

NATIONAL UNIVERSITY



Syllabus

Subject: B. Sports

Three Years B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: B. Sports
Session: 2013-2014

Course content and marks distribution

B. Sports (Arts):

| Paper Code | Paper | Paper Title | Marks | Credits |
|---|--------------|---|--------------|----------------|
| First Year | | | | |
| 114601 | Paper-I | Science of Sports Training | 100 | 4 |
| 114603 | Paper-II | Exercise Physiology & Sports Biomechanics | 100 | 4 |
| Second Year | | | | |
| 124601 | Paper-III | Sports Psychology | 100 | 4 |
| 124603 | Paper-IV | Sports Nutrition, Care & Prevention of Sports Injuries & Sports Management | 100 | 4 |
| Third Year | | | | |
| Any Two Paper (One Theory and One Practical) | | | | |
| 134601 | Paper-V | Sport/Game (Hokey) (Theory) | 100 | 4 |
| 134602 | Paper-VI | Sport/Game (Hokey) (Practical) | 100 | 4 |
| 134603 | Paper-V | Sport/Game (Cricket) (Theory) | 100 | 4 |
| 134604 | Paper-VI | Sport/Game (Cricket) (Practical) | 100 | 4 |
| 134605 | Paper-V | Sport/Game (Football) (Theory) | 100 | 4 |
| 134606 | Paper-VI | Sport/Game (Football) (Practical) | 100 | 4 |
| 134607 | Paper-V | Sport/Game (Basketball) (Theory) | 100 | 4 |
| 134608 | Paper-VI | Sport/Game (Basketball) (Practical) | 100 | 4 |
| 134609 | Paper-V | Sport/Game (Tennis) (Theory) | 100 | 4 |
| 134610 | Paper-VI | Sport/Game (Tennis) (Practical) | 100 | 4 |
| 134611 | Paper-V | Sport/Game (Boxing) (Theory) | 100 | 4 |
| 134612 | Paper-VI | Sport/Game (Boxing) (Practical) | 100 | 4 |
| 134613 | Paper-V | Sport/Game (Shooting) (Theory) | 100 | 4 |
| 134614 | Paper-VI | Sport/Game (Shooting) (Practical) | 100 | 4 |
| 134615 | Paper-V | Sport/Game (Gymnastics) (Theory) | 100 | 4 |
| 134616 | Paper-VI | Sport/Game (Gymnastics) (Practical) | 100 | 4 |
| 134617 | Paper-V | Sport/Game (Swimming) (Theory) | 100 | 4 |
| 134618 | Paper-VI | Sport/Game (Swimming) (Practical) | 100 | 4 |
| 134619 | Paper-V | Sport/Game (Track and Field) (Theory) | 100 | 4 |
| 134620 | Paper-VI | Sport/Game (Track and Field) (Practical) | 100 | 4 |
| | | Total= | 600 | 24 |

Detailed Syllabus First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------------|-------|---------|
| 114601 | Paper-I | Science of Sports Training | 100 | 4 |

1. Introduction:

- Basic concept of sport training;
- Principle of sport training;
- Training means.

2. Training load:

- Definition of training load, Inner load and outer load;
- Factors of training load;
- Overload – symptoms, causes and remedies.

3. Training methods:

- Methods based on continuous principle;
- Methods based on interval principle;
- Circuit training, Weight training.

4. Fitness:

- Concept of a) Total fitness, b) Physical fitness c) Motor fitness.
- Components of motor fitness: (Strength, Speed, Endurance, Agility, Flexibility)
- Coordinative components of fitness: (Orientation, Adaptation, Reaction ability, Differentiation, Coupling, Balance, Rhythm).

5. Technique:

- Concept of Technique, Skill and Style;
- Stages of Technique learning (First phase of rough coordination, Second phase of fine coordination and Third phase of automatic execution).
- Principles of technique training.

6. Planning:

- Basic concept of planning of training;
- Principles of planning;
- Planning of Micro-, Meso- and Macro cycles.

Reference:

1. Frank Dick : Sports Training Principles
2. Hardayal Singh : Science of Sports Training
3. A. K Uppal : Principle of Sports Training
4. V. L. Garry Kumar,
Mamta Manjari Panda : Modern Principles of Athletic Training.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 114603 | Paper-II | Exercise Physiology & Sports Biomechanics | 100 | 4 |

Part A: Exercise Physiology

- 1. Introduction:** Historical background of exercise physiology: Importance of exercise physiology in sports.
- 2. a) Cells; Tissues and Organ:**
 - Cell structure of living organism;
 - Chemical composition;
 - b) Tissue:** Aggregation of cells and their derivatives of performing specific function;
 - c) Organ:** Aggregation of various types of tissues for specific function of organ.
- 3. Introduction of different systems of human body:** Skeleton system; Muscular system; Respiratory system; Cardiovascular system; Nervous system; Endocrine system; Digestive system.
- 4. Muscle contraction:**
 - Types of muscle contraction: Isometric, Isotonic, Eccentric and Concentric.
 - Slow twitch and fast twitch fibers; Distribution of slow and fast twitch fibers. Characteristics and importance of slow and fast twitch fibers; Adaptational changes due to different fitness training; Muscle hypertrophy.
- 5. Respiratory system:** Introduction and overview of the system; Respiratory muscles; Mechanism and function of the respiratory muscles.

Pulmonary capacities; Tidal volume; Vital capacity; Residual volume; Forced expiratory volume; Lung volume; Volume of maximum oxygen uptake; Adaptational changes due to exercise.

Pulmonary ventilation; Exchange of gases in lung and transport of oxygen in blood; Transport of Carbon di oxide; Exchange of gases at he tissue level.

Reference:

1. C.C. Chatterjee : Human Physiology
2. Jack H. Williams : Physiology of Sport and Exercise
3. Jack H. Wilmore : Physiology of Sports
4. Mathew & Fox : Physiology of Exercise
5. McArdle, Catch, Catch : Exercise Physiology

Part B: Sport Biomechanics

1. Introduction:

- Basic concept;
- Historical background;
- Importance in games and sports.

2. Kinesiology:

- Meaning and relation with sport biomechanics;
- Planes and axes for human motion;
- Fundamental movements around the joints.

3. Kinematics:

- Motion: definition and type;
- Kinematic parameters of linear and angular motion: Displacement, Speed; Velocity; Acceleration.
- Relation between linear and angular motion parameters.

4. Kinetics:

- Newton's laws of motion and their application in sports.

5. Machine function of human body:

- Lever: Definition; components, types, mechanical functions, skeletal levers.
- Wheel & axle: Definition, type, mechanical function, Wheel & Axle arrangements in human body.

6. Equilibrium:

- Definition, type and conditions of equilibrium;
- Factors affecting degree of stability.

Reference:

1. M. Gladly Scott : Analysis of Human Motion
2. Luttgens and Wells : Kinesiology
3. J. Dyson : Mechanics of Athletics
4. Petter McGinnis : Biomechanics of Sport and Exercise

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-------------------|-------|---------|
| 124601 | Paper-III | Sports Psychology | 100 | 4 |

1. Introduction:

- Meaning of Psychology and Sport Psychology;
- Importance of sport psychology;
- Meaning of growth and development;
- Psychological characteristics of growth and development.

2. Motor learning:

- Definition of learning and motor learning;
- Factors affecting motor learning;
- Selected theories of motor learning: Conditioned response; Insight; Trial and Error.

3. Emotion and sport performance:

- Anxiety: meaning and type: effect of anxiety on sport performance

4. Personality and sport performance:

- Definition of personality.
- Nature of personality.
- Sport participation and personality.

5. Motivation in sport:

- Meaning of motivation
- Types of motivation (Extrinsic and Intrinsic)
- Goal setting – and effective technique of motivation.

Reference:

1. M. L. Kaamlesh : Psychology in Physical Education and Sports
2. Agyajit Singh : Sports Psychology
3. R. May and Michel J. Asken : Sports Psychology
4. Jhelma S. Horn : Advance Sport Psychology

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 124603 | Paper-IV | Sports Nutrition, Care & Prevention of Sports Injuries & Sports Management | 100 | 4 |

Part A: Sports Nutrition, Care & Prevention of Sports Injuries

1. **Introduction:** Basic concept and importance in sports;

2. Nutrition:

- Concept of nutrition, Diet, Calorie, Energy balance.
- Components of nutrition – Carbohydrate, Fat Protein, Mineral, Vitamins, Water Fibers.

3. **Nutrient balance:** Weight control; Balance diet; Pre competition and competition and post competition. Meals, Diets for athletes of different age, sex and activity.

4. **First Aid:** Definition and Principles of First Aid.

5. **Injury management:** Soft tissue injuries of knee and ankle; rehabilitation of injuries; Injury Management program: Water training; Weight training; cycling; walking; Relaxation. Prevention of injuries through fitness; Warm up and treatment.

Reference:

1. Sue Rodwell Williams : Essentials of Nutrition and Diet Therapy
2. Nancy Clark : Sports Nutrition Guidebook
3. Malinda J. Flegel : Sport First Aid.

Part B: Sports Management**1. Concept of Sports Management**

- Introduction to Sports Management
- What is Sports Management
- Function of Sports Management
- Competency based approach and impements in Sports and Physical Education

2. Organization and Management in Sports

- Organization in sports
- Management of Sports in School. Colleges and Universites, Inter-University, District, Intra mural extra mural, National and International level.
- Roles and responsibilities of efficient managers.

3. Leadership in Sports Management

- Defination of Leadership
- Types and Importance of leadership in Sports
- Quality of good leader - Creativity, Innovation and Motivation
- Difference between Democratic and Autocratic leadership
- Communications
- Importance of communications in leadership

4. Ethics in Sports Management

- Decision making in Sports
- Types of Decision
- Decision makers
- Effective decision making
- Smart choices

5. Preparation of Planning and Budget

- Planning and Budget
- Types of Planning and Budget
- Qualities of Ferature of good plan
- Nature of General characteristics of Planning
- Various steps in Planning
- Advantage and disadvantage of Planning
- Preparation of budget, Collection fund, Purchase of Sports goods and their Preservation.

Reference:

1. Dr. Abdul Awal Khan and Abu Bokkor Siddikey : Management
2. Cerfo (10th Edition) : Mordern Management
3. S. S. Roy. : Sports Management
4. Harold J. Vanclerzwaag : Sports Management in School & College
5. Mcgrow Hill : Management & Organization

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-----------------------------|--------------|----------------|
| 134601 | Paper-V | Sport/Game (Hokey) (Theory) | 100 | 4 |

1. Historical Development

- History of the game Hockey from ancient times to the present.
- History of Hockey in Bangladesh.

2. Rules and regulations of the game Hockey.**3. Fundamental techniques of the game Hockey:** definition, types and methods of execution of (i) Hitting, (ii) Receiving, (iii) Pushing, (iv) Scooping, (v) Flicking, (vi) Passing, (vii) Tackling, (viii) Dribbling and Dodging, (ix) Goal keeping.**4. Warming up:** (i) Definition, (ii) Types, (iii) Need and importance, (iv) Advantage and disadvantages, (v) Important factors to be noted during warming up.**5. Systems of play**

- Definition
- Different formation : 3-3-4-1/4-2-4/3-3-3-1-1
- Qualities and responsibilities of players in each formation.

6. Qualities of players

- Personal qualities.
- Qualities and efficiencies of players as per position.

7. Defensive and attacking principles

- Attacking principles : (i) Width in attack; (ii) Penetration in attach; (iii) Mobility in attack; (iv) Improvisation in attack.
- Principles for defense : (i) Delay in defense; (ii) Cover in defense; (iii) Concentration in defense; (iv) Control in defense.

Reference :

1. Mike Craig : *Modern Hockey for Juniors*
2. Deepak Jain : *Teaching and Coaching Hockey*
3. Md. Kaosar Ali : *Hockey Khelar Pratham Path*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--------------------------------|-------|---------|
| 134602 | Paper-VI | Sport/Game (Hokey) (Practical) | 100 | 4 |

1. Physical Fitness

- (i) Strength;
- (ii) Speed;
- (iii) Endurance;
- (iv) Agility;
- (v) Flexibility

2. Basic Techniques of the game:

- (i) Hitting, (ii) Receiving, (iii) Pushing, (iv) Scooping, (v) Flicking, (vi) Passing, (vii) Tackling, (viii) Dribbling and Dodging, (ix) Goal keeping.

3. Overall performance;
4. Application of the systems and formation of play;
5. Principles of attack and defense;
6. Match analysis;
7. Practical notebook and viva.

Marks Distribution :

| | | |
|--|---|------------|
| 1. Test for Physical fitness | - | 15 |
| 2. Test for basic techniques | - | 30 |
| 3. Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. Application of rules of the game | - | 10 |
| 5. Practical note book and viva-voce | - | 20 |
| Total = | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-------------------------------|--------------|----------------|
| 134603 | Paper-V | Sport/Game (Cricket) (Theory) | 100 | 4 |

1. **Historical Development**

- a. History of the game Cricket from ancient times to the present.
- b. History of Cricket in Bangladesh.
- c. International tournaments in cricket.

2. Terminologies of cricket.

3. Warm up (Definition, Importance, Types, Advantages, Factors to be noted during warming up).

4. **Fundamental techniques of the Cricket :**

- Bowling : (Basic bowling action-Grip, run up, delivery, follow through, swing, cutter, definition importance and types of spin)
- Batting : (Grip, Stance, Forward and backward defense, Off drive, Square Cut, Pull).
- Wicket keeping.
- Fielding (Defensive and attacking : Catching and Throwing).

5. Rules of the game Cricket and their application.

6. Captaincy.

Reference :

1. Keith Andrew : *Coaching Cricket*
2. Keith Andrew : *The Handbook of Cricket*
3. Mahinder : *Learn to Play Good Cricket*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|----------------------------------|--------------|----------------|
| 134604 | Paper-VI | Sport/Game (Cricket) (Practical) | 100 | 4 |

1. **Physical fitness :** (Students will be tested in any two)

- (i) Strength;
- (ii) Speed;
- (iii) Endurance;
- (iv) Agility;
- (v) Flexibility.

2. Individual skill :

(i) Batting; (ii) Grip, (iii) Stance, (iv) Forward and Backward defense, (v) Off drive, (vi) Square cut, (vii) Pull.

3. Bowling :

(i) In swing, (ii) Out swing, (iii) Off break, (iv) Googly.

4. Fielding and Wicket keeping.

5. Running between the wickets.

6. Captaincy.

7. Team tactics.

8. Practical note books and Viva.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------------------|--------------|----------------|
| 134605 | Paper-V | Sport/Game (Football) (Theory) | 100 | 4 |

1. History of Football from ancient times to the present

2. History of Football in Bangladesh.

3. National and International football tournaments.

4. Organizational set up of Football in Bangladesh.

5. Rules of Football game (FIFA).

6. **Warming up :** (i) Definition, (ii) Importance, (iii) Types, (iv) Advantages, (v) Factors to be noted during warming up.

7. Fundamental techniques (Definition, importance, types and methods of execution) of (i) Kicking, (ii) Receiving, (iii) Dribbling, (iv) Feinting, (v) Passing, (vi) Heading, (vii) Tackling, (viii) Goal keeping.

8. **Systems of play**

Basic concept of systems/formations of play;

Types of formation : (2-4-4-1/4-2-4-1/2-4-3-1)

Duties and responsibilities of the players for implementing the formations of play.

Advantages and disadvantages of each type of formation.

9. Qualities of the players :

(i) Qualities according to the position;

(ii) Individual specific qualities of the players.

10. Attacking and defensive principles

Attacking principles : (i) Width in attack, (ii) Penetration in attack, (iii) Depth in attack, (iv) Mobility in attack, (v) Improvisation in attack.

Defensive principles : (i) Delay in defense, (ii) Cover in defense, (iii) Concentration in defense (iv) Control in defense.

11. Match analysis : Definition; Importance; Match analysis of different level.

Reference :

1. Nick Whitehead & Malcolm Cork : *Soccer Training*
2. Nelson McAvoy : *Teaching Soccer Fundamentals*
3. Deepak Jain : *Teaching and Coaching Football*
4. Peter Treadmill : *Skillful Soccer*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-----------------------------------|-------|---------|
| 134606 | Paper-VI | Sport/Game (Football) (Practical) | 100 | 4 |

1. Physical fitness : (Students will be tested in any two)

(i) Strength;

(ii) Speed;

(iii) Endurance;

(iv) Agility;

(v) Flexibility.

2. Individual skill : (Students will be tested in any five)

(i) Kicking; (ii) Receiving, (iii) Dribbling, (iv) Feinting, (v) Heading, (vi) Passing, (vii) Tackling, (viii) Throw in, (ix) Goal keeping.

3. Overall performance (During match between two teams);

4. Application of the systems/formation of play;
5. Defensive and attacking principles;
6. Match analysis;
7. Practical note books and Viva.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------------------|-------|---------|
| 134607 | Paper-V | Sport/Game (Basketball) (Theory) | 100 | 4 |

1. History of Basketball game :

- i) Basketball in Bangladesh;
- ii) World Basketball;
- iii) Structure of Basketball administration;

2. Rules of Basketball (FIBA).

3. Warming up and cool down :

- i) Definition;
- ii) Use of warming up and cool down;
- iii) Advantages and disadvantages of warming up and cool down;

4. Techniques of Basketball game :

- i) Passing and receiving;
- ii) Dribbling;
- iii) Rebound;
- iv) First break;
- v) Screening;
- vi) Shooting.

5. Qualities of a basketball player : a) Physical; b) Tactical

6. Formation of games or set play.

Reference :

1. Douchant : *College Basketball*
2. Bunn : *Basketball Teaching and Play*
3. O.P. Sharma : *Coaching Basketball*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------------------------|-------|---------|
| 134608 | Paper-VI | Sport/Game (Basketball) (Practical) | 100 | 4 |

1. Physical fitness (Strength; Endurance; Speed; Agility; Flexibility; Reaction time).
 - (i) Strength;
2. Individual defense.
3. Team defense : (a) Zone defense; (b) Man to man defense; (c) Combine defense
4. Individual attack.
5. Team attack (Formation game or set play).
6. Practical note book.

Marks Distribution :

| | | |
|--|---|------------|
| 1. Test for Physical fitness | - | 15 |
| 2. Test for basic techniques | - | 30 |
| 3. Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. Application of rules of the game | - | 10 |
| 5. Practical note book and viva-voce | - | 20 |
| Total = | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|------------------------------|-------|---------|
| 134609 | Paper-V | Sport/Game (Tennis) (Theory) | 100 | 4 |

1. **History of Tennis:** (a) Bangladesh; (b) International.

2. Organizational set up of Bangladesh Tennis Federation.
3. Rules of Tennis (ITF)
4. **Warming up and cooling down** : (a) Definition; (b) Advantage; (c) Disadvantage.
5. **Techniques and tactics of Tennis** :
(a) Service; (b) Fore hand stroke; (c) Back hand stroke; (d) Volley; (e) Smash.
6. **Systems of Tennis game** : (a) Definition; (b) Different systems of tennis.
7. Attacking techniques.
8. Defensive techniques.
9. **Tactics of Tennis** :
(a) Approach shot; (b) Service and volley; (c) Counter attack; (d) Back-line game; (e) Play at the net; (f) Puffing shot.

Reference :

1. Deepak Jain : *Teaching and Coaching Tennis*
2. M. Barrie Richmond : *Total Tennis*
3. Paul Metzler : *Advanced Tennis*
4. Bill. Murphy. Chet Murphy : *Tennis Hand Book*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|---------------------------------|--------------|----------------|
| 134610 | Paper-VI | Sport/Game (Tennis) (Practical) | 100 | 4 |

1. Physical fitness :
(a) Strength;
(b) Endurance;
(c) Speed;
(d) Flexibility;
(e) Agility;
(f) Reaction time.
2. Individual skills.
3. Tactics and strategy of tennis game.
4. Game.
5. Practical note book.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|------------------------------|--------------|----------------|
| 134611 | Paper-V | Sport/Game (Boxing) (Theory) | 100 | 4 |

- History of Boxing :** (a) Bangladesh; (b) Olympic; (c) International.
- Organizational set up of Boxing :
(a) Bangladesh; (b) Olympic; (c) International.
- Rules of Boxing (Olympic and International).
- Techniques and skills of Boxing :**
(a) Punch; (b) Jab; (c) Hook; (d) Cut; (i) Definition (ii) Importance; (iii) Types.
- Warm up and Cool down :**
(a) Definition; (b) Requirement; (c) Importance; (d) Advantage; (e) Disadvantage.
- Boxing attacking system :**
a) Different types of attack; (b) Advantage and disadvantage of different systems.
- Different types of defense.
- Physical fitness of a boxer.
- Quality of a good boxer.

Reference :

- Bob Mee : *Boxing*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|---------------------------------|--------------|----------------|
| 134612 | Paper-VI | Sport/Game (Boxing) (Practical) | 100 | 4 |

1. Physical fitness :

(a) Strength;

(b) Speed;

(c) Flexibility;

(d) Agility;

(e) Endurance;

(f) Coordination.

2. **Basic Techniques:** Individual defense; Peace; Slip; Step back; Ducking; Lay back; Block.

3. Attacking techniques and tactics.

4. Defensive techniques and tactics.

5. Application if rules during ring fight.

6. Practical note book.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------------------|--------------|----------------|
| 134613 | Paper-V | Sport/Game (Shooting) (Theory) | 100 | 4 |

1. Historical development of Shooting as a sport;

2. Description of a shooting range of International standard (including all events);

3. Description of all the events of shooting for International level of competition;

4. Description of the dress, materials and equipments for shooting;
5. Influence of psychological aspects, balance and readiness in shooting;
6. (i) Description of the events for men and women in 10m range. Total number of points in this event;
 (ii) Description of the events for men and women in 50m range. Total number of points in this event;
 (iii) Description of the events for men and women in 25m range. Total number of points in this event;
7. Description of the most effective techniques for standing, kneeling and prone positions;
8. Description of the safety rules imposed by World Shooting Federation for the safety of the shooting ranger;
9. Difference between the conventional arms and the arms used in shooting;
10. Description the organizational and function of the International Shooting Federation;
11. Detailed explanation of the reality for achieving highest level of success and the importance of shooting at the target.

Reference :

Official Status, Rules and regulations - *International Shooting Sport Federation*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-----------------------------------|--------------|----------------|
| 134614 | Paper-VI | Sport/Game (Shooting) (Practical) | 100 | 4 |

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------------------|-------|---------|
| 134615 | Paper-V | Sport/Game (Gymnastics) (Theory) | 100 | 4 |

- History of Gymnastics :** (a) Bangladesh; (b) International; (c) Olympic.
- Organizational set up of gymnastics.
- Code of points of gymnastics (Rules).
- Physical fitness for gymnastics :**
 - Strength, Endurance, agility, flexibility, speed, coordination.
 - Qualities of a good gymnast.
- Techniques of different skills of gymnastics**
 - Floor; (b) Parallel bar; (c) Horizontal bar; (d) Roman ring; (e) Vaulting horse; (f) Pummelled horse; (g) Balance beam; (h) Uneven bar (Girls); (i) Side horse.
- Warm up and cool down :** (a) Reasons of warming up; (b) Advantages.
- Safety measures during gymnastics practice.

Reference :

- Gurdial Singh Bawa : *Fundamentals of Men's Gymnastics*
- Samiran Chakraborty : *Women's Gymnastics*
- Pintu Modak : *Coaching Gymnastics*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------------------------|-------|---------|
| 134616 | Paper-VI | Sport/Game (Gymnastics) (Practical) | 100 | 4 |

- Physical fitness : (a) Strength; (b) Speed; (c) Flexibility; (d) Agility; (e) Endurance; (f) Coordination.
- Warming up and cool down- (i) General; (ii) Specific for gymnasts.
- Technique-
 - a) Floor, b) Side horse, c) Uneven bar, d) Pummelled horse, e) Balance beam, f) Roman ring.
 - a) Vaulting horse, b) Parallel bar, c) Side horse, d) Horizontal bar.
- Practical note book.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------------------|--------------|----------------|
| 134617 | Paper-V | Sport/Game (Swimming) (Theory) | 100 | 4 |

1. Introduction :

- i) Historical background of swimming;
- ii) History of swimming in Bangladesh;
- iii) History of swimming in Olympic games; Asian games; SAF games; National swimming competition.
- iv) History of Water Polo.

2. Organization and administration of swimming :

- i) Definition;
- ii) Need and importance of organization and administration;
- iii) Principles of organization;
- iv) Organizational set up;
- v) Qualities of a good administrator;
- vi) Organizing swimming competitions.

3. Lay out of swimming pool and diving pool.**4. Rules of International competition in swimming :** (a) Arranging swimming competition; (b) Officials; (c) Stroke mechanism-Free style, Breaststroke, Back stroke, Butterfly.**5. Training theory :** (i) Principles and purpose of training; (ii) Types of training-Continuous training; Interval training; Repetition training; Sprint training; Set training; Pace training.

6. **Additional methods** : (i) Weight training; (ii) Strength training – (a) with ones own body weight and (b) with additional weight (c) Circuit training; Training for flexibility.
7. Physique of swimmers; selection of talents.
8. **Health and nutrition of swimmers** :
 - i) Diet one week before the competition;
 - ii) Diet just before the competition;
 - iii) Diet during competition;
 - iv) Medical check up.
9. **Drill training** : (i) Free style; (ii) Breaststroke; (iii) Backstroke; (iv) Butter fly.
10. Warming up for swimming.
11. **Water Polo** : (i) Water polo pool; (ii) Goal; (iii) Ball; (iv) Cap, (v) Official; (vi) Timer; (vii) Start of play; (viii) Corner throw; (ix) Ordinary fouls; (x) Major fouls; (xi) Penalty throw; (xii) Extra time; (xiii) Referee.
12. **Rules of diving** : (i) Diving competition; (ii) Referee; (iii) Marking; (iv) Age specific diving; (v) Score sheet for diving.

Reference :

1. Torney : *Swimming*
2. James E. Counsilman : *The Science of Swimming*
3. Billingeley : *Diving Illustrated*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-----------------------------------|--------------|----------------|
| 134618 | Paper-VI | Sport/Game (Swimming) (Practical) | 100 | 4 |

1. Physical fitness :
 - (a) Strength;
 - (b) Agility;
 - (c) Flexibility;
 - (d) Endurance;
 - (e) Speed.
2. Individual skill for the techniques in :
 - Free style.

- Brest stroke.
 - Back stroke.
 - Butterfly.
3. Individual skill for water polo : Ball throw; Overall performance; Spring; Passing; Dribbling; Attacking; Defense.
 4. Officiating for water Polo and Diving.
 5. Practical note book.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|---------------------------------------|-------|---------|
| 134619 | Paper-V | Sport/Game (Track and Field) (Theory) | 100 | 4 |

1. Introduction :

- Definition;
- Historical background of Track and Field Athletics;
- Role of Athletics in ancient and modern Olympics :
- History of Women Athletics;
- History of Athletics in Bangladesh;
- Olympic games, Asian games, SAF games, National Championship.

2. Organization and Administration of Track and Field :

- Concept and definition;
- Principles of organization;
- Organizational set up;
- Need for organization and administration;
- Qualities of good administrator;
- Administrative set up;

- Organizing Track and Field Athletic Meet.
- 3. Lay out of Athletic track.
- 4. General rules of International Athletic competitions.
- 5. Training theory : (a) Principles and purpose of training; (b) Types of training for running – Continuous methods (i) Continuous running; (ii) Fartlek; (iii) Hill running.
- 6. (i) Interval method; (ii) Repetition method; (iii) Pace work; (iv) Competitive pace.
- 7. **Helping methods** : (i) Weight training; (ii) Gymnastic exercise; (iii) Different types of jumping; (iv) Circuit training; (v) Total training.
- 8. Additional aspects : (i) Health; (ii) Diet; (iii) Medical check up.
- 9. Theory of Athletic events : (i) Track events; (ii) Field events.
- 10. **Running events, types and characteristics** :
(i) Sprint; (ii) Middle distance; (iii) Long middle distance; (iv) Long distance; (v) Factors influencing running events- Stride frequency, power, stride length, endurance, technique, physique of the sprinters, evaluation tests Rules.
- 11. **Jumping events** :
(i) Basic Characteristic and types of jumps; (ii) Important factors; (iii) Approach; (iv) Take-off; (v) Hight and Landing; (vi) Physique of the jumpers; (vii) Technique and style (viii) Evaluation test; (ix) Rules.
- 12. **Throwing events**
(i) Basic characteristics and types of jumps; (ii) Important factors; (iii) Technical features; (iv) Physique of the throwers; (v) Techniques and style; (vi) Evaluation test ; (vii) Rules.

Reference :

- 1. Kleff & Arnheim : *Modern Principles of Athletic Training*
- 2. G. Dyson : *Mechanics of Athletics*
- 3. Deepak Jain : *Coaching Track & Field*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 134620 | Paper-VI | Sport/Game (Track and Field) (Practical) | 100 | 4 |

- 1. **Physical fitness** : (a) Strength; (b) Speed; (c) Endurance; (d) Agility;

- (e) Flexibility.
2. Basic techniques.
 3. Overall efficiency.
 4. Rules of Track and Field Athletics .
 5. Practical note book.

Marks Distribution :

| | | | |
|----------------|--|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

B. Sports (Science):

| Paper Code | Paper | Paper Title | Marks | Credits |
|---|------------|--|-------|---------|
| First Year | | | | |
| 114601 | Paper-I | Science of Sports Training | 100 | 4 |
| 114603 | Paper-II | Exercise Physiology & Sports Biomechanics | 100 | 4 |
| Second Year | | | | |
| 124601 | Paper-III | Sports Psychology | 100 | 4 |
| 124603 | Paper-IV | Sports Nutrition, Care & Prevention of Sports Injuries & Sports Management | 100 | 4 |
| Third Year | | | | |
| Any Two Paper (One Theory and One Practical) | | | | |
| 134601 | Paper-V | Sport/Game (Hokey) (Theory) | 100 | 4 |
| 134602 | Paper-VI | Sport/Game (Hokey) (Practical) | 100 | 4 |
| 134603 | Paper-V | Sport/Game (Cricket) (Theory) | 100 | 4 |
| 134604 | Paper-VI | Sport/Game (Cricket) (Practical) | 100 | 4 |
| 134605 | Paper-V | Sport/Game (Football) (Theory) | 100 | 4 |
| 134606 | Paper-VI | Sport/Game (Football) (Practical) | 100 | 4 |
| 134607 | Paper-V | Sport/Game (Basketball) (Theory) | 100 | 4 |
| 134608 | Paper-VI | Sport/Game (Basketball) (Practical) | 100 | 4 |
| 134609 | Paper-V | Sport/Game (Tennis) (Theory) | 100 | 4 |
| 134610 | Paper-VI | Sport/Game (Tennis) (Practical) | 100 | 4 |
| 134611 | Paper-V | Sport/Game (Boxing) (Theory) | 100 | 4 |
| 134612 | Paper-VI | Sport/Game (Boxing) (Practical) | 100 | 4 |
| 134613 | Paper-V | Sport/Game (Shooting) (Theory) | 100 | 4 |
| 134614 | Paper-VI | Sport/Game (Shooting) (Practical) | 100 | 4 |
| 134615 | Paper-V | Sport/Game (Gymnastics) (Theory) | 100 | 4 |
| 134616 | Paper-VI | Sport/Game (Gymnastics) (Practical) | 100 | 4 |
| 134617 | Paper-V | Sport/Game (Swimming) (Theory) | 100 | 4 |
| 134618 | Paper-VI | Sport/Game (Swimming) (Practical) | 100 | 4 |
| 134619 | Paper-V | Sport/Game (Track and Field) (Theory) | 100 | 4 |
| 134620 | Paper-VI | Sport/Game (Track and Field) (Practical) | 100 | 4 |
| 134622 | Paper- VII | Sport Science (Practical) | 100 | 4 |
| | | Total= | 700 | 28 |

Detailed Syllabus First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------------|-------|---------|
| 114601 | Paper-I | Science of Sports Training | 100 | 4 |

1. Introduction:

- Basic concept of sport training;
- Principle of sport training;
- Training means.

2. Training load:

- Definition of training load, Inner load and outer load;
- Factors of training load;
- Overload – symptoms, causes and remedies.

3. Training methods:

- Methods based on continuous principle;
- Methods based on interval principle;
- Circuit training, Weight training.

4. Fitness:

- Concept of a) Total fitness, b) Physical fitness c) Motor fitness.
- Components of motor fitness: (Strength, Speed, Endurance, Agility, Flexibility)
- Coordinative components of fitness: (Orientation, Adaptation, Reaction ability, Differentiation, Coupling, Balance, Rhythm).

5. Technique:

- Concept of Technique, Skill and Style;
- Stages of Technique learning (First phase of rough coordination, Second phase of fine coordination and Third phase of automatic execution).
- Principles of technique training.

6. Planning:

- Basic concept of planning of training;
- Principles of planning;
- Planning of Micro-, Meso- and Macro cycles.

Reference:

1. Frank Dick : Sports Training Principles
2. Hardayal Singh : Science of Sports Training
3. A. K Uppal : Principle of Sports Training
4. V. L. Garry Kumar,
Mamta Manjari Panda : Modern Principles of Athletic Training.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 114603 | Paper-II | Exercise Physiology & Sports Biomechanics | 100 | 4 |

Part A: Exercise Physiology

- 1. Introduction:** Historical background of exercise physiology: Importance of exercise physiology in sports.
- 2. a) Cells; Tissues and Organ:**
 - Cell structure of living organism;
 - Chemical composition;
 - b) Tissue:** Aggregation of cells and their derivatives of performing specific function;
 - c) Organ:** Aggregation of various types of tissues for specific function of organ.
- 3. Introduction of different systems of human body:** Skeleton system; Muscular system; Respiratory system; Cardiovascular system; Nervous system; Endocrine system; Digestive system.
- 4. Muscle contraction:**
 - Types of muscle contraction: Isometric, Isotonic, Eccentric and Concentric.
 - Slow twitch and fast twitch fibers; Distribution of slow and fast twitch fibers. Characteristics and importance of slow and fast twitch fibers; Adaptational changes due to different fitness training; Muscle hypertrophy.
- 5. Respiratory system:** Introduction and overview of the system; Respiratory muscles; Mechanism and function of the respiratory muscles.

Pulmonary capacities; Tidal volume; Vital capacity; Residual volume; Forced expiratory volume; Lung volume; Volume of maximum oxygen uptake; Adaptational changes due to exercise.

Pulmonary ventilation; Exchange of gases in lung and transport of oxygen in blood; Transport of Carbon di oxide; Exchange of gases at he tissue level.

Reference:

6. C.C. Chatterjee : Human Physiology
7. Jack H. Williams : Physiology of Sport and Exercise
8. Jack H. Wilmore : Physiology of Sports
9. Mathew & Fox : Physiology of Exercise
10. McArdle, Catch, Catch : Exercise Physiology

Part B: Sport Biomechanics

1. Introduction:

- Basic concept;
- Historical background;
- Importance in games and sports.

2. Kinesiology:

- Meaning and relation with sport biomechanics;
- Planes and axes for human motion;
- Fundamental movements around the joints.

3. Kinematics:

- Motion: definition and type;
- Kinematic parameters of linear and angular motion: Displacement, Speed; Velocity; Acceleration.
- Relation between linear and angular motion parameters.

4. Kinetics:

- Newton's laws of motion and their application in sports.

5. Machine function of human body:

- Lever: Definition; components, types, mechanical functions, skeletal levers.
- Wheel & axle: Definition, type, mechanical function, Wheel & Axle arrangements in human body.

6. Equilibrium:

- Definition, type and conditions of equilibrium;
- Factors affecting degree of stability.

Reference:

5. M. Gladly Scott : Analysis of Human Motion
6. Luttgens and Wells : Kinesiology
7. J. Dyson : Mechanics of Athletics
8. Petter McGinnis : Biomechanics of Sport and Exercise

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-------------------|-------|---------|
| 124601 | Paper-III | Sports Psychology | 100 | 4 |

1. Introduction:

- Meaning of Psychology and Sport Psychology;
- Importance of sport psychology;
- Meaning of growth and development;
- Psychological characteristics of growth and development.

2. Motor learning:

- Definition of learning and motor learning;
- Factors affecting motor learning;
- Selected theories of motor learning: Conditioned response; Insight; Trial and Error.

3. Emotion and sport performance:

- Anxiety: meaning and type: effect of anxiety on sport performance

4. Personality and sport performance:

- Definition of personality.
- Nature of personality.
- Sport participation and personality.

5. Motivation in sport:

- Meaning of motivation
- Types of motivation (Extrinsic and Intrinsic)
- Goal setting – and effective technique of motivation.

Reference:

5. M. L. Kaamlesh : Psychology in Physical Education and Sports
6. Agyajit Singh : Sports Psychology
7. R. May and Michel J. Asken : Sports Psychology
8. Jhelma S. Horn : Advance Sport Psychology

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 124603 | Paper-IV | Sports Nutrition, Care & Prevention of Sports Injuries & Sports Management | 100 | 4 |

Part A: Sports Nutrition, Care & Prevention of Sports Injuries

6. Introduction: Basic concept and importance in sports;

7. Nutrition:

- Concept of nutrition, Diet, Calorie, Energy balance.
- Components of nutrition – Carbohydrate, Fat Protein, Mineral, Vitamins, Water Fibers.

8. Nutrient balance: Weight control; Balance diet; Pre competition and competition and post competition. Meals, Diets for athletes of different age, sex and activity.

9. First Aid: Definition and Principles of First Aid.

10. Injury management: Soft tissue injuries of knee and ankle; rehabilitation of injuries; Injury Management program: Water training; Weight training; cycling; walking; Relaxation. Prevention of injuries through fitness; Warm up and treatment.

Reference:

- | | |
|-------------------------|--|
| 4. Sue Rodwell Williams | : Essentials of Nutrition and Diet Therapy |
| 5. Nancy Clark | : Sports Nutrition Guidebook |
| 6. Malinda J. Flegel | : Sport First Aid. |

Part B: Sports Management**1. Concept of Sports Management**

- Introduction to Sports Management
- What is Sports Management
- Function of Sports Management
- Competency based approach and impements in Sports and Physical Education

2. Organization and Management in Sports

- Organization in sports
- Management of Sports in School. Colleges and Universites, Inter-University, District, Intra mural extra mural, National and International level.
- Roles and responsibilities of efficient managers.

3. Leadership in Sports Management

- Defination of Leadership
- Types and Importance of leadership in Sports
- Quality of good leader - Creativity, Innovation and Motivation
- Difference between Democratic and Autocratic leadership
- Communications
- Importance of communications in leadership

4. Ethics in Sports Management

- Decision making in Sports
- Types of Decision
- Decision makers
- Effective decision making
- Smart choices

5. Preparation of Planning and Budget

- Planning and Budget
- Types of Planning and Budget
- Qualities of Ferature of good plan
- Nature of General characteristics of Planning
- Various steps in Planning
- Advantage and disadvantage of Planning
- Preparation of budget, Collection fund, Purchase of Sports goods and their Preservation.

Reference:

6. Dr. Abdul Awal Khan and Abu Bokkor Siddikey : Management
 7. Cerfo (10th Edition) : Mordern Management
 8. S. S. Roy. : Sports Management
 9. Harold J. Vanclerzwaag : Sports Management in School & College
 10. Mcgrow Hill : Management & Organization

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-----------------------------|--------------|----------------|
| 134601 | Paper-V | Sport/Game (Hokey) (Theory) | 100 | 4 |

1. Historical Development

- History of the game Hockey from ancient times to the present.
- History of Hockey in Bangladesh.

2. Rules and regulations of the game Hockey.**3. Fundamental techniques of the game Hockey:** definition, types and methods of execution of (i) Hitting, (ii) Receiving, (iii) Pushing, (iv) Scooping, (v) Flicking, (vi) Passing, (vii) Tackling, (viii) Dribbling and Dodging, (ix) Goal keeping.**4. Warming up:** (i) Definition, (ii) Types, (iii) Need and importance, (iv) Advantage and disadvantages, (v) Important factors to be noted during warming up.**5. Systems of play**

- Definition
- Different formation : 3-3-4-1/4-2-4/3-3-3-1-1
- Qualities and responsibilities of players in each formation.

6. Qualities of players

- Personal qualities.
- Qualities and efficiencies of players as per position.

7. Defensive and attacking principles

- Attacking principles : (i) Width in attack; (ii) Penetration in attach; (iii) Mobility in attack; (iv) Improvisation in attack.
- Principles for defense : (i) Delay in defense; (ii) Cover in defense; (iii) Concentration in defense; (iv) Control in defense.

Reference :

1. Mike Craig : *Modern Hockey for Juniors*
2. Deepak Jain : *Teaching and Coaching Hockey*
3. Md. Kaosar Ali : *Hockey Khelar Pratham Path*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--------------------------------|-------|---------|
| 134602 | Paper-VI | Sport/Game (Hokey) (Practical) | 100 | 4 |

1. Physical Fitness

- (i) Strength;
- (ii) Speed;
- (iii) Endurance;
- (iv) Agility;
- (v) Flexibility

2. Basic Techniques of the game:

- (i) Hitting, (ii) Receiving, (iii) Pushing, (iv) Scooping, (v) Flicking, (vi) Passing, (vii) Tackling, (viii) Dribbling and Dodging, (ix) Goal keeping.

3. Overall performance;
4. Application of the systems and formation of play;
5. Principles of attack and defense;
6. Match analysis;
7. Practical notebook and viva.

Marks Distribution :

| | | |
|--|---|------------|
| 1. Test for Physical fitness | - | 15 |
| 2. Test for basic techniques | - | 30 |
| 3. Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. Application of rules of the game | - | 10 |
| 5. Practical note book and viva-voce | - | 20 |
| Total = | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-------------------------------|--------------|----------------|
| 134603 | Paper-V | Sport/Game (Cricket) (Theory) | 100 | 4 |

1. **Historical Development**

- a. History of the game Cricket from ancient times to the present.
- b. History of Cricket in Bangladesh.
- c. International tournaments in cricket.

2. Terminologies of cricket.

3. Warm up (Definition, Importance, Types, Advantages, Factors to be noted during warming up).

4. **Fundamental techniques of the Cricket :**

- Bowling : (Basic bowling action-Grip, run up, delivery, follow through, swing, cutter, definition importance and types of spin)
- Batting : (Grip, Stance, Forward and backward defense, Off drive, Square Cut, Pull).
- Wicket keeping.
- Fielding (Defensive and attacking : Catching and Throwing).

5. Rules of the game Cricket and their application.

6. Captaincy.

Reference :

1. Keith Andrew : *Coaching Cricket*
2. Keith Andrew : *The Handbook of Cricket*
3. Mahinder : *Learn to Play Good Cricket*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|----------------------------------|--------------|----------------|
| 134604 | Paper-VI | Sport/Game (Cricket) (Practical) | 100 | 4 |

1. **Physical fitness :** (Students will be tested in any two)

- (i) Strength;
- (ii) Speed;
- (iii) Endurance;
- (iv) Agility;
- (v) Flexibility.

2. Individual skill :

(i) Batting; (ii) Grip, (iii) Stance, (iv) Forward and Backward defense, (v) Off drive, (vi) Square cut, (vii) Pull.

3. Bowling :

(i) In swing, (ii) Out swing, (iii) Off break, (iv) Googly.

4. Fielding and Wicket keeping.

5. Running between the wickets.

6. Captaincy.

7. Team tactics.

8. Practical note books and Viva.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|--------------------------------|-------|---------|
| 134605 | Paper-V | Sport/Game (Football) (Theory) | 100 | 4 |

1. History of Football from ancient times to the present

2. History of Football in Bangladesh.

3. National and International football tournaments.

4. Organizational set up of Football in Bangladesh.

5. Rules of Football game (FIFA).

6. **Warming up :** (i) Definition, (ii) Importance, (iii) Types, (iv) Advantages, (v) Factors to be noted during warming up.

7. Fundamental techniques (Definition, importance, types and methods of execution) of (i) Kicking, (ii) Receiving, (iii) Dribbling, (iv) Feinting, (v) Passing, (vi) Heading, (vii) Tackling, (viii) Goal keeping.

8. **Systems of play**

Basic concept of systems/formations of play;

Types of formation : (2-4-4-1/4-2-4-1/2-4-3-1)

Duties and responsibilities of the players for implementing the formations of play.

Advantages and disadvantages of each type of formation.

9. Qualities of the players :

(i) Qualities according to the position;

(ii) Individual specific qualities of the players.

10. Attacking and defensive principles

Attacking principles : (i) Width in attack, (ii) Penetration in attack, (iii) Depth in attack, (iv) Mobility in attack, (v) Improvisation in attack.

Defensive principles : (i) Delay in defense, (ii) Cover in defense, (iii) Concentration in defense (iv) Control in defense.

11. Match analysis : Definition; Importance; Match analysis of different level.

Reference :

1. Nick Whitehead & Malcolm Cork : *Soccer Training*
2. Nelson McAvoy : *Teaching Soccer Fundamentals*
3. Deepak Jain : *Teaching and Coaching Football*
4. Peter Treadmill : *Skillful Soccer*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-----------------------------------|-------|---------|
| 134606 | Paper-VI | Sport/Game (Football) (Practical) | 100 | 4 |

1. Physical fitness : (Students will be tested in any two)

(i) Strength;

(ii) Speed;

(iii) Endurance;

(iv) Agility;

(v) Flexibility.

2. Individual skill : (Students will be tested in any five)

(i) Kicking; (ii) Receiving, (iii) Dribbling, (iv) Feinting, (v) Heading, (vi) Passing, (vii) Tackling, (viii) Throw in, (ix) Goal keeping.

3. Overall performance (During match between two teams);

4. Application of the systems/formation of play;
5. Defensive and attacking principles;
6. Match analysis;
7. Practical note books and Viva.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------------------|-------|---------|
| 134607 | Paper-V | Sport/Game (Basketball) (Theory) | 100 | 4 |

1. History of Basketball game :

- i) Basketball in Bangladesh;
- ii) World Basketball;
- iii) Structure of Basketball administration;

2. Rules of Basketball (FIBA).

3. Warming up and cool down :

- i) Definition;
- ii) Use of warming up and cool down;
- iii) Advantages and disadvantages of warming up and cool down;

4. Techniques of Basketball game :

- i) Passing and receiving;
- ii) Dribbling;
- iii) Rebound;
- iv) First break;
- v) Screening;
- vi) Shooting.

5. Qualities of a basketball player : a) Physical; b) Tactical

6. Formation of games or set play.

Reference :

1. Douchant : *College Basketball*
2. Bunn : *Basketball Teaching and Play*
3. O.P. Sharma : *Coaching Basketball*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------------------------|-------|---------|
| 134608 | Paper-VI | Sport/Game (Basketball) (Practical) | 100 | 4 |

1. Physical fitness (Strength; Endurance; Speed; Agility; Flexibility; Reaction time).
 - (i) Strength;
2. Individual defense.
3. Team defense : (a) Zone defense; (b) Man to man defense; (c) Combine defense
4. Individual attack.
5. Team attack (Formation game or set play).
6. Practical note book.

Marks Distribution :

| | | |
|--|---|------------|
| 1. Test for Physical fitness | - | 15 |
| 2. Test for basic techniques | - | 30 |
| 3. Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. Application of rules of the game | - | 10 |
| 5. Practical note book and viva-voce | - | 20 |
| Total = | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|------------------------------|-------|---------|
| 134609 | Paper-V | Sport/Game (Tennis) (Theory) | 100 | 4 |

1. **History of Tennis:** (a) Bangladesh; (b) International.

2. Organizational set up of Bangladesh Tennis Federation.
3. Rules of Tennis (ITF)
4. **Warming up and cooling down** : (a) Definition; (b) Advantage; (c) Disadvantage.
5. **Techniques and tactics of Tennis** :
(a) Service; (b) Fore hand stroke; (c) Back hand stroke; (d) Volley; (e) Smash.
6. **Systems of Tennis game** : (a) Definition; (b) Different systems of tennis.
7. Attacking techniques.
8. Defensive techniques.
9. **Tactics of Tennis** :
(a) Approach shot; (b) Service and volley; (c) Counter attack; (d) Back-line game; (e) Play at the net; (f) Puffing shot.

Reference :

1. Deepak Jain : *Teaching and Coaching Tennis*
2. M. Barrie Richmond : *Total Tennis*
3. Paul Metzler : *Advanced Tennis*
4. Bill. Murphy. Chet Murphy : *Tennis Hand Book*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|---------------------------------|--------------|----------------|
| 134610 | Paper-VI | Sport/Game (Tennis) (Practical) | 100 | 4 |

1. Physical fitness :
(a) Strength;
(b) Endurance;
(c) Speed;
(d) Flexibility;
(e) Agility;
(f) Reaction time.
2. Individual skills.
3. Tactics and strategy of tennis game.
4. Game.
5. Practical note book.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|------------------------------|--------------|----------------|
| 134611 | Paper-V | Sport/Game (Boxing) (Theory) | 100 | 4 |

1. **History of Boxing :** (a) Bangladesh; (b) Olympic; (c) International.
2. Organizational set up of Boxing :
(a) Bangladesh; (b) Olympic; (c) International.
3. Rules of Boxing (Olympic and International).
4. **Techniques and skills of Boxing :**
(a) Punch; (b) Jab; (c) Hook; (d) Cut; (i) Definition (ii) Importance; (iii) Types.
5. **Warm up and Cool down :**
(a) Definition; (b) Requirement; (c) Importance; (d) Advantage; (e) Disadvantage.
6. **Boxing attacking system :**
a) Different types of attack; (b) Advantage and disadvantage of different systems.
7. Different types of defense.
8. Physical fitness of a boxer.
9. Quality of a good boxer.

Reference :

1. Bob Mee : *Boxing*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|---------------------------------|--------------|----------------|
| 134612 | Paper-VI | Sport/Game (Boxing) (Practical) | 100 | 4 |

1. Physical fitness :

(a) Strength;

(b) Speed;

(c) Flexibility;

(d) Agility;

(e) Endurance;

(f) Coordination.

2. **Basic Techniques:** Individual defense; Peace; Slip; Step back; Ducking; Lay back; Block.

3. Attacking techniques and tactics.

4. Defensive techniques and tactics.

5. Application if rules during ring fight.

6. Practical note book.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------------------|--------------|----------------|
| 134613 | Paper-V | Sport/Game (Shooting) (Theory) | 100 | 4 |

1. Historical development of Shooting as a sport;

2. Description of a shooting range of International standard (including all events);

3. Description of all the events of shooting for International level of competition;

4. Description of the dress, materials and equipments for shooting;
5. Influence of psychological aspects, balance and readiness in shooting;
6. (i) Description of the events for men and women in 10m range. Total number of points in this event;
 (ii) Description of the events for men and women in 50m range. Total number of points in this event;
 (iii) Description of the events for men and women in 25m range. Total number of points in this event;
7. Description of the most effective techniques for standing, kneeling and prone positions;
8. Description of the safety rules imposed by World Shooting Federation for the safety of the shooting ranger;
9. Difference between the conventional arms and the arms used in shooting;
10. Description the organizational and function of the International Shooting Federation;
11. Detailed explanation of the reality for achieving highest level of success and the importance of shooting at the target.

Reference :

Official Status, Rules and regulations - *International Shooting Sport Federation*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-----------------------------------|--------------|----------------|
| 134614 | Paper-VI | Sport/Game (Shooting) (Practical) | 100 | 4 |

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------------------|-------|---------|
| 134615 | Paper-V | Sport/Game (Gymnastics) (Theory) | 100 | 4 |

- History of Gymnastics :** (a) Bangladesh; (b) International; (c) Olympic.
- Organizational set up of gymnastics.
- Code of points of gymnastics (Rules).
- Physical fitness for gymnastics :**
 - Strength, Endurance, agility, flexibility, speed, coordination.
 - Qualities of a good gymnast.
- Techniques of different skills of gymnastics**
 - Floor; (b) Parallel bar; (c) Horizontal bar; (d) Roman ring; (e) Vaulting horse; (f) Pummelled horse; (g) Balance beam; (h) Uneven bar (Girls); (i) Side horse.
- Warm up and cool down :** (a) Reasons of warming up; (b) Advantages.
- Safety measures during gymnastics practice.

Reference :

- Gurdial Singh Bawa : *Fundamentals of Men's Gymnastics*
- Samiran Chakraborty : *Women's Gymnastics*
- Pintu Modak : *Coaching Gymnastics*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------------------------|-------|---------|
| 134616 | Paper-VI | Sport/Game (Gymnastics) (Practical) | 100 | 4 |

- Physical fitness : (a) Strength; (b) Speed; (c) Flexibility; (d) Agility; (e) Endurance; (f) Coordination.
- Warming up and cool down- (i) General; (ii) Specific for gymnasts.
- Technique-
 - a) Floor, b) Side horse, c) Uneven bar, d) Pummelled horse, e) Balance beam, f) Roman ring.
 - a) Vaulting horse, b) Parallel bar, c) Side horse, d) Horizontal bar.
- Practical note book.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------------------|--------------|----------------|
| 134617 | Paper-V | Sport/Game (Swimming) (Theory) | 100 | 4 |

1. Introduction :

- i) Historical background of swimming;
- ii) History of swimming in Bangladesh;
- iii) History of swimming in Olympic games; Asian games; SAF games; National swimming competition.
- iv) History of Water Polo.

2. Organization and administration of swimming :

- i) Definition;
- ii) Need and importance of organization and administration;
- iii) Principles of organization;
- iv) Organizational set up;
- v) Qualities of a good administrator;
- vi) Organizing swimming competitions.

3. Lay out of swimming pool and diving pool.**4. Rules of International competition in swimming :** (a) Arranging swimming competition; (b) Officials; (c) Stroke mechanism-Free style, Breaststroke, Back stroke, Butterfly.**5. Training theory :** (i) Principles and purpose of training; (ii) Types of training-Continuous training; Interval training; Repetition training; Sprint training; Set training; Pace training.

6. **Additional methods** : (i) Weight training; (ii) Strength training – (a) with ones own body weight and (b) with additional weight (c) Circuit training; Training for flexibility.
7. Physique of swimmers; selection of talents.
8. **Health and nutrition of swimmers** :
 - i) Diet one week before the competition;
 - ii) Diet just before the competition;
 - iii) Diet during competition;
 - iv) Medical check up.
9. **Drill training** : (i) Free style; (ii) Breaststroke; (iii) Backstroke; (iv) Butter fly.
10. Warming up for swimming.
11. **Water Polo** : (i) Water polo pool; (ii) Goal; (iii) Ball; (iv) Cap, (v) Official; (vi) Timer; (vii) Start of play; (viii) Corner throw; (ix) Ordinary fouls; (x) Major fouls; (xi) Penalty throw; (xii) Extra time; (xiii) Referee.
12. **Rules of diving** : (i) Diving competition; (ii) Referee; (iii) Marking; (iv) Age specific diving; (v) Score sheet for diving.

Reference :

1. Torney : *Swimming*
2. James E. Counsilman : *The Science of Swimming*
3. Billingeley : *Diving Illustrated*

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-----------------------------------|--------------|----------------|
| 134618 | Paper-VI | Sport/Game (Swimming) (Practical) | 100 | 4 |

1. Physical fitness :
 - (a) Strength;
 - (b) Agility;
 - (c) Flexibility;
 - (d) Endurance;
 - (e) Speed.
2. Individual skill for the techniques in :
 - Free style.

- Brest stroke.
 - Back stroke.
 - Butterfly.
3. Individual skill for water polo : Ball throw; Overall performance; Spring; Passing; Dribbling; Attacking; Defense.
 4. Officiating for water Polo and Diving.
 5. Practical note book.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|---------------------------------------|-------|---------|
| 134619 | Paper-V | Sport/Game (Track and Field) (Theory) | 100 | 4 |

1. Introduction :

- Definition;
- Historical background of Track and Field Athletics;
- Role of Athletics in ancient and modern Olympics :
- History of Women Athletics;
- History of Athletics in Bangladesh;
- Olympic games, Asian games, SAF games, National Championship.

2. Organization and Administration of Track and Field :

- Concept and definition;
- Principles of organization;
- Organizational set up;
- Need for organization and administration;
- Qualities of good administrator;
- Administrative set up;

- Organizing Track and Field Athletic Meet.
- 3. Lay out of Athletic track.
- 4. General rules of International Athletic competitions.
- 5. Training theory : (a) Principles and purpose of training; (b) Types of training for running – Continuous methods (i) Continuous running; (ii) Fartlek; (iii) Hill running.
- 6. (i) Interval method; (ii) Repetition method; (iii) Pace work; (iv) Competitive pace.
- 7. **Helping methods** : (i) Weight training; (ii) Gymnastic exercise; (iii) Different types of jumping; (iv) Circuit training; (v) Total training.
- 8. Additional aspects : (i) Health; (ii) Diet; (iii) Medical check up.
- 9. Theory of Athletic events : (i) Track events; (ii) Field events.
- 10. **Running events, types and characteristics** :
(i) Sprint; (ii) Middle distance; (iii) Long middle distance; (iv) Long distance; (v) Factors influencing running events- Stride frequency, power, stride length, endurance, technique, physique of the sprinters, evaluation tests Rules.
- 11. **Jumping events** :
(i) Basic Characteristic and types of jumps; (ii) Important factors; (iii) Approach; (iv) Take-off; (v) Hight and Landing; (vi) Physique of the jumpers; (vii) Technique and style (viii) Evaluation test; (ix) Rules.
- 12. **Throwing events**
(i) Basic characteristics and types of jumps; (ii) Important factors; (iii) Technical features; (iv) Physique of the throwers; (v) Techniques and style; (vi) Evaluation test ; (vii) Rules.

Reference :

- 1. Kleff & Arnheim : *Modern Principles of Athletic Training*
- 2. G. Dyson : *Mechanics of Athletics*
- 3. Deepak Jain : *Coaching Track & Field*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 134620 | Paper-VI | Sport/Game (Track and Field) (Practical) | 100 | 4 |

- 1. **Physical fitness** : (a) Strength; (b) Speed; (c) Endurance; (d) Agility;

- (e) Flexibility.
2. Basic techniques.
 3. Overall efficiency.
 4. Rules of Track and Field Athletics .
 5. Practical note book.

Marks Distribution :

| | | | |
|----------------|---|---|------------|
| 1. | Test for Physical fitness | - | 15 |
| 2. | Test for basic techniques | - | 30 |
| 3. | Test for Overall performance from the match between two teams (in any one aspect) | - | 25 |
| 4. | Application of rules of the game | - | 10 |
| 5. | Practical note book and viva-voce | - | 20 |
| Total = | | | 100 |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|------------|---------------------------|-------|---------|
| 134622 | Paper- VII | Sport Science (Practical) | 100 | 4 |

Sport Science (Practical):

- I) Science of Sport Training. (5X15) = 75
- II) Exercise Physiology.
- III) Sport Biomechanics.
- IV) Sport Psychology.
- V) Sport Injuries.

Note Book- 10
Viva-voce -15

Total = 100

NATIONAL UNIVERSITY



Syllabus All Compulsory Subject

Three Years B.Sc.Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Years B.Sc. Pass Course
Effective from the Session: 2013-2014

Marks Distribution:

২০১৩-১৪ শিক্ষাবর্ষ থেকে কার্যকর বি এসসি (পাস) কোর্সের বর্ষওয়ারী কোর্স, ক্রেডিট ও নম্বর বণ্টন হবে নিম্নরূপঃ

| ১ম বর্ষ | | | ২য় বর্ষ | | | ৩য় বর্ষ | | |
|--------------------------------------|-------------|---------|-------------------------------|-------------|---------|--------------------------------------|-------------|---------|
| বিষয় | নম্বর | ক্রেডিট | বিষয় | নম্বর | ক্রেডিট | বিষয় | নম্বর | ক্রেডিট |
| স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস | ১০০ | ৪ | বাংলা জাতীয় ভাষা | ১০০ | ৪ | ইংরেজি (আবশ্যিক) | ১০০ | ৪ |
| ঐচ্ছিক ৩টি বিষয়ের ১ম পত্র- | ১০০×৩ = ৩০০ | ১২ | ঐচ্ছিক ৩টি বিষয়ের ৩য় পত্র- | ১০০×৩ = ৩০০ | ১২ | ঐচ্ছিক ৩টি বিষয়ের ৫ম পত্র- | ১০০×৩ = ৩০০ | ১২ |
| ঐচ্ছিক ৩টি বিষয়ের ২য় পত্র- | ১০০×৩ = ৩০০ | ১২ | ঐচ্ছিক ৩টি বিষয়ের ৪র্থ পত্র- | ১০০×৩ = ৩০০ | ১২ | ঐচ্ছিক ৩টি বিষয়ের ৬ষ্ঠ পত্র- | ১০০×৩ = ৩০০ | ১২ |
| | | | | | | ঐচ্ছিক ৩টি বিষয়ের ব্যবহারিক পরীক্ষা | ১০০×৩ = ৩০০ | ১২ |
| | ৭০০ | ২৮ | | ৭০০ | ২৮ | | ১০০০ | ৪০ |

সর্বমোট নম্বর (৭০০ + ৭০০ + ১০০) = ২৪০০, মোট ক্রেডিট - ৯৬।

Detailed Syllabus

Compulsory Subjects

| | | | | |
|----------------------|---|-------------------|-------------------|------------------------|
| Course Code | 111501 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Course Title: | History of Emergence of Independent Bangladesh | | | |

স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস

ভূমিকা: স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস-পরিধি ও পরিচিতি

১। দেশ ও জনগোষ্ঠীর পরিচয়

- ক) ভূ প্রকৃতির বৈশিষ্ট্য ও প্রভাব
- খ) নৃতাত্ত্বিক গঠন
- গ) ভাষা
- ঘ) সংস্কৃতির সমন্বয়বাদিতা ও ধর্মীয় সহনশীলতা
- ঙ) অভিন্ন বাংলার পরিপ্রেক্ষিতে তৎকালীন পূর্ববঙ্গ ও বর্তমান বাংলাদেশের স্বকীয় সত্তা

২। অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের প্রয়াস ও উপমহাদেশের বিভক্তি, ১৯৪৭

- ক) ঔপনিবেশিক শাসন আমলে সাম্প্রদায়িকতার উদ্ভব ও বিস্তার
- খ) লাহোর প্রস্তাব, ১৯৪০
- গ) অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের উদ্যোগ, ১৯৪৭ ও পরিণতি

ঘ) পাকিস্তান সৃষ্টি, ১৯৪৭

৩। পাকিস্তান: রাষ্ট্রীয় কাঠামো ও বৈষম্য

- ক) কেন্দ্রীয় ও প্রাদেশিক কাঠামো
- খ) সামরিক ও বেসামরিক আমলাতন্ত্রের প্রভাব
- গ) অর্থনৈতিক, সামাজিক ও সাংস্কৃতিক বৈষম্য

৪। ভাষা আন্দোলন ও বাঙালির আত্মপরিচয় প্রতিষ্ঠা

- ক) মুসলিম লীগের শাসন ও গণতান্ত্রিক রাজনীতির সংগ্রাম
- খ) আওয়ামী লীগের প্রতিষ্ঠা, ১৯৪৯
- গ) ভাষা আন্দোলন: পটভূমি ও ঘটনা প্রবাহ
- ঘ) হক-ভাসানী-সোহরাওয়ার্দীর যুক্তফ্রন্ট, ১৯৫৪ সালের নির্বাচন ও পরিণতি

৫। সামরিক শাসন: আইয়ুব খান ও ইয়াহিয়া খানের শাসনামল (১৯৫৮-৭১)

- ক) সামরিক শাসনের সংজ্ঞা ও বৈশিষ্ট্য
- খ) আইয়ুব খানের ক্ষমতা দখল ও শাসনের বৈশিষ্ট্য (রাজনৈতিক নিপীড়ন, মৌলিক গণতন্ত্র, ধর্মের রাজনৈতিক ব্যবহার)
- গ) আইয়ুব খানের পতন ও ইয়াহিয়া খানের শাসন, এক ইউনিট বিলুপ্তিকরণ, সার্বজনীন ভোটাধিকার, এলএফও (Legal Framework Order)

৬। জাতীয়তাবাদের বিকাশ ও স্বাধিকার আন্দোলন

- ক) সাংস্কৃতিক আত্মসনের বিরুদ্ধে প্রতিরোধ ও বাঙালি সংস্কৃতির উজ্জীবন
- খ) শেখ মুজিবুর রহমানের ৬-দফা আন্দোলন
- গ) ৬-দফা আন্দোলনের প্রতিক্রিয়া, গুরুত্ব ও তাৎপর্য
- ঘ) আগরতলা মামলা, ১৯৬৮

৭। ১৯৬৯-এর গণঅভ্যুত্থান ও ১১-দফা আন্দোলন

- ক) পটভূমি
- খ) আন্দোলনের কর্মসূচী, গুরুত্ব ও পরিণতি

৮। ১৯৭০ এর নির্বাচন, অসহযোগ আন্দোলন ও বঙ্গবন্ধুর স্বাধীনতা ঘোষণা

- ক) নির্বাচনের ফলাফল এবং তা মেনে নিতে কেন্দ্রের অস্বীকৃতি
- খ) অসহযোগ আন্দোলন, বঙ্গবন্ধুর ৭ই মার্চের ভাষণ, অপারেশন সার্চলাইট
- গ) বঙ্গবন্ধুর স্বাধীনতা ঘোষণা ও গ্রেফতার

৯। মুক্তিযুদ্ধ ১৯৭১

- ক) গণহত্যা, নারী নির্যাতন, শরণার্থী
- খ) বাংলাদেশ সরকার গঠন ও স্বাধীনতার ঘোষণাপত্র
- গ) স্বতঃস্ফূর্ত প্রাথমিক প্রতিরোধ ও সংগঠিত প্রতিরোধ (মুক্তিফৌজ, মুক্তিবাহিনী, গেরিলা ও সম্মুখ যুদ্ধ)
- ঘ) মুক্তিযুদ্ধে প্রচার মাধ্যম (স্বাধীন বাংলা বেতার কেন্দ্র, বিদেশী প্রচার মাধ্যম ও জনমত গঠন)
- ঙ) ছাত্র, নারী ও সাধারণ মানুষের অবদান (গণযুদ্ধ)
- চ) মুক্তিযুদ্ধে বৃহৎশক্তি ও মুসলিম রাষ্ট্র সমূহের ভূমিকা
- ছ) দখলদার বাহিনী, শানিড়কমিটি, আলবদর, আলশামস, রাজাকার বাহিনী, রাজনৈতিক দল ও দেশীয় অন্যান্য সহযোগীদের স্বাধীনতা বিরোধী কর্মকাণ্ড ও বুদ্ধিজীবী হত্যা
- জ) পাকিস্তানে বন্দি অবস্থায় বঙ্গবন্ধুর বিচার ও বিশৃঙ্খলিত প্রতিক্রিয়া
- ঝ) প্রবাসী বাঙালি ও বিশ্বের বিভিন্ন দেশের নাগরিক সমাজের ভূমিকা
- ঞ) মুক্তিযুদ্ধে ভারতের অবদান
- ট) যৌথ বাহিনী গঠন ও বিজয়
- ঠ) স্বাধীনতা সংগ্রামে বঙ্গবন্ধুর নেতৃত্ব এবং অবদান

১০। বঙ্গবন্ধু শেখ মুজিবুর রহমানের শাসনকাল, ১৯৭২-১৯৭৫

- ক) স্বদেশ প্রত্যাবর্তন
- খ) সংবিধান প্রণয়ন
- গ) যুদ্ধ বিধ্বস্ত দেশ পুনর্গঠন
- ঘ) সপরিবারে বঙ্গবন্ধু হত্যা ও আদর্শিক পটপরিবর্তন

History of the Emergence of Independent Bangladesh

Introduction: Scope and description of the emergence of Independent Bangladesh.

1. Description of the country and its people.

- a. Geographical features and their influence.
- b. Ethnic composition.
- c. Language.
- d. Cultural syncretism and religious tolerance.
- e. Distinctive identity of Bangladesh in the context of undivided Bangladesh.

2. Proposal for undivided sovereign Bengal and the partition of the Sub Continent, 1947.

- a. Rise of communalism under the colonial rule,
- b. Lahore Resolution 1940.
- c. The proposal of Suhrawardi and Sarat Bose for undivided Bengal : consequences
- d. The creation of Pakistan 1947.

3. Pakistan: Structure of the state and disparity.

- a. Central and provincial structure.
- b. Influence of Military and Civil bureaucracy.
- c. Economic, social and cultural disparity

4. Language Movement and quest for Bengali identity

- a. Misrule by Muslim League and Struggle for democratic politics.
- b. Foundation of Awami league, 1949
- c. The Language Movement: context and phases.
- d. United front of Haque – Vasani – Suhrawardi: election of 1954, consequences.

5. Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971)

- a. Definition of military rules and its characteristics.
- b. Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy, Islamisation)
- c. Fall of Ayub Khan and Yahia Khan's rule (Abolition of one unit, universal suffrage, the Legal Framework Order)

6. Rise of nationalism and the Movement for self determination.

- a. Resistance against cultural aggression and resurgence of Bengali culture.
- b. The six point movement of Sheikh Mujibur Rahman

- c. Reactions; Importance and significance of the six Point movement.
- d. The Agortola Case 1968.

7. The mass-upsurge of 1969 and 11 point movement:

- a. background
- b. programme significance and consequences.

8. Election of 1970 Non-cooperation movement of March 1971 and the Declaration of Independence by Bangabondhu

- a. Election result and centres refusal to comply
- b. The non co-operation movement, the 7th March Address of Bangabondhu, Operation Searchlight
- c. Declaration of Independence by Bangabondhu and his arrest

9. The war of Liberation 1971

- a. Genocide, repression of women, refugees
- b. Formation of Bangladesh government and proclamation of Independence
- c. The spontaneous early resistance and subsequent organized resistance (Mukti Fouz, Mukti Bahini, guerillas and the frontal warfare)
- d. Publicity Campaign in the war of Liberation (Shadhin Bangla Betar Kendra, the Campaigns abroad and formation of public opinion)
- e. Contribution of students, women and the masses (Peoples war)
- f. The role of super powers and the Muslim states in the Liberation war.
- g. The Anti-liberation activities of the occupation army, the Peace Committee, Al-Badar, Al-Shams, Rajakars, pro Pakistan political parties and Pakistani Collaborators, killing of the intellectuals.
- h. Trial of Bangabondhu and reaction of the World Community.
- i. The contribution of India in the Liberation War
- j. Formation of joint command and the Victory
- k. The overall contribution of Bangabondhu and his leadership in the Independence struggle.

10. The Bangabondhu Regime 1972-1975

- a. Homecoming
- b. Making of the constitution
- c. Reconstruction of the war ravaged country
- d. The murder of Bangabondhu and his family and the ideological turn-around.

সহায়ক গ্রন্থ

১. নীহার রঞ্জন রায়, *বাঙালীর ইতিহাস*, দে' জ পাবলিশিং, কলকাতা ১৪০২ সাল।
২. সালাহ উদ্দিন আহমেদ ও অন্যান্য (সম্পাদিত), *বাংলাদেশের মুক্তি সংগ্রামের ইতিহাস ১৯৪৭-১৯৭১*, আগামী প্রকাশনী, ঢাকা ২০০২।

৩. সিরাজুল ইসলাম (সম্পাদিত), *বাংলাদেশের ইতিহাস ১৭০৪-১৯৭১*, ৩ খন্ড, এশিয়াটিক সোসাইটি অব বাংলাদেশ, ঢাকা ১৯৯২।
৪. ড. হারুন-অর-রশিদ, *বাংলাদেশ: রাজনীতি, সরকার ও শাসনতান্ত্রিক উন্নয়ন ১৭৫৭-২০০০*, নিউ এজ পাবলিকেশন, ঢাকা ২০০১।
৫. ড. হারুন-অর-রশিদ, *বাঙালির রাষ্ট্রচিন্তা ও স্বাধীন বাংলাদেশের অভ্যুদয়*, আগামী প্রকাশনী, ঢাকা ২০০৩।
৬. ড. হারুন-অর-রশিদ, *বঙ্গবন্ধুর অসমাপ্ত আত্মজীবনী পুনর্পাঠ*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১৩।
৭. ড. আতফুল হাই শিবলী ও ড.মোঃ মাহবুবুর রহমান, *বাংলাদেশের সাংবিধানিক ইতিহাস ১৭৭৩-১৯৭২*, সূবর্ণ প্রকাশন, ঢাকা ২০১৩।
৮. মুনতাসির মামুন ও জয়ন্ত কুমার রায়, *বাংলাদেশের সিভিল সমাজ প্রতিষ্ঠার সংগ্রাম*, অবসর, ঢাকা ২০০৬।
৯. আতিউর রহমান, *অসহযোগ আন্দোলনের দিনগুলি: মুক্তিযুদ্ধের প্রস্তুতি পর্ব*, সাহিত্য প্রকাশ, ঢাকা ১৯৯৮।
১০. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস, ১৯০৫-৪৭*, তাম্রলিপি, ঢাকা ২০১১।
১১. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস, ১৯৪৭-১৯৭১*, সময় প্রকাশন, ঢাকা ২০১২।
১২. সৈয়দ আনোয়ার হোসেন, *বাংলাদেশের স্বাধীনতা যুদ্ধে পরাশক্তির ভূমিকা*, ডানা প্রকাশনী, ঢাকা ১৯৮২।
১৩. আবুল মাল আবদুল মুহিত, *বাংলাদেশ: জাতিরাজের উদ্ভব*, সাহিত্য প্রকাশ, ঢাকা ২০০০।
১৪. শেখ মুজিবুর রহমান, *অসমাপ্ত আত্মজীবনী*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১২।
১৫. সিরাজ উদ্দীন আহমেদ, *একাত্তরের মুক্তিযুদ্ধ: স্বাধীন বাংলাদেশের অভ্যুদয়*, ইসলামিক ফাউন্ডেশন, ঢাকা ২০১১।
১৬. জয়ন্ত কুমার রায়, *বাংলাদেশের রাজনৈতিক ইতিহাস*, সূবর্ণ প্রকাশন, ঢাকা ২০১০।
১৭. Harun-or-Roshid, *The Foreshadowing of Bangladesh: Bengal Muslim League and Muslim Politics, 1906-1947*, The University Press Limited, Dhaka 2012.
১৮. Rounaq Jahan, *Pakistan: Failure in National Integration*, The University Press Limited, Dhaka 1977.
১৯. Talukder Maniruzzaman, *Radical Politics and the Emergence of Bangladesh*, Mowla, Brothers, Dhaka 2003.
২০. মেসবাহ কামাল ও ঈশানী চক্রবর্তী, *নাচোলের কৃষক বিদ্রোহ, সমকালীন রাজনীতি ও ইলা মিত্র*, উত্তরণ, ঢাকা ২০০৮।
২১. মেসবাহ কামাল, *আসাদ ও উনসত্তরের গণঅভ্যুত্থান*, বিবর্তন, ঢাকা ১৯৮৬।

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|---------------------|-----------------------------|-------------------|-------------------|------------------------|
| Course Code | 121101 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Course Title | English (Compulsory) | | | |

Aims and objective of this course: To develop students' English language skills, to enable them to benefit personally and professionally. The four skills- listening, speaking, reading and writing will be integrated to encourage better language use

1. Reading and understanding

5x4=20

Students will be expected to read passages so that they might come across in their everyday life, such as newspapers, magazines, general books etc. Simple stories will also be included to give students a familiarity with different uses of the language.

[N.B. 5 Questions are to be answered. Each question will carry 4 marks. There may be division in each question]

- a) Understanding different purposes and types of readings
- b) Guessing word- meaning in context.
- c) Understanding long sentences
- d) Recognizing main idea and supporting ideas
- e) Answering comprehension questions
- f) Writing summaries

2. Writing

- a) Writing correct sentences, completing sentences and combining sentences. 05
- b) Situational Writing: Posters, notices, slogans, memos, advertisements etc. 04
- c) Paragraph Writing :Structure of a paragraph; to topic sentence; developing ideas; writing a conclusion; types of paragraphs (narrative, descriptive, expository, persuasive); techniques of paragraph development (such as listing, cause and effect, comparison and contrast) 08

Or,

- d) Newspaper writing: Reports. Press realize, dialogue etc
 - e) Writing resume 08
- Or,
- f) Writing letters : Formal and Informal letters, letters to the editor, request letter, job applications, complaint letter etc.
 - g) Essay : Generating ideas; outlining, Writing a Thesis sentence; writing the essay: writing introduction, developing ideas, writing conclusion, revising and editing. 15

3. Grammar

25

- a) Word order of sentences.
- b) Framing questions.
- c) Tenses, articles, subject –verb agreement, noun-pronoun agreement, verbs, phrasal verbs, conditionals, prepositions and prepositional phrases, infinitives, participles; gerunds. (Knowledge of grammar will be test through contextualized, passages).
- d) Punctuation

4. Developing Vocabulary: Using the dictionary, suffixes, prefixes, synonyms, antonyms, changing word forms (from verb to noun etc.) and using them in sentences. 10

5. Translation from Bengali to English. 1x5=5

6. Speaking Skills: Speaking skill should be integrated with writing and reading in classroom activities.

The English sound system; pronunciation skills; the IPA system; problem sounds; vowels; consonant and diphthongs; lexical and syntactic stress.

(Writing dialogue and practice it orally students can develop their speaking skill. Dialogue writing can be an item in writing test.)

| | | | |
|----------------------|-----------------------------|-------------|------------------|
| Course Code : 131001 | Marks : 100 | Credits : 4 | Class Hours : 60 |
| Course Title : | বাংলা জাতীয় ভাষা (আবশ্যিক) | | |

ক : সাহিত্য

নম্বর-৭৫

১) নির্বাচিত কবিতা

নম্বর-২৫

| | |
|------------------------|--------------------|
| ক) মাইকেল মধুসূদন দত্ত | : আত্ম-বিলাপ |
| খ) রবীন্দ্রনাথ ঠাকুর | : ঐকতান |
| গ) কাজী নজরুল ইসলাম | : চৈতী হাওয়া |
| ঘ) জীবনানন্দ দাশ | : বনলতা সেন |
| ঙ) ফররুখ আহমদ | : ডালুক |
| চ) শামসুর রাহমান | : বার বার ফিরে আসে |
| ছ) আল মাহমুদ | : সোনালী কবিন: ৫ |

২) নির্বাচিত প্রবন্ধ

নম্বর-২৫

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|--|-----------------------|
| ক) বঙ্কিমচন্দ্র চট্টোপাধ্যায়: বাঙ্গালা ভাষা | |
| খ) হরপ্রসাদ শাস্ত্রী | : তৈল |
| গ) রবীন্দ্রনাথ ঠাকুর | : সভ্যতার সংকট |
| ঘ) প্রমথ চৌধুরী | : যৌবনে দাও রাজটিকা |
| ঙ) কাজী আবদুল ওদুদ | : বাংলার জাগরণ |
| চ) কাজী নজরুল ইসলাম | : রাজবন্দীর জবানবন্দী |
| ছ) মোতাহের হোসেন চৌধুরী | : সংস্কৃতি-কথা |

৩) নির্বাচিত গল্প

নম্বর-২৫

| | |
|-------------------------------|--------------------------|
| ক) রবীন্দ্রনাথ ঠাকুর | : একরাত্রি |
| খ) বিভূতিভূষণ বন্দ্যোপাধ্যায় | : পুঁই মাচা |
| গ) আবুল মনসুর আহমদ | : হুয়ুর কেবলা |
| ঘ) মানিক বন্দ্যোপাধ্যায় | : প্রাগৈতিহাসিক |
| ঙ) সৈয়দ ওয়ালীউল- হা | : নয়নচারা |
| চ) শামসুদ্দীন আবুল কালাম | : পথ জানা নাই |
| ছ) হাসান আজিজুল হক | : আত্মজা ও একটি করবী গাছ |

খ : ভাষা শিক্ষা

নম্বর-২৫

- ১। পত্র রচনা : ব্যক্তিগতপত্র, দাফতরিকপত্র, ব্যবসায়-সংক্রান্তপত্র, আবেদনপত্র ও মানপত্র
- ২। গদ্যরীতি : সাধু, চলিত ও আঞ্চলিক
- ৩। প্রমিত বাংলা বানানের নিয়ম (বাংলা একাডেমি, ঢাকা)
- ৪। অনুবাদ : ইংরেজি থেকে বাংলা
- ৫। সারসংক্ষেপ।

NATIONAL UNIVERSITY



Syllabus

Subject: Biochemistry and Molecular Biology

Three Year B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: Biochemistry and Molecular Biology
Session: 2013-2014
Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|--------------|------------------------------------|--------------|----------------|
| First Year | | | | |
| 112901 | Paper-I | Physical and Organic Chemistry | 100 | 4 |
| 112903 | Paper-II | Biomolecules | 100 | 4 |
| Second Year | | | | |
| 122901 | Paper-III | Metabolism | 100 | 4 |
| 122903 | Paper-IV | Microbiology and Molecular Biology | 100 | 4 |
| Third Year | | | | |
| 132901 | Paper-V | Human Physiology & Endrocrinology | 100 | 4 |
| 132903 | Paper-VI | Clinical Biochemistry | 100 | 4 |
| 132904 | Paper-VII | Practical | 100 | 4 |
| | | Total = | 700 | 28 |

Detailed Syllabus First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|--------------------------------|-------|---------|
| 112901 | Paper-I | Physical and Organic Chemistry | 100 | 4 |

A. Physical Chemistry:

Structure of atoms: Fundamental practices, Rutherford's and Bohr's atom model, Concept of Quantum numbers, Pauli exclusion principle. Hund's rule, Electronic structure of atoms.

Elementary treatment of chemical bonds: Ionic bond, Covalent bond, Co-ordination bond, Hydrogen bond and Metallic bond, Polarity of covalent molecules.

The behavior of gases: Gas laws, Kinetic theory of gases, Avogadro's law, Graham's law, Dalton's law of partial pressure, Behavior of real gases, Vander Waals modifications.

Thermodynamics: 1st law of thermodynamics, enthalpy, heat capacity, isothermal and adiabatic expansion of ideal gas, thermochemistry, 2nd law of thermodynamics; Carnot cycle, entropy & entropy changes in ideal gas, Free energy, maximum work function, conditions of spontaneous changes, Clausius-Clapeyron equation, standard free energy and its significance.

Chemical equilibrium: Laws of mass action, Partition coefficient, equilibrium constant, determination of equilibrium constant.

Acids, bases and buffers: Concepts of acids, bases and buffer solutions, Mechanism of buffer action. Dissociation of water, weak acid & buffer solution, Henderson-Hasselbach equation.

B. Organic Chemistry:

Aliphatic: Nomenclature, preparation, characteristic reactions and biological occurrence of each class

- a) Saturated & unsaturated hydrocarbons
- b) Monohydric alcohols & glycerol
- c) Aldehydes & ketones
- d) Monocarboxylic & dicarboxylic acids and
- e) Amines.

Aromatic: Nomenclature, preparation, characteristic reactions and biological occurrence of aromatic a) hydrocarbons, b) phenols, c) amines, d) diazonium salts, e) aldehydes and, f) ketones.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--------------|-------|---------|
| 112903 | Paper-II | Biomolecules | 100 | 4 |

Cells: Cell: structural & functional a unit, subcellular particles, their isolation & function.

Chemistry of carbohydrates: Definition, classification, structure, nomenclature, optical properties, general reactions, mono, oligo & polysaccharides (starch, cellulose, glycogen & inulin) amino sugars; biological importance and characteristic identification reactions of carbohydrates.

Chemistry of Proteins & Amino acids: Definition, classification & nomenclature of amino acids, structure, general reactions, biological importance, ionization states of amino acids, acid-base behavior of amino acids, buffering action, zwitterion, pK, pH, titration curves, isolation procedures of amino acids from their mixtures, characteristic & identification reactions; peptides & their chemical synthesis, peptides of biological interest.

Classification & structure of proteins: Primary & secondary structure, alpha-helix & beta-pleated sheets, tertiary structure of globular proteins, quaternary structure of hemoglobin, isolation, separation & purification of proteins, identification of N-terminal & C-terminal residues of proteins.

Chemistry of Lipids: Definition, classification, chemical composition and importance of lipids.

Fats and oils: Fatty acids: their classification, structure & nomenclature, biological importance, general reactions, chemical constants of fats, such as Iodine Number, RM-value, Saponification Number, Acetyl Number & Acid Value and their importance. Waxes, phospholipids, membrane lipids with special reference to biological importance.

Structures of nucleic acids: Purines & pyrimidines. Nucleosides & Nucleotides, structure and properties of DNA.

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-------------|-------|---------|
| 122901 | Paper-III | Metabolism | 100 | 4 |

A. Vitamins & Minerals

Fat soluble vitamins – A, D, E, K: biological functions, deficiency symptoms, dietary sources, RDA

Water soluble vitamins – B complex, C: biological functions, deficiency symptoms, dietary sources, RDA

Minerals – Fe⁺⁺, Ca⁺⁺, P, Zn⁺⁺, Mg⁺⁺, Se and I₂; biological functions.

B. Enzyme

Definition, chemical nature, classification, factors affecting enzyme action, enzyme kinetics, inhibition, importance of enzymes in diagnostic purpose. Digestion and digestive enzymes. Structure and coenzyme activities of B-vitamins.

C. Metabolism

General aspects of metabolism & method of study, bioenergetic principles & ATP cycle, high- energy compounds & their free energy changes, catabolic pathways of carbohydrates, glycolysis, tricarboxylic acid (TCA) cycle, electron transport chain (ETC), pentose phosphate pathway (PPP), Biosynthesis of carbohydrates in plants and animals ; synthesis of glucose by photosynthesis (brief treatment of light and dark reactions in photosynthesis). Synthesis of glucose from fat in germinating seeds by gluconeogenic pathway. Synthesis of disaccharides; lactose and sucrose, synthesis of polysaccharides; starch, cellulose and glycogen. Synthesis and oxidation of fatty acids. Degradation of amino acids; Decarboxylation, transamination & deamination, urea cycle.

D. Endocrinology

Characteristic of hormones, classification, general mode of action; Synthesis, Secretion & biological functions and pathophysiology of Pancreatic hormones (insulin and glucagon), Thyroid hormones (T₄, T₃) Pituitary hormones, Adrenal hormones.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|------------------------------------|-------|---------|
| 122903 | Paper-IV | Microbiology and Molecular Biology | 100 | 4 |

A. Microbiology

General aspect , classification of microbes; Microscopy,

Bacteria – Structure, gram staining; Nutritional aspects; Media preparation, autoclaving & sterilization, conditions for bacterial growth, growth curve, reproduction, pure culture concept, bacterial enumeration, importance of bacteria from industrial point of view, pathogenicity, toxins, infectious diseases e.g. cholera, tuberculosis.

Fungus- Brief outline on growth & reproductive characteristics.

Virus – general features; classification with examples; Viral infection & multiplication of TMV, λ - phage (lytic cycle & lysogeny), HIV (brief outline)

B. Immunology

General aspect of immune system; B&T lymphocytes, nature of antigens, antigenic response to immune system, antibodies (Immunoglobulins) & their chemical nature, antigen – antibody interactions, blood grouping , assay of serum antibodies, complement system; hypersensitivity, autoimmunity; immunodeficiency.

C. Molecular Biology

DNA as genetic material, along with exception; central dogma of molecular biology.

Replication- Nature of the process, enzymes involved, mechanism (Okazaki fragments) of replication.

Transcription- Classes of RNAs with function, bacterial DNA transcription with mechanism; enzymes involved in animal cell DNA transcription, post-transcriptional modification.

Translation – Site & direction of protein synthesis , ribosome structure on bacteria & animal cell, genetic code & its characteristics, protein synthesis, post- translational modification.

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------------------|-------|---------|
| 132901 | Paper-V | Human Physiology & Endocrinology | 100 | 4 |

Part A : Human Physiology

- 1. Blood:** Blood cells, lymph, serum, plasma, total count (TC), differential count (DC), origin of the blood cells, blood grouping (types).
- 2. Hemostasis, biochemistry of blood clotting.**
- 3. Circulatory System:** Heart- structure and functions, Arteries, veins, capillaries, heart sound, cardiac cycle, basic properties of cardiac muscles ,blood pressure and measurement.
- 4. Respiratory system:** The breathing apparatus, exchange of gases, ventilation, lung volume and capacity.
- 5. Digestive system:** Digestive enzymes, digestion of carbohydrates, proteins and lipids and absorption of digested products.
- 6. Kidney:** Excretory system, role of kidney in water, electrolyte and acid-base balance of the body, buffers of the cells, regulation of extra cellular fluid composition and formation and excretion of urine.
- 7. Liver:** Structural organization and function.
- 8. Reproductive system:** male reproductive system; spermatogenesis, hormonal factors that stimulate spermatogenesis, regulation of male reproductive function by various hormones. Female reproductive system; monthly ovarian and uterine cycle and function of gonadotropic hormones, pregnancy, function of the placenta, hormonal factors in pregnancy, lactation, menopause.
- 9. Nervous system:** Nerve cells, ionic basis of excitation and conduction, synaptic transmission, reflex action, the sense, sense receptors, hypothalamus and temperature regulation.

Part B: Endocrinology

- 1. Characteristics of the hormone system:** Introduction, function of hormones, endocrine glands, target gland concept, negative and positive feed back, hormone receptors and its abnormalities. Classification of hormones , intracellular messengers .
- 2. Pituitary, Hypothalamic, Thyroid and Parathyroid hormones:** structure, synthesis, physiological and biochemical actions.

3. **Hormones of the adrenal cortex, adrenal medulla, gonads and Pancreas:** Their structure biosynthesis, regulation, transport, mechanism of action and pathophysiology.
4. **Gastrointestinal hormones:** Gastrin, cholecystokinin (CCK), secretin, glucagon, gastric inhibitory polypeptide (GIP), vasoactive intestinal polypeptide (VIP), glicentin, neurotensin, substance P and somatostatin.
5. **Hormone assay techniques:** Assay of peptide and steroid hormones by radioimmunoassay (RIA) and enzyme-linked immunosorbent assay (ELISA)

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-----------------------|-------|---------|
| 132903 | Paper-VI | Clinical Biochemistry | 100 | 4 |

Clinical Biochemistry:

1. **Clinical application of enzymes and metabolites as diagnostic tools:** Basic approach to diagnosis involving handling and processing of samples, acquisition and interpretation of biochemical data, investigation of CSF, Tumor markers poisons, Biochemical aspects of mental handicrafts. Enzymes in diagnosis, use of enzymes e.g. alanineaminotransferase (ALT), aspartate aminotransferase (AST), creatine kinase (CK), lactate dehydrogenase (LDH), amylase, acid phosphatase (ACP) and metabolites e.g. bilirubin, uric acid, blood urea nitrogen (BUN), cholesterol and electrolytes in diagnosis.
2. **Biochemistry of various diseases:** Atherosclerosis, Macrophage lipid metabolism in atherosclerosis, vascular dysfunction and its contribution to atherosclerosis, oxidative stress and platelet function in Atherosclerosis lipoprotein influx and efflux lipoproteins in Atherosclerosis, protein oxidation in Atherosclerosis, and other diseases hepatitis, diabetes, rheumatoid arthritis, obesity, gout, malabsorption syndromes, acidosis and alkalosis, Thyroids dysfunction, (HRT).
3. **Biochemical interpretation & certain genetic disorders:** PKU, Fructose intolerance, Glycogen storage diseases sickle cell anemia, hemolytic anemia, thalassemia, hypercholesterolemia, lipid storage disease, muscular dystrophy .
4. **Antioxidant intervention studies in human beings, antioxidants and co-antioxidation.**

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-------------|-------|---------|
| 132904 | Paper-VII | Practical | 100 | 4 |

Laboratory works:

Group A:

Volumetric analysis:

1. a) Preparation of standard N/ 10 Na_2CO_3 solution.
b) Determination of the strength of HCl against standard Na_2CO_3 solution.
2. a) Preparation of N/ 10 solution of potassium biphthalate.
b) Standardization of NaOH against standard potassium biphthalate .
c) Determination of the amount of acetic acid in vinegar against standardized NaOH.

3. Standardization of potassium permanganate solution against sodium oxalate as the primary standard and estimation of calcium content of the supplied sample solution.
4. Estimation of calcium in milk.
5. Standardization of sodium thiosulphate solution using potassium dichromate as primary standard.
6. Determination of the amount of ferrous iron in Mohr's salt solution against standard potassium dichromate.

Group B: Detection of organic compounds:

- a) Carboxylic acids and phenols
- b) Aldehydes and ketones
- c) Amides, amines, nitrocompounds
- d) Carbohydrates

Group C:

1. Estimation of Vitamin C by Bessel's titrimetric method.
2. Determination of Iodine value and Saponification value of fats & oils
3. Estimation of glucose by colorimetric method.
4. Estimation of creatinine by colorimetric method.
5. Estimation of proteins by biuret method.
6. Hydrolysis of starch by salivary amylase.
7. Colour tests for proteins, amino acids & carbohydrates.
8. Identification and separation of amino acids by chromatographic method.
9. Determination of partition coefficient and equilibrium constant ($KI + I_2 \leftrightarrow KI_3$).
10. Preparation of buffer and determination of pK value of acetic acid.

Distribution of marks:

| | |
|-------------------------|----------|
| i) Group A | 25 Marks |
| ii) Group B | 25 Marks |
| iii) Group C | 25 Marks |
| iv) Practical Note Book | 10 Marks |
| v) Industrial tour | 05 Marks |
| vi) Viva- voce | 10 Marks |

Total =100 Marks

NATIONAL UNIVERSITY



Syllabus Subject: **Botany**

Three Years B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Subject: Botany
Syllabus for Three Year B.Sc. (Pass) Course
Effective from the Session: 2013-2014

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|--------------|--|--------------|----------------|
| First Year | | | | |
| 113001 | Paper-I | Microbiology, Physiology, Mycology | 100 | 4 |
| 113003 | Paper-II | Higher Cryptogams, Gymnosperms, Plant Pathology | 100 | 4 |
| Second Year | | | | |
| 123001 | Paper-III | Angiosperms, Economic Botany, Anatomy, Embryology, Paleobotany | 100 | 4 |
| 123003 | Paper-IV | Biodiversity, Conservation, Ecology, Environmental science & Cytology | 100 | 4 |
| Third Year | | | | |
| 133001 | Paper-V | Plant Physiology, Phytochemistry Agronomy and Horticulture | 100 | 4 |
| 133003 | Paper-VI | Genetics, plant Breeding, Evolution, Biotechnology and Biostatistics. | 100 | 4 |
| 133004 | Paper-VII | Practical | 100 | 4 |
| | | Total = | 700 | 28 |

Detailed Syllabus

First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|------------------------------------|-------|---------|
| 113001 | Paper-I | Microbiology, Physiology, Mycology | 100 | 4 |

A. Microbiology Marks: 40

- (i) Introduction, contribution of eminent scientists in the field Microbiology.
- (ii) Introduction, characteristics and reproduction of Prions, Viroids, Rickettsia and Mycoplasma.
- (iii) Viruses: Definition, biological nature, physical and chemical structure, multiplication, transmission and economic importance.
- (iv) Bacteria: Introduction, classification, structure, multiplication and economic importance.

B. Phycology Marks: 30

- (i) Habit and habitats, classification, general structures, reproduction and economic importance of Algae.
- (ii) Salient feature of Cyanophyceae, Chlorophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae.
- (iii) Life histories of *Anabaena*, *Oedogonium*, *Vaucheria*, *Sargassum* and *Polysiphonia*.

C. Mycology: Marks: 30

- (i) Introduction, general characteristics, classification, structure and economic importance of Fungi.
- (ii) Life histories of *Synchytrium*, *Pythium*, *Saccharomyces*, *Penicillium*, *Puccinia*, *Agaricus* and *Fusarium*.
- (iii) Lichens: Habit and habitats, classification, structure and importance.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|---|-------|---------|
| 113003 | Paper-II | Higher Cryptogams, Gymnosperms, Plant Pathology | 100 | 4 |

A. Higher Cryptogams Marks: 40

Bryophyta

- (i) Introduction, salient features of Hepaticopsida, Anthoceropsida and Bryopsida with examples.
- (ii) Life history of *Marchantia*, *Pelia*, *Anthoceros* and *Sphagnum*.

Pteridophyta

- (i) Introduction, salient features of Psilopsida, Lycopsida, Sphanopsida and Pteropsida with examples.
- (ii) Life histories of *Lycopodium*, *Selaginella*, *Ophioglossum* and *Marsilea*.

B. Gymnosperms

Marks : 20

- (i) Introduction, general characteristics, modern classification and economic importance.
- (ii) Life histories of *Cycas* and *Gnetum*

C. Plant Pathology:

Marks: 40

- (i) Introduction, scope and importance of plant diseases.
- (ii) Classification of plant diseases.
- (iii) Stages in the development of plant diseases: Inoculation, penetration, infection, growth and reproduction, dissemination, overwintering and oversummering of the pathogens.
- (iv) Causal organisms, symptoms, etiology and control measures of the following plant diseases:
 - a) Brown spot of rice, b) Late light of potato, c) Stem rust of wheat, d) Stem rot of jute e) Tikka disease of ground nut.

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--|--------------|----------------|
| 123001 | Paper-III | Angiosperms, Economic Botany, Anatomy, Embryology, Paleobotany | 100 | 4 |

Angiosperms

Marks: 40

- b) Morphology of flowers, types of inflorescence and fruits.
- c) Definition, scope, units of Classification, nomenclature, preparation of herbarium sheets; Artificial (Linnaeus), natural (Benthum and Hooker.) and phylogenetic. (Engler and Prantle) systems of classification, merits and demerits of these systems.
- d) Magnoliopsida (Dicot): Nymphaeaceae, Rutaceae, Cucurbitaceae, Apocynaceae, Rubiaceae and Lamiaceae.
- e) Liliopsida (Monocot): Amaryllidaceae and Aracaceae

Economic botany

Marks: 20

- a) Scientific and local names, parts used and importance of 10 plants of each of the following group: food grains, pulses, medicines, rubber, oil, spices and timber yielding plants.
- b) Tea and rubber: Cultivation and processing.

Anatomy**Marks: 15**

- a) Origin and differentiation of apical meristem, tissues and tissue systems.
- b) Distribution of mechanical tissues, normal secondary growth in dicot stem and dicot root and root-stem transition.

Embryology**Marks: 15**

- a) Introduction, sporogenesis and gametogenesis, fertilization.
- b) Development of embryo and endosperm in dicot plant, seed and fruit formation.

Palaeobotany**Marks: 10**

- (a) Definitions and scope of Palaeobotany,
- (b) Types of fossils and fossilization processes.
- (c) Geological era; appearance and extinctions of the life forms in different geological periods.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|---|-------|---------|
| 123003 | Paper-IV | Biodiversity, Conservation, Ecology, Environmental science & Cytology | 100 | 4 |

Biodiversity and Conservation**Marks: 20**

- (i) Definition and elements of biodiversity; causes and losses of biodiversity; rare, vulnerable, threatened and endangered species of Bangladesh.
- (ii) Definition and types of conservation, principles of conservation, advantages and disadvantages of *in situ* and *ex-situ* conservation; conservation in botanic gardens and seed banks; role and activity of IUCN, WWF and CITES.

Ecology**Marks: 40**

- (i) Definition and scope of ecology, climatic, topographic and biotic factors.
- (ii) Salient features of hydrophytes, xerophytes and halophytes.
- (iii) Plant succession: Causes and types, hydrosere, xerosere.
- (iv) Structure and function of ecosystems (Sundarban forest).
- (v) Food chain, food web and ecological pyramids.
- (vi) Phytogeographical regions of Bangladesh.

Environmental Science**Marks: 20**

- i) Definition and components of the environment
- ii) Pollution: Air, water and sound pollution, causes and effects of pollution on plants and animals and their remedies.
- iii) Green house effect: Sources and effects of green house gases, ozone layer depletions.
- iv) Population growth and its impact on nature

Cytology**Marks 20**

- (i) Introduction, definition and scope of Cytology, concept of prokaryotic and eukaryotic cells.
- (ii) Ultra structure of eukaryotic cell; detailed structure and function of cell organelles (chloroplast, mitochondria, ribosome, endoplasmic reticulum and nucleus).
- (iii) Physical and chemical structure of chromosome.
- (iv) Meiotic cell division and its significance.

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|---|-------|---------|
| 133001 | Paper-V | Plant Physiology, Phytochemistry Agronomy and Horticulture | 100 | 4 |

Plant Physiology

Marks: 40

- (i) Absorption of water: Mechanism of absorption of water and nutrients by roots and ascent of sap.
- (ii) Essential mineral elements: Essential elements, deficiency symptoms in plants.
- (iii) Photosynthesis: Pigment systems, photophosphorylation and the fixation of CO₂ through C₃ and C₄ pathways, factors affecting the rate of photosynthesis.
- (iv) Respiration: Mechanism of aerobic and anaerobic respiration and fermentation, respiratory quotient, factors affecting respiration.
- (v) Plant growth regulators: Classification with examples, application of plant growth regulators
- (vi) Physiology of flowering: Photoperiodism and vernalization.
- (vii) Dormancy of seeds: Nature, causes and removal of seed dormancy, viability of seeds.

Phytochemistry

Marks: 30

- (i) Nitrogen metabolism: Nitrogen fixation and nitrogen cycle.
- (ii) Carbohydrates: Classification, common carbohydrates found in plants.
- (iii) Amino acids: Classification, structure and synthesis of amino acids.
- (iv) Vitamins: Definition, origin, types and deficiency diseases caused by Vitamin-A, B, B₂ and C
- (v) Enzymes: Definition, nomenclature, classification with examples, mechanism of action.

Agronomy and Horticulture

Marks: 30

- (i) Definition and scope of Agronomy and Horticulture, classification of field crops.
- (ii) Seeds: Characteristics of a good seed, procurement, quality of seeds, seed treatment.
- (iii) Fertilizers: Definition, classification of fertilizers, composition, dosage, application time and procedure.
- (iv) Crop rotation: Significance, common weeds and their control.
- (v) Preparation of seed bed, sowing and seedling growth; pre-and post-transplanting care.
- (vi) Cultivation of tomato, mango and rose.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 133003 | Paper-VI | Genetics, plant Breeding, Evolution, Biotechnology and Biostatistics. | 100 | 4 |

Genetics

Marks: 30

- (i) Mendelism, exceptions of Mendel's laws.
- (ii) Linkage and crossing over; Linked genes and recombination of linked gene.
- (iii) Biochemical structure of DNA and RNA; replication of DNA
- (iv) Mutation: Definition, types of mutation and mutagens, detection of mutation in *Drosophila* by CIB method.

- (v) Sex determination: Different methods of sex determination with examples (XX-XO type, XX-XY type)
- (vi) Polyploids and their economic importance plant breeding and evolution

Plant Breeding and Evolution

Marks: 30

- (i) Introduction: Definition, scope and objectives of Plant Breeding.
- (ii) Hybridization: Objectives and techniques of artificial hybridization.
- (iii) Breeding techniques in self pollinated crops: Methods, merits and demerits of pure line selection and pedigree method.
- (v) Theories of evolution, Darwins theory, Lamarck's theory and mutation theory of evolution.

Biotechnology

Marks: 20

- (i) Definition, scope, importance and achievements of biotechnology.
- (ii) Plant tissue culture: Direct and indirect methods of *in vitro* culture, culture medium, production of disease free plants and commercial aspects of tissue culture.
- (iii) Biogas technology: Production methods and uses.
- (iv) Biofertilizers: Definition, production methods and uses.

Biostatistics

Marks: 20

- (i) Definition and scope of biostatistics, idea of continuous and discontinuous variables, concept of population and sample.
- (ii) Parameters of measures of central tendency (mean, mode, medium) and dispersion (range, variance, standard deviation and co-efficient of variation).

Books Recommended:

Microbiology:

1. Brock, T.D., W.S. David and T.M. Michael : 1984. Biology of Microorganisms. Prentice-Hall Engle Wood, Cliffs, New Jersey.
2. Dubey, R. C. and D. K. Maheshwari : 1999. A text book of Microbiology. S. Chand and Co. Ltd.
3. Frobisher, M., R.D. Hinsdill, K. T. Grabtree and C.R. Goodheart: 1947. Fundamentals of Microbiology (9th ed.). W.B. Saunders Co. London.
4. Pelczer, M.J., E.C. Chan and N.R. Krieg: 1993. Microbiology: Concepts and Application. McGraw Hill Book Co. Inc. New York.
5. Tortora, G.J., B.R. Funke and C. L. Case: 1997. Microbiology (6th ed.) Addison Wesley Longman, Inc., California.
6. ইসলাম, এম. রফিকুল, মিহির লাল সাহা এবং এম. এ. বাসার : ২০০৪. অনুজীব বিজ্ঞান, হাসান বুক হাউজ, ঢাকা।
7. খান. এ. এ. : ২০০০. মাইক্রোবায়োলজি, দোলন চাপা, কাজী প্রকাশনী, ঢাকা।

Phycology:

1. Bold, H.C. and M.J. Wynne : 1978. Introduction to the Algae, Prentice Hall, India.
2. Chapman, V. J. and D. J. Chapman: 1983. The Algae, Macmillan, London.
3. Fritsch, F.E. : 1946. The Structure and Reproduction in Algae. Vol. I, Cambridge Univ. Press, London.
4. Lee, R.R. : 1989. Phycology, Cambridge Univ. Press, U.K.
5. Prescott. C.W. : 1968. The Algae: A review. Thomas Nelson, London.

6. Smith, G.W. : 1950. The Fresh Water Algae of the United States. McGraw Hill Book Co. Inc., New York.
7. Van dan Hoek, C.D.G. Mann and H. M. Johns: 1966. Algae: An Introduction to Phycology, Cambridge Univ. Press.
8. খান. এ. এ. : ২০০০. মাইক্রোবায়োলজি, দোলন চাপা, কাজী প্রকাশনী, ঢাকা।

Mycology:

1. Alexopoulos, C.J., C.W. Mims and M. Blackwell : 1996. Introductory Mycology (4th ed.), Wiley, Eastern Ltd. Calcutta, India.
2. Hawker, Liliam, E : 1967. Fungi, Hutchinson Univ. Library, Cambridge Univ. Press, London.
3. Moore-Landecker, Elizabeth : 1982. Fundamentals of the Fungi. Prentice-Hall. Inc., New Jersey, USA.
4. Webster, J. : 1980. Introduction to Fungi. Cambridge Univ. Press, London, UK.
5. খান. এ. এ. : ২০০০. মাইক্রোবায়োলজি, দোলন চাপা, কাজী প্রকাশনী, ঢাকা।

Bryophyta and Pteridophyta:

1. Eams, A. J. : 1964. Morphology of Vascular Plants. Tata McGraw-Hill Pub. Co. Ltd. Bombay.
2. Parihar, N. S. : 1955. An Introduction to Embryophyta, Vol. I & II, Central Book Depot, Allahabad.
3. Smith, G. M. : 1955. Cryptogamic Botany. Vol. II McGraw-Hill Co. Inc., New York, London.
4. Vashista, P. C. : 1993. Botany for Degree Students: Pteridophyta. S. C. Chand & Co. Ltd. Ramnagar, New Delhi.

Gymnosperms:

1. Arnold, C. R. : 1977. An Introduction to Palaeobotany. Tata McGraw Hill Pub. House, New Delhi.
2. Biswas, C. and B. M. Johri: 1997. The Gymnosperms. Norasa Pub. House, New Delhi.
3. Coulterm, J. M and C. J. Chamberlain: 1964. Morphology of Gymnosperms. Central Book Depot, Allahabad, India.
4. Mukherji, H. : 1997. Plant Groups. New Central Book Agency, Ltd. Calcutta.
5. Parihar, N. S. : 1995. An Introduction to Embryophyta Vol. I & II. Central Book Depot. Allahabad
6. Sharma, O. P. : 1980. Gymnosperms – A treatise, Progati Parkashan, Meerut, India.
7. Smith, G.M. : 1955. Cryptogamic Botany. Vol. II. Bryophyta & Pteridophyta, McGraw Hill Co. London.
8. Vashishta, P.C. : 1994. Botany for Degree Students. Vol. V. Gymnosperms. S. Chand and Co. Ltd. Ramnagar, New Delhi.

Plant Pathology:

1. Agrios, G.N. : 1997. Plant Pathology (4th ed.) Academic Press, London.
2. Fahy, P. C. and G.J. Persley : 1983. Plant bacterial disease. A diagnostic guide, Academic Press, London.
3. Mehrotra, R.S. : 1980. Plant Pathology. Tata McGraw-Hill Pub. Co., Ltd.

- New, Delhi.
4. Rangaswami, G. : 1972. Diseases of crop plants in India. Prentice-Hall of India Private Ltd., New Delhi.
 5. Singh, R.S. : 1978. Plant Diseases. Oxford & IBH Pub. Co., New Delhi.
 6. খান. এ. এ. : ২০০০. মাইক্রোবায়োলজি, দোলন চাপা, কাজী প্রকাশনী, ঢাকা।

Angiosperms:

1. Davis, P. H and V.H. Heywood : 1963. Principles of Angiosperm Taxonomy. Oliver Boyd, Edinburgh and London.
2. Hooker, J.D. : 1887-1897. Flora of British India, Vols. 1-7.
3. Jeffrey, C. : 1986. An Introduction to Plant Taxonomy (2nd edition), Cambridge Univ. Press.
4. Kapoor-Vijay, P. and James White (ed.): 1992. Conservation Biology: The Commonwealth Sciences Council.
5. Khan. M.S. and M. Halim : 1967. Aquatic Angiosperms of Bangladesh, BARC, Dhaka.
6. Khan. M.S. (ed.). : 1973-1993. Flora of Bangladesh; fascicles 1-51, BARC, Dhaka.
7. Lawrence, G.H.M. : 1951. Taxonomy of Vascular Plants. The Macmillan Co. New York.
8. Prain, D. : 1903. Bengal Plants. Vols. 1-2, Botanical Survey of India, Calcutta.
9. হাসান, এম.এ. এবং এম. কে. আলম : ১৯৯৭. উদ্ভিদ শ্রেণী বিন্যাস তত্ত্ব (৩য় সংস্করণ), হাসান বুক হাউজ, ঢাকা।

Plant Anatomy and Embryology:

1. Cutter, E.G : 1969. Plant Anatomy. Part I & II. Edward Arnold Pub., UK.
2. Eames, A.J. and L.H. MacDaniels : 1947. An Introduction to Plant Anatomy. McGraw Hill Pub. Co., New York.
3. Esau, K. : 1953. Plant Anatomy, John Wiley & Sons, Inc., New York.
4. Fahn, A. : 1969. Plant Anatomy, Pergamon Press.
5. Maheswari, P. : 1950. An Introduction to the Embryology of Angiosperms. Tata McGraw-Hill Pub. Co. Ltd. Bombay, New Delhi.

Economic Botany:

1. Albert, F. H. : 1972. Economic Botany. Tata McGraw Hill Pub. Co. Ltd., New Delhi.
2. Cotton, C.M. : 1990. Ethnobotany – Principles & Application.
3. Hill, A. F. : 1951. Economic Botany, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
4. Jain, S. K. : 1997. Indian Ethnobotany, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
5. Pandey, B. P : 1978. Economic Botany, S. Chand and Co., New Delhi.
6. হাসান, এম. এ. : ১৯৯৬. বাংলাদেশের ভেষজ উদ্ভিদ, আশরাফিয়া বই ঘর, বাংলাবাজার, ঢাকা।
7. আহমেদ, সামসুদ্দিন : ১৯৯৬. বাংলাদেশের লোকজ বনৌষধি, হাসান বুক হাউজ, বাংলা বাজার, ঢাকা।

Plant Ecology & Environmental Science:

1. Bannister, P. : 1976. Introduction of Physiological Plant Ecology. Black well Scientific Publications.

2. Kershaw, K.A. : 1973. Quantitative and dynamic Plant Ecology, Edward Arnold Ltd.
3. Kumar, H.D. : 1995. General Ecology, Vikash Pub. House, India.
4. Kumar, H.D. : 1995. Modern concepts of Ecology, Vikash Pub. House, India.
5. Odum, E.P. : 1971. Fundamentals of Ecology, Toppan Co. Ltd. Japan.
6. Poole, R.W. : 1974. An Introduction of Quantitative Ecology, McGraw-Hill Book Co., New York.
7. Sharma, P.D. : 1995. Ecology and Environment, Rastogi Pub.
8. Shukla and P.S. Chandel : 1991. Plant Ecology and Soil Science, S.Chand & Co., India.

Cytology:

1. Dupraw E. J. : 1970. DNA and Chromosomes, Holt, Rinehart and Winston, New York.
2. Gupta, M.L. and M.L. Jangir : 1998. Cell Biology: Fundamentals and Applications, Agro Botnika, New Delhi.
3. Sharma, A. : 1976. The Chromosomes. Oxford & IBH Pub. Co., New Delhi.
4. Wilson, G. B. and J. H. Morrison: 1966. Cytology, Litton Educational Pub. Inc., New York.
5. জামান, এম. এ. : ১৯৭৫. কোষবিদ্যা, বাংলা একাডেমী, ঢাকা।
6. সুহিত গুহ : ১৯৭৮. সাইটোলজি, পশ্চিম বঙ্গ রাজ্য পুস্তক পর্ষদ।

Plant Physiology:

1. Goodwin, T.W. and E. I. Mereer: 1983. Introduction to Plant Biochemistry (2nd ed.). Pergamon Press.
2. Hess, D. : 1975. Plant Physiology. Springer International Student Edition.
3. Pandey, S.N. and B.L Sinha: 1990. Plant Physiology (2nd ed.) Vikash Pub House Pvt. Ltd.
4. Salisbury, F. B. and C. Ross : 1969. Plant Physiology. Wardsworth Pub. Co. Inc., Belmont, California.
5. কর্মকার : ২০০০. উদ্ভিদ শরীর বিজ্ঞান, হাসান বুক হাউজ, ঢাকা।

Phytochemistry:

1. Goodwin, T. W. and E. I. Mereer : 1983. Introduction to Plant Biochemistry (2nd ed.). Pergamon Press.
2. Jain, J.L : 1983. Fundamentals of Biochemistry (2nd ed.). S. and Co. Ltd. New Delhi.
3. Srivastava, H.S. : 1990. Elements of Biochemistry. Rastogi Publication Meerut.
4. Varner, J.E. and J. Bonner : 1965. Plant Biochemistry. Acad. Press, New York, London.

Genetics:

1. Benjamin Lewin : 2000. Gene 2000. Oxford University Press and Cell Press.
2. Gordner, E. J. : 1960. Principles of Genetics. John Wiley and Sons, Inc. New York, London.

3. Singleton, W.R. : 1967. Elementary Genetics. D. Von Nostrand Co., Inc., Canada.
4. Sinnot, E. W., L.C. Dunn and Th. Dobzlaansky: 1985. Principles of Genetics. (5th ed.). McGraw-Hill Book Co. Inc., New York, London.
5. Snustad, D.P. et al. : Principles of Genetics, John Willey & Son, Inc.
6. Strickberger, M.W. : 1996. Genetics. MacMillan Pub. Co. Inc., New York, London.
7. Whilehouse, H. L. K. : Towards an Understanding of the Mechanism of Heredity, Edward Arnold. England.
8. ইসলাম, এ. এস. : ১৯৮৪. বংশগতি বিদ্যার মূল কথা, বাংলা একাডেমী, ঢাকা।
9. আখতার-জামান : বংশগতি বিদ্যা, বাংলা একাডেমী, ঢাকা।

Plant Breeding:

1. Allard, R.W. : 1999. Principles of Plant Breeding. (3rd ed.). John Wiley & Sons. Inc., New York.
2. Chaudhury, H.K : 1978. Elementary Principles of Plant Breeding. Oxford & IBH Pub. Co., New Delhi.
3. Dana, S. : 2001. Plant Breeding, Naya Udyog, Calcutta.
4. Simonds, N.W. : 1979. Principles of Plant Improvement, Longman Group Ltd. London
5. Singh, B.D. : 1995. Plant Breeding-Principles and Methods, (5th ed.). Kalyani Publishers, New Delhi.
6. Sinha, U. and S. Sinha: 1977. Cytogenetics, Plant Breeding and Evolution, Vikas Publ. House, Pvt. Ltd. New Delhi.
7. ভূইয়া, এম. এস. রশীদ: ১৯৯২. উদ্ভিদ প্রজনন, বাংলা একাডেমী, ঢাকা।

Practical

Marks: 100

1. Morphological and microscopic examination of Bacteria, Algae and Fungi included in the syllabus.
2. Morphological and microscopic examination of Bryophytes, Pteridophytes and Gymnosperms included in the syllabus.
3. Anatomy of root, stem (primary and secondary) with single staining technique.
4. T.S. of Anther and ovary.
5. Preparation of root tip squash using acetocarmine to observe and identify different stages of mitosis.
6. Morphological and anatomical adaptations of plants in different ecological conditions.
7. Preparation of lactophenol and cotton blue. Working out of the plant diseases included in the syllabus.
8. Working out of locally available angiosperms and members of the angiospermic families included in the syllabus. Technique of preparation of herbarium sheets.
9. Preparation of compost and seed bed. Raising seedling, vegetative propagation by cutting, budding and layering. Practices of pruning and training in garden plants. Transplantation of rice and vegetables.
10. Setting up of the physiological experiments on osmosis, photosynthesis and respiration in order to know the working principles and expected results.
11. Determination of emasculation and crossing technique.
12. Study of plant population by quadrat method.
13. i) Identification: fertilizers, seeds, vegetables and fruits.
ii) Museum specimens and permanent slides.
iii) Botanical names of available local plants.

- iv) Economic products included in the syllabus.
- v) Plants of morphological and ecological interest
- 14. Excursion shall be performed in order to study and collect plants from natural habitats, records of field trips should be maintained properly.
- 15. Practical note book should be maintained properly and regularly signed by course teacher.
- 16. Practical class records duly signed by course teacher and herbarium sheets as well as other collections have to be submitted on the day of practical examination.
- 17. Viva-voce will be held during the practical examination.

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------|--------------|----------------|
| 133004 | Paper-VII | Practical | 100 | 4 |

| | | |
|-----|---|----|
| 01. | Bacteria/Algae/Fungi/Plant Pathology | 10 |
| 02. | Bryophytes/Pteridophytes/Gymnosperms | 10 |
| 03. | Taxonomy | 12 |
| 04. | Anatomy (Secondary growth of dicot stem and root) | 12 |
| 05. | Cytology/Plant Breeding/Physiological experiments | 10 |
| 06. | Ecological adaptations (two specimens) | 04 |
| 07. | (i) Identification: (5 specimens) | 10 |
| | (ii) Botanical names of 2 angiosperms | 02 |
| 08. | Collections | 05 |
| 09. | Practical Note Book and Excursion report | 10 |
| 10. | Viva-voce | 15 |

NATIONAL UNIVERSITY



Syllabus

Subject: Chemistry

Three Year B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: Chemistry
Session: 2013-2014

Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|------------|----------------------------|-------|---------|
| First Year | | | | |
| 112801 | Paper-I | Physical Chemistry | 100 | 4 |
| 112803 | Paper-II | Organic Chemistry | 100 | 4 |
| Second Year | | | | |
| 122801 | Paper-III | Inorganic Chemistry | 100 | 4 |
| 122803 | Paper-IV | Synthetic Organic Polymers | 100 | 4 |
| Third Year | | | | |
| 132801 | Paper-V | Industrial Chemistry | 100 | 4 |
| 132803 | Paper-VI | Analytical Chemistry | 100 | 4 |
| 132804 | Paper- VII | Practical | 100 | 4 |
| | | Total = | 700 | 28 |

**Detailed Syllabus
First Year**

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|--------------------|-------|---------|
| 112801 | Paper-I | Physical Chemistry | 100 | 4 |

1. State of aggregation of matter: General discussion.
2. **Gaseous state:** The gas laws. kinetic theory of gases, deviation from ideal behaviour. Amagat's curves. Van der Waals equation. Andrew's isotherms. Iequification of gases. Joule-Thompson effect. critical phenomena. molecular weights from gas density, abnormal molecular weights, thermal dissolution.
3. **The Liquid state:** The vapour pressure of liquids, intermolecular forces, surface tension and viscosity of liquids, molecular structure and its relationship with surface tension, viscosity, optical rotation and dipole moment.
4. **Thermodynamics:** Work, energy and heat; first law of Thermodynamics, internal energy, enthalpy, laws of Thermochemistry. heat of reaction formation etc, heat capacities of substances. Kirchoffs equation.
Reversible and irreversible process, isothermal and adiabatic processes; second law of thermodynamics, Carnot cycle, entropy, free energy, Gibb's-Helmholtz equation, Clausius-Clayron equation.
5. **Solution properties:** Dalton's law of partial pressure, Henry's law and distribution law and their simple applications (association dissociation and solvent extraction).
6. **Colligative properties:** Raouit's laws of lowering of vapour pressure, elevation of boiling point and depression of freezing point, osmotic pressure, their experimental determination.

7. **Homogeneous equilibrium:** Law of mass action, its enunciation and mathematical formulation of equilibrium constant and its application to chemical reactions, principle of mobile equilibrium and its application to industrial reactions.
8. **Phase rule:** Simple one component systems, simple two component system with and without compound formation, partly miscible liquid pairs, principles of fractional distillation.
9. **Surface chemistry and colloids:** Different types of adsorption: Langmuir adsorption isotherm, classification of colloids, importance of colloids.
10. **Chemical kinetics:** First and second order reactions and their simple treatment, determination of order of reaction, simple theories of reaction rate (Only outline of Arrhenius). Catalysis (elementary treatment).

Books Recommended:

- | | |
|----------------------------|--|
| 1. Afinolley | : <i>An Introduction to Physical Chemistry</i> |
| 2. Daniels and Alberty | : <i>Physical Chemistry</i> |
| 3. A. R. Chowdhury | : <i>Chemistry Fundamentals</i> |
| 4. M. Haque & Y. A. Mollah | : <i>Principles of Physical Chemistry</i> |
| 5. নূরুল হক ও মহির উদ্দিন | : <i>ভৌত রসায়ন পরিচিতি</i> |
| 6. সিরাজুল ইসলাম | : <i>প্রাথমিক ভৌত রসায়ন</i> |
| 7. পাল ও চক্রবর্তী | : <i>ভৌত রসায়ন</i> |
| 8. পালিত | : <i>ভৌত রসায়ন</i> |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------|-------|---------|
| 112803 | Paper-II | Organic Chemistry | 100 | 4 |

1. **Fundamentals:** Purification and analysis of organic compounds, hybridization, nomenclature and structure of organic compounds.
2. **Aliphatic compounds:**
 - 2.1 **General knowledge of the following terms:** Free radicals, inductive effects, tautomerism, resonance, carbonium ions and carbanion.
 - 2.2 **Isomerism:** A general knowledge of isomerism including optical isomerism of substances containing one and two asymmetric carbon atoms and geometrical isomerism of carbon compounds.
 - 2.3. **Aliphatic compounds:** A general study, nomenclature, general methods of preparations, physical properties, reactions with special reference to functional groups and characteristic reactions and important uses of alkanes, alkynes, alkenes, alkylhalides, hydroxy compounds, ethers, amines, aldehydes, ketones, carboxylic acids and their esters halides, anhydrides and amides.
3. **Aromatic compounds:** A general study of the hybridization and structure of benzene; resonance and delocalization. isomerism in benzene substitution, preparation & reactions of benzene, aromatic halides, phenols. aldehydes, ketones, carboxylic acids, nitro, amino and diazonium compounds. polynuclear aromatic hydrocarbons with special reference to the chemistry of naphthalene.
6. **Important reactions:** General principles and applications of some important reactions: Wurtz-Fitting. Williamson synthesis, Malonic and acetoacetic ester synthesis, Grignard

reaction. Sandmeyer reaction. Friedel-Crafts reaction. Aldol condensation, Cannizzaro reaction. Perkin reaction.

7. **Heterocyclic compounds:** Furan, pyrrole, thiophene and pyridine- their preparation and properties.
8. **Study of Carbohydrates:** With special reference to glucose, fructose, mutarotation, Kiliani reaction and Ruff's degradation.

Books Recommended:

1. I. L. Finar : *Organic Chemistry (Vol.I)*
2. J. Conant : *The Text Book of Organic Chemistry*
3. Ahmad & Miah : *Organic Chemistry*
4. English & Cassidy : *Principles of Organic Chemistry*
5. A. Khaleque : *Organic Chemistry*
6. মফিজুদ্দিন আহমেদ ও জব্বার মিয়া : *জৈব রসায়ন*
7. পাল ও চক্রবর্তী : *জৈব রসায়ন*
8. রবীন্দ্রনাথ ঘোষ : *জৈব রসায়ন*
9. নূরুল হক ও মহির উদ্দিন : *জৈব রসায়ন পরিচিতি*

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|---------------------|-------|---------|
| 122801 | Paper-III | Inorganic Chemistry | 100 | 4 |

1. Atomic structure: General study of the modern concept of the structure of atom. Rutherford atom model, Bohr's atom model; quantum numbers, Pauli's exclusion principle, electronic configurations of elements; elementary ideas about the wave nature of electrons; atomic orbitals.

2. Periodic classification: General survey of the classification of elements; periodic nature as related to the atomic structure. modern periodic table: its constitution; s-block, p-block, d-block & f-block elements, change of properties of elements in periods & groups.

3. Sizes of atoms and ions: Atomic and ionic radii-ionization potential, electron affinity, electronegativity and their influences on the properties of molecules.

4. Bonding: Elementary ideas about the electronic theory of bonding, different bonds; hybridization of orbital, bond length, bond strength and bond angles, shapes of molecules.

5. Transition metals: General chemistry of transition elements with reference to the elements of the first transition series (3d elements).

6. Acids and bases: Modern views about acids and bases, theories and their applications and limitations. strength of acids.

7. Group chemistry: Brief general study of the following groups of elements in the periodic table with reference to properties and uses of elements and their important compounds with special emphasis to comparative chemistry.

i) Inert gases ii) Alkali and coinage metals iii) Alkaline earth metals iv) Group-III v) Group-IV vi) Group-V vii) Group-VI viii) Group-VII. Elements.

8. Radio-activity: Discovery of radioactivity, concepts of half life, and disintegration constant of radioelements, uses of radioisotopes. Typical examples and elementary idea about artificial radio-activity and nuclear reactions.

9. Co-ordination compounds: Classification; Werner's theory and electronic interpretation of the structure and isomerism in 6-coordinated complexes (elementary treatment only).

10. Principles of analytical chemistry: Theoretical principles of qualitative and quantitative analysis.

Books Recommended:

1. S. Z. Haider : *Introduction to Modern Inorganic Chemistry*
2. G. S. Gilreath : *Fundamental Concept of Inorganic Chemistry*
3. T. Moellar : *Inorganic Chemistry*
4. এ কে এস আহমদ : *অজৈব রসায়ন*
5. সায়েম এ লতিফ : *অজৈব রসায়ন*
6. নূরুল হক ও মহির উদ্দিন : *জৈব রসায়ন পরিচিতি*
7. রবীন্দ্রনাথ ঘোষ : *অজৈব রসায়ন*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|----------------------------|-------|---------|
| 122803 | Paper-IV | Synthetic Organic Polymers | 100 | 4 |

1. Classification of Polymers & Polymerization Process: Addition (chain reaction) and condensation (step reaction) polymerizations

2. Fundamental concept of the Following Polymer: Homopolymers and heteropolymers. low density and high density polymers and their properties. Copolymers, alternating, random, block and graft copolymers. elastomer, thermoplastic and thermosetting polymers and their properties. fiber and elastomer.

3. Mechanism of polymerization: Radical, cationic and anionic polymerization, and their kinetics, chain termination, chain transfer, chain retardation and chain inhibition.

4. Co-ordination polymerization: Fluid-bed process, Ziegler-Natta catalysis, mechanism of co-ordination polymerization and its kinetics, metal oxide catalyzed and olefin polymerizations. ring opening polymerization.

5. Configuration of polymers: Syndiotactic, isotactic, atactic polymers.

6. Some important polymers: Production of monomer unit, physical properties and important uses of polythene, polyvinylchloride (PVC), polystyrene, polybutylene, polybutadiene-styrene, neoprene, polymethylmethacrylate, polyacrylonitrile, polyvinylacetate, polyamides: Nylon 6, Nylon 66, Nylon 11 and Nylon 12, silk and wool.

8. Thermosetting resins: Phenol-formaldehyde, phenol-urea, melamine-formaldehyde polymers, their preparation and uses. Epoxy resins and polyurethanes.

Books Recommended:

1. R.T. Morrison and RN Boyd Fifth edition : *Organic Chemistry*
2. F.W. Billmeyer, JR : *Text book of polymer science*

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------|-------|---------|
| 132801 | Paper-V | Industrial Chemistry | 100 | 4 |

- 1. Fundamentals to the development of a chemical industry:** Future prospect of different types of chemical industries in Bangladesh. general ideas regarding unit processes and unit operations.
- 2. Natural gas and urea fertilizer industries:** Composition of natural gas and its survey in Bangladesh, Purification of natural gas, manufacture of ammonia and urea from natural gas.
- 3. Phosphoric and sulfuric acids:** Manufacture of phosphoric and sulfuric acids, triple super phosphate, calcium phosphate.
- 4. Cement industry:** Raw materials, composition, methods of manufacture of portland cement, types of cement, setting and hardening of cement.
- 5. Glass industry:** Basic raw materials and manufacturing processes of glass, their composition and users.
- 6. Oils, fats, waxes, soap, and detergent:** Manufacturing of soap and detergent. concept of soap and detergents and their action.
- 7. Pulp and paper industry:** Concept of cellulose structure. natural sources of cellulose and their composition. different processes for the manufacturing of paper from pulp.
- 8. Synthetic fibres:** Rayon, nylon and cellulose acetate.

Books recommended:

1. R. N. Shreve and J. A. Brink, Jr., McGraw-Hill Inc. : Chemical Process Industries
2. B. K. Sharma, Geol Publishing House. : Industrial Chemistry
3. J. A. Kent edited, Van Nostrand. : Reagent's Hand Book of Industrial Chemistry
4. G. T. Austin edited, McGraw-Hill. : Chemical Process Industries
5. W. D. Callister, Jr., John Wiley & Sons, Inc. : Materials Science and Engineering – An Introduction
6. J. H. Block and E. B. Roche, Lea and Febiger Pub. : Inorganic Medicinal and Pharmaceutical Chemistry
7. H. J. M. Bowen, The Royal Society of Chemistry. : Environmental Chemistry Vol. I - III

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|----------------------|-------|---------|
| 132803 | Paper-VI | Analytical Chemistry | 100 | 4 |

- 1. Basic concepts in analytical chemistry and statistical treatment of data:** Analytical detection and quantification, sensitivity, selectivity, specificity, concentration limit, dilution limit etc. of chemical reactions, sample containers, sample preservation, sampling, sample dissolution, wet ashing and dry ashing, reagents and reactions, population and sample mean, standard deviation, relative standard deviation, coefficient of variation, variance, confidence limit, Gaussian distribution, statistical tests – the F test, the T test, the Q test, regression lines, least square method, coefficient of correlation.
- 2. Volumetric analysis:** Principle, apparatus, end point, indicator, general factors influencing volumetric method, advantages, acid-base titrations, redox titrations, complexometric titrations – complexing agents, influence of $[H^+]$ on complexation.

3. **Gravimetric analysis:** Introduction, general requirements of a gravimetric method, precipitation from homogeneous solution.
4. **Spectrophotometric analysis:** Ultraviolet and visible radiation, absorbance, transmittance, absorptivity, the Beer-Lambert's law, limitations of Beer-Lambert's law, basic components of a spectrophotometer, qualitative and quantitative analysis.
5. **Thermal analysis:** Thermogravimetry (TG), types of TG, instrumentation, application of TG, differential thermal analysis (DTA): working principle, instrumentation, factors affecting DTA, applications, differential scanning calorimetry (DSC): working principle, instrumentation and applications.
6. **Atomic spectrometric methods:** Atomic absorption and atomic emission, absorption line width, choice of absorption line, flame emission spectrometry: instrumentation, flame emission analysis, atomic absorption spectrophotometry: principles, instrumentation and interferences, hydride vapour generation technique, cold vapour technique, advantages and disadvantages of AAS.
7. **Voltammetric analysis:** Diffusion current, half wave potential, oxygen interference, cyclic voltammetry(Cv), quantitative applications.

Books Recommended:

1. D. A. Skoog, D. M. West, F. J. Holler : Fundamentals of Analytical Chemistry and S. R. Crouch, Saunders College Publishing.
2. G. D. Christian, John Wiley & Sons. : Analytical Chemistry
3. D. Harvey, McGraw-Hill Higher Education : Modern Analytical Chemistry
4. A. I. Vogel, Longman, Green and Co. Ltd : A Text Book of Quantitative

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|------------|-------------|-------|---------|
| 132804 | Paper- VII | Practical | 100 | 4 |

For B.Sc (Pass) Course (Two days of 6 hours duration each day)

Marks distribution:

- | | |
|--|------------------|
| 1. Inorganic qualitative analysis | 30 Marks |
| 2. Organic qualitative analysis | 25 Marks |
| 3. Inorganic quantitative/Physical chemistry | 20 Marks |
| 4. Lab note book | 10 Marks |
| 5. Viva-voce | 15 Marks |
| Total = | 100 Marks |

Experiments:

- A. **Inorganic Qualitative Analysis:** Qualitative analysis of mixture of inorganic compounds containing three radicals, two basic and one acid (including interfering radicals by classical or semi-micro methods).
- B. **Inorganic qualitative Analysis:**
 - i) Acidimetry and Alkalimetry: Preparation of N/10 HCl, H₂SO₄ and CH₃, COOH solutions and their standardisation.

- ii) Determination of Na_2CO_3 content in washing soda.
- iii) Determination of mixture of carbonate and caustic soda
- iv) Oxidation-reduction titration's involving.
 - a) Preparation and standardization of N/10 KMnO_4 sodium oxalate solution.
 - b) Determination of ferrous iron using standard KMnO_4 solution.
 - c) Determination of Ca in CaCO_3 by standard KMnO_4 solution.
 - d) Preparation of standard N/10 $\text{K}_2\text{Cr}_2\text{O}_7$ solution and determination of ferrous iron by using internal indicators.
 - e) Determination of Cu iodometrically.

Physical Chemistry:

1. Determination of molecular weight by
 - a) Vapour density method
 - b) Depression of freezing point or elevation of boiling point.
 2. Thermochemical measurements; heat of neutralization and heat of solution calorimetrically.
 3. Rate of inversion of sucrose to be followed by a polarimeter.
 4. Experiment involving distribution law: Determination of partition co-efficient, molecular association and equilibrium constant.
 5. Measurements of electrolytic conductance and two typical conductometric titrations of strong acid-strong base and weak acid-strong base.
 6. Determination of solubility of a solid at various temperatures and calculation of its heat of solution.
- C. Organic qualitative analysis: analysis of organic compounds, such as amine (primary, secondary and tertiary), aldehydes, ketones, carboxylic acids, phenols and nitrocompounds (containing only one functional group).

The analysis should include the following:

- i) Elemental analysis (N.S. and halogen).
- ii) Solubility tests with the following solvents.
 - a) Water
 - b) 5% Solution of sodium bicarbonate, sodium hydroxide and hydrochloric acid
 - c) Concentrated sulphuric acid
- iii) Functional group analysis

Book Recommended:

1. A. I. Vogel : *A. Text Book of Quantitative Inorganic Analysis*
2. A. I. Vogel : *A. Text Book of Qualitative Inorganic Analysis*
3. Jabbar & Haque : *Practical Chemistry*
4. Shriner & Fuson : *Systematic Identification of Organic compounds*
5. নরুল হক ও মহির উদ্দিন : ব্যবহারিক রসায়ন
6. হাজারী, গুপ্ত ও দে. : স্নাতক জৈব রসায়ন

NATIONAL UNIVERSITY



Syllabus

Subject: Computer Science

Three Years B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Years B.Sc. Pass Course
Subject: Computer Science
Session: 2013-2014
Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|-----------|--|-------|---------|
| First Year | | | | |
| 115001 | Paper-I | Computer Fundamental and Programming Language | 100 | 4 |
| 115003 | Paper-II | Data Structure and Algorithms | 100 | 4 |
| Second Year | | | | |
| 125001 | Paper-III | Database Management System and Information System Design | 100 | 4 |
| 125003 | Paper-IV | Data Communication and Computer Network | 100 | 4 |
| Third Year | | | | |
| 135001 | Paper-V | E-Commerce and Web Engineering | 100 | 4 |
| 135003 | Paper-VI | Operating System and Multimedia | 100 | 4 |
| 135004 | Paper-VII | Practical: | 100 | 4 |
| | | Programming Language Lab Data Structure and Algorithms Lab Database Management System Lab Data Communication and Networking Lab | | |
| | | Total= | 700 | 28 |

Detailed Syllabus
First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|---|-------|---------|
| 115001 | Paper-I | Computer Fundamental and Programming Language | 100 | 4 |

Computer Fundamentals: Computer basics, Components of a computer system, Importance, limitations, Classifications, generations and history of computers. **Microcomputer System:** Microcomputer basics, PC and PC clones, organizations of microcomputer, Bus architecture, Motherboard and its components, Adapter boards. **Input and Output Devices:** I/O operations and interfaces, Keyboard, Pointing devices, Scanners, Monitor, Printer, Plotters, Speakers. **Microprocessors:** Functions, organization and classifications of microprocessors, Arithmetic logic unit, Control unit, RISC, CISC, Special processors. **Memory & Storage devices:** Classification, General properties, Memory hierarchies, ROM, RAM, Cache memory, Secondary memory: Hard disk, Optical disk, flash memory. **Computer Software:** Software,

Classification of software, Commercial software, Freeware, Advantages of package programs, popular package programs, Programming languages, High level languages. **System Software and Operating System:** System software, BIOS, Language translators, Text editor, OS: characteristics, Types, Linux, UNIX, MS DOS, Windows, utility programs. **Database Concepts:** Basic Concepts, database structures, Database management system, Benefits and limitations of DBMS. **Computer Networks and the Internet:** Introduction to computer network, Network terminologies, LAN topology, Transmission media, WAN, Bandwidth, Evolution of the internet, Internet services, Internet address, Electronic mail, The world wide web, introduction to some protocols. **IT Applications:** Concepts and applications of IT, Multimedia hardware and software, Ecommerce, **Security:** Computer and network security, malwares, antivirus. **Computer and Society:** Impact of computer and internet on society. **Computer Programming:** Introduction, Problem solving techniques, algorithm specification and development. Programming style, debugging and testing, documentation. Program design methodologies, structured and modular program design. **Programming Language in C:** Introduction to C, programming file structure: purpose of .h and .c files, Simple Makefile, constant, variable and data types, operator and expression, type conversion, decision making: branching and looping, arrays and strings, user defined functions, structures and union, bit field and bit-wise operations, pointer, file management in C, command line arguments, dynamic memory allocation and linked list, preprocessor, managing input/output operation.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------------------|-------|---------|
| 115003 | Paper-II | Data Structure and Algorithms | 100 | 4 |

Introduction to Data Structures, Purposes of data structure, **Array:** Insertion, Deletion, Matrix representation of arrays, Multidimensional arrays, Pointers arrays, Record structures, Parallel arrays, Sparse matrices. **Linked List:** Types of Linked Lists, Basic Operations on Linked List (Insertion, Deletion and Traverse). **Stack:** Basic Stack Operations (Push and Pop), Infix, Postfix and Prefix Notation of Arithmetic Expressions, Conversions and Evaluations of Arithmetic Expressions Using Stack, **Recursion:** Direct and indirect recursion, Simulation of recursion, Depth of recursion, Removal of recursion. Problem of Towers of Hanoi. **Queue:** Types of Queue, Basic Queue Operations (Insertion and Deletion). **Searching:** Sequential Searching, Binary Searching, **Basic Sorting:** Quick Sort, Merge Sort, Selection Sort, Inserting Sort, Radix Sort, Counting Sort, External Sort, **Binary Tree:** Binary tree representation, Traversal of Binary Tree (Inorder, Preorder and Postorder), Application of Binary Trees. Binary Search Tree, **Heap – Max and Min Heap,** Operations on Heap (Insertion and Deletion), Heapsort, Priority Queue , **General Tree:** Representation of General Tree, Conversion Algorithm (General Tree to Binary Tree), **Balanced Tree:** Basic Concepts of 2-3 Tree, 2-3-4 Tree, AA Tree and AVL Tree, B-Tree and Basic Operations on B-Tree, Huffman Codes and Compression Algorithm, Disjoint Set and Operations and Disjoint set forests, **Graphs:** Graph Representation, Basic Operations on Graph (Node/Edge Insertion and Deletion), **Hashing:** Hash Function and Overflow Handling, Open Hashing and Close Hashing, Linear Probing, Quadratic Probing, Double Hashing, randomize hash. **Files:** File queries sequential organization. Indexing Technique: Cylinder + surface indexing, Hash indexes trees, Indexing-Btrees, Tree indexing. **Algorithms:** The role of algorithms in computing. **Complexity Analysis:** Growth of a function, Asymptotic notation and Runtime analysis of Algorithms. **Recurrence Relation:** Methods to solve recurrences, Substitution method, Recursion tree method, Master method. **Graph related algorithms:** Breadth First search, Depth First Search, Topological sort, Strongly connected components, Euler Path, Articulation Point. **Shortest Path:** Dijkstra's shortest path algorithm, The Bellman-Ford algorithm for single source shortest path, The Floyd-Warshall algorithm for all-pair shortest path. **Divide and Conquer:** basic idea, properties, Applications, Counting Inversions, Closest pair of points, etc. **Dynamic Programming:** Basic idea, Comparison with Divide and Conquer, Memorization. Application of Dynamic programming: Coin related

problems, Longest Increasing Sequence (LIS), Longest Common Subsequence (LCS), 0/1 Knapsack problem, Matrix Chain Multiplication, etc. **Greedy method:** Elements of greedy method basic control structure, Comparison with dynamic programming and Divide and Conquer. Application of Greedy method: Minimum spanning tree: The algorithms of Prim & Kruskal, Job sequencing with deadline. **Backtracking:** Basic idea behind backtracking, control structure. Application of backtracking: Permutation & Combination Generation, Graph coloring problem, n-queens problems, Hamiltonian Cycle etc. Branch and Bound. **Network Flow:** Flow networks, The Ford-Fulkerson method, maximum bipartite matching, Maxflow-Mincut Theorem. Lower bound Theory for sorting, Exhaustive Search. **Number Theoretic Algorithms:** Extended Euclid's Theorem, Solving modular linear equations, The Chinese remainder theorem, The RSA public key encryption. **Computational Geometry related Algorithms:** Line segment intersection, Inclusion in a polygon, Finding Convex Hull: Grahams scan, Jarvis's March. **String Matching Algorithms:** Naive string matching algorithm, String matching with finite automata, The Boyer-More algorithm for string matching, Knuth-Morris-Pratt algorithm. **NP-Completeness:** Polynomial time, Polynomial Time verification, NP-completeness and reducibility, NP-Completeness proofs, NP Complete problems. **Approximation Algorithms:** Introduction, Approximation Ratio, Approximation algorithms for Vertex-Cover Problem, TSP Problem

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|--|-------|---------|
| 125001 | Paper-III | Database Management System and Information System Design | 100 | 4 |

Introduction: General overview and purpose of DBMS, advantages, applications, common features and overall structure of database. **Data modeling:** Relational model: structure of relational model, key constraints, referential integrity constraints, general constraints, relational algebra – fundamental, additional and extended operations, aggregate functions, outer joins and database modification using [RA](#). **ER** model: entity and relationship sets, constraints – key, mapping cardinality and participation constraints, strong and weak entity sets, E-R diagram, class hierarchies, aggregation, conceptual database design with the ER model, converting ER to relational model, Object-relational data model: complex data types, structured types and inheritance, implementing O-R features. **Relational database design:** Features of good relational design, functional dependency theory - basic concept, uses, closure of a set of FDs, closure of attribute sets, canonical cover, algorithms for FDs, decomposition using FDs & its desirable properties, atomic domains and first normal form, BCNF and 3NF, multivalued dependencies and fourth normal form, decomposition algorithms for different normal forms, database design process. **Database application development:** Database Management Systems (DBMS s), SQL: data definition and data manipulation languages, integrity constraints, basic queries, nested and complex queries, modification of the database, Views: definition, update on views, cursors, Extending DBMS functionality: stored procedures, assertions and triggers, embedded and dynamic SQL, DBMS administration: DBA, users, privileges, security, performance, ODBC, JDBC, Web/Database architectures. **DBMS implementation technology:** Storage and file structure: different storage types, file and record organization, data dictionary storage, Indexing and hashing: basic concepts, ordered indices, B+-tree index files, B-tree index files, static & dynamic hashing, comparison of ordered indexing & hashing. **Query processing:** overview, measures of query costs, selection operation, sorting, join operation, other operations, evaluation of expressions. Query optimization: Introduction, transformation of relational expressions, evaluation plan. **Transaction processing:** Transactions: concepts, ACID properties, transaction states, concurrent schedules, serializability - conflict and view serializability, recoverability, Concurrency control: lock-based concurrency control, two-phase

locking, problems with locking, locking and starvation, deadlock – prevention, detection and recovery. **Introduction to modern database systems:** object-relational databases, deductive databases, spatial databases, temporal databases, multimedia databases, mobile databases and advanced relational databases. **Information System Design:** Introduction to general systems theory, Players in the Systems Game, Information Systems Building Blocks. Information Systems Development, Project Management. Systems Analysis, Requirements Discovery, Deliverables, Data Modeling and Analysis, Process Modeling, Feasibility Analysis and System Proposal, Systems Design, Applications Architecture and Modeling, Database Design, Output Design and Prototyping, Input Design and Prototyping, User Interface Design, Systems Construction and Implementation, Systems Operations and Support, Object-Oriented Analysis and Modeling, Object-Oriented Design and Modeling.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|---|-------|---------|
| 125003 | Paper-IV | Data Communication and Computer Network | 100 | 4 |

Introduction: Communication models, data communication tasks, network standards and organizations. Protocol architecture, communications between layers, peer to peer communication between remote layers, service access points, service primitives and communication between adjacent layers, encapsulation of PDUs, addition of headers on transmission; removal on reception, segmentation & reassembly by protocol layers, introduction to TCP/IP model and OSI models. **Physical Layer:** Analog and digital data transmission, spectrum and bandwidth, transmission impairments, data rate and channel capacity. **Transmission Media:** Characteristics and applications of various types of guided medium. **Wireless Transmission:** Characteristics and applications of wireless transmission, terrestrial and satellite microwave, radio waves, propagation mechanism, free space propagation, land propagation, path loss, slow fading, fast fading, delay spread, inter symbol interference, VSAT. **Digital transmission:** Line coding techniques- NRZ, RZ, Manchester, and differential Manchester encoding, AMI, Block coding, analog to digital conversion based on PCM, delta modulation, etc. **Analog transmission:** ASK, FSK, PSK, QPSK, QAM encodings, AM, PM, FM, etc. **Data Transmission:** Synchronous and asynchronous data transmission techniques, interfacing and V.24BIA-232-F, Multiplexing: FDM, international FDM carrier standards, synchronous TDM, international TDM carrier standards, statistical time division multiplexing. **Spread Spectrum:** Frequency hopping spread spectrum, direct sequence spread spectrum, code division multiple access. **High speed digital access:** DSL, SONET, SDH, etc. **Data Link Layer:** Error Detection and Correction; parity check, CRC, forward error correction technique, linear block code, hamming code, etc. **Data Link Control:** Line configurations, flow control and error control techniques- sliding window, stop and wait ARQ, selective reject ARQ and HDLC protocols. **Data Communication and Network:** Circuit switching network, packet switching network, X.25 etc., Introduction to telecommunication structure of public telephone system and its operation, simplex, duplex, half-duplex, full-duplex communication, etc. **Computer Networking:** Definition and types of network, point-to-point connections, circuit-switched networks, message-switched networks, packet-switched networks. types of equipment-end systems, intermediate systems (IS), client and server communication, broadcast, unicast and multicast modes, Internet service providers (ISPs). **Local Area Network:** Topologies, LAN protocols, bridges, repeaters, hub, switches, routers, Ethernet, Token ring, Fiber channel, Introduction to wireless LAN. **Application Layer:** Principles of Application Layers, HTTP, FTP, E-mail, DNS, SNMP, Socket Programming, P2P Networks. **Transport Layer:** Introduction to services, Multiplexing, UDP, Reliable data delivery, TCP, Congestion Control. **Network Layer:** Virtual Circuits, IP, Addressing, Router Internals, Routing Algorithms. **Data Link Layer:** Services, Error detection, Multiple Access Protocols, Link layer addressing, Ethernet, Switches, PPP. **Network Security:** Introduction to Cryptography, Authentication, Digital Signatures, Key Distribution and certification, Firewalls.

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|--------------------------------|-------|---------|
| 135001 | Paper-V | E-Commerce and Web Engineering | 100 | 4 |

Introduction to Internet programming, E-commerce, E-Commerce Revolution, E-commerce Organizing Themes. The Internet and World Wide Web, E-commerce Infrastructure, **E - Commerce System Models and Concepts:** B2B, B2C, C2C. The Internet: Technology, background. E-Commerce Application: A systematic approach. Choosing server software. Choosing the hardware for an E-commerce site. E-commerce Application Development: XML and XML parsing Methods, XFORMS and XHTML. Presentation layer Development (Servlet, JSP), Business Logic Layer Development(EJB), Data Layer Development(JDBC), Web Application Design pattern (MVC and other). Personalization, Testing and Debugging, Application to Application communication Protocols: SOAP, WSDL, UDDI, RMI, DCOM, CORBA etc. Security and Encryption: Security, privacy and payment. The E-commerce Security Environment, Security Model. Network-level Security: SSL, Application-level Security. SQL-injection, Form modification, cross site scripting, Privacy: P3P, Policies, Procedures; and Laws. E-commerce Payment Systems. E - Commerce Application infrastructure: J2EE, Net and Web services.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|---------------------------------|-------|---------|
| 135003 | Paper-VI | Operating System and Multimedia | 100 | 4 |

Introduction: Operating system overview, structure and components of an operating system. **System calls:** class of system calls and description. **MIPS R3000 processor:** overview and programming model, Exceptions, MIPS system call, system161. **Process and threads:** process and thread model, process and thread creation and termination, user and kernel level thread, scheduling, scheduling algorithms, dispatcher, context switch, real time scheduling, OS/161 switch. **Concurrency and synchronization:** IPC and inter-thread communication, critical region, critical section problems and solutions. **Resource management:** introduction to deadlock, ostrich algorithm, deadlock detection and recovery, deadlock avoidance, deadlock prevention, starvation. **File management:** File Naming and structure, file access and attributes, system calls, file organization: OS and user perspective view of file, memory mapped file, file directories organization, **case study:** UNIX file access permissions and rights. **File System Implementation:** implementing file, allocation strategy, method of allocation, directory implementation, UNIX i-node, block management, quota. **UNIX file management:** Berkeley fast file system (FFS) Ext2fs, Ext3fs, superblocks, partition, Ext2fs and Ext3fs Directories, supporting multiple filesystem, OS/161 VFS, UNIX buffer cache, filesystem consistency. **Memory management:** basic memory management, fixed and dynamic partition, virtual memory, segmentation, paging and swapping, MMU. **Virtual memory management:** paging, page table structure, page replacement, TLB, R3000 TLB and address space, R3000 TLB handling, exception vector, demand paging and segmentation, thrashing and performance. **I/O management:** I/O Devices, I/O Bus architecture and controller, interrupts, DMA, programmed I/O, Evolution of I/O functions, I/O software layer, Device drivers, Device independent I/O software, buffering. **Disk I/O management:** structure, performance, low-level disk formatting, Disk arm scheduling algorithm, error handling, stable storage. **Security:** threats, data security, intruders, data loss, user authentication, password security and salt, one way function, authentication using physical object, software threats, Trojan Horses, spoofing, trap doors, viruses, anti-virus approach and technique, snadbox implementation, security policy and mechanism, protection mechanism, protection domain, Access Matrix, access control list, capabilities. **RAID:** RAID 0-5, HP auto RAID. **Multiprocessor system:** UMA MP, NUMA, SMP- structure and programming model, synchronization, scheduling. **Multimedia:** Introduction, Design Concepts, Preproduction and Presentation Graphics: Presentation Graphics Design, Preproduction, Typefaces and Graphics. Desktop Publishing, Production

Planning and Design, User Interface Design, Hypermedia Authoring Concepts, Multimedia Sound, File Compression, Video Production, Digital Video, Animation, HTML & Web-Based Multimedia, Designing Web-based Multimedia, Producing Multimedia, Content & Legal Considerations for Multimedia, Content & Legal Considerations for Multimedia, Multimedia Distribution, Networking Multimedia.

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|---|--------------|----------------|
| 135004 | Paper-VII | Practical: | 100 | 4 |
| | | Programming Language Lab Data Structure and Algorithms Lab Database Management System Lab Data Communication and Networking Lab | | |

***** Programming Language Lab**

Based on Computer Fundamental and Programming Language Theory Course.

***** Data Structure and Algorithms Lab**

Based on Data Structure and Algorithms Theory Course.

***** Database Management System Lab**

Based on Database Management System and Information System Design Theory Course.

***** Data Communication and Networking Lab**

Based on Data Communication and Networking Lab.

NATIONAL UNIVERSITY



Syllabus

Subject: Geography and Environment

Three Year B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: Geography and Environment
Session: 2013-2014
Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|-----------|--|-------|---------|
| First Year | | | | |
| 113201 | Paper-I | Physical Geography & Environment | 100 | 4 |
| 113203 | Paper-II | Economic Geography | 100 | 4 |
| Second Year | | | | |
| 123201 | Paper-III | Population and Cultural Geography | 100 | 4 |
| 123203 | Paper-IV | Geography of Bangladesh | 100 | 4 |
| Third Year | | | | |
| 133201 | Paper-V | Regional Geography of South Asia (Excluding Bangladesh) | 100 | 4 |
| 133203 | Paper-VI | Geography of Human Settlements | 100 | 4 |
| 133204 | Paper-VII | Practical | 100 | 4 |
| | | Total = | 700 | 28 |

Detailed Syllabus
First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------------------|-------|---------|
| 113201 | Paper-I | Physical Geography & Environment | 100 | 4 |

- a) Physical Environment (1 Question out of 2 to be answered)
- b) Geomorphology (2 Questions out of 4 to be answered)
- c) Climatology (1 Question out of 2 to be answered)
- d) Oceanography (1 Question out of 2 to be answered)

a) Physical Environment:

1. Elements and Components of Physical Environment
2. Global Cycles and Systems of the Earth's Environment
3. The Sources of Energy for the Earth's Environment
4. Major Energy Systems of Earth and Interrelation in Environmental systems
5. The Hydrologic Cycle, Water Budget, Water Resources
6. Scope and contents of Physical Geography and Environment

b) Geomorphology:

1. Size and Shape of the Earth
2. Materials of the Earth's Crust, Rocks and Minerals
3. Sculpturing of the Land Surface: Weathering, Erosion, Transportation and Deposition
4. Tectonic Processes in the Earth's Crust
5. Earthquakes and features produced in the Earth's Surface
6. Volcanoes: Types and Features in the Earth surface
7. Works of Rivers, Wind and Glacier.

c) Climatology:

1. Composition of the atmosphere
2. Elements and Factors of Weather and Climate
3. Insolation and Temperature, Horizontal and Vertical Distribution of Temperature
4. Atmospheric Pressure and Wind System
5. Humidity, Condensation and Precipitation: Formation of Clouds, Fogs, Dews, Frosts, Snows and Hails, Types and Distribution of Rainfall
6. Tropical and Temperate Cyclones
7. Study of the Climatic Types: Equatorial, Monsoon and Mediterranean

d) Oceanography:

1. Distribution of Land and Water
2. Relief of the Ocean Floors
3. Ocean Deposits
4. Salinity of the Oceans and Seas
5. Tides and Currents of the Oceans

Books Recommended:

1. Strahler A. H. and Strahler A. N. 1992: Modern Physical Geography, 4th edition, Wiley: Singapore.
2. Blij H. J. de and Muller P. O. 1996: Physical Geography of the Global Environment, Wiley: New York.
3. Singh Savindra, 2007: Climatology, Prayag pustak Bhawan: Allahabad, India.
4. Singh Savindra, 2003: Physical Geography, Prayag pustak Bhawan: Allahabad, India.
5. আহমেদ, রফিক, ২০০০: আবহাওয়া ও জলবায়ু বিজ্ঞান, ঢাকা।
6. দাস, সুভাস চন্দ্র, ২০০২: আধুনিক সমুদ্র বিজ্ঞান, ঢাকা ।

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--------------------|-------|---------|
| 113203 | Paper-II | Economic Geography | 100 | 4 |

1. Introduction to Economic Geography

- a) Definition, Concept, Scope and Objective of Economic Geography
- b) Relation between Geography and Economics
- c) Classification of Economic Activities

2. Economic Geography of Production

2.1 Primary Activities

- a) Gathering, Hunting, Lumbering, Fishing, Mining and Nomadic Herding /Livestock Ranching
- b) Agriculture: General characteristics of various agricultural systems and case studies of selected commodities such as Rice, Wheat, Cotton, Jute, Sugarcane, Rubber and Tea

2.2 Secondary Activities

- a) Development and Distribution of Power and Energy Resources of the World
- b) Manufacturing; Characteristics; Physical and Socio-economic Factors for growth of Industries
- c) Major Industrial and Manufacturing regions of the world
- d) Case Studies of some Industrial Complexes: Iron and Steel Industry, Apparel Industry, Textile Industry, Dairying and Mixed Farming Industries

2.3 Tertiary Activities

- a) Transportation and Trade: Regional and International Pattern
- b) Trade and its effect on the economy of the region

2.4 Quaternary Activities: Professional, Administrative Services and Entertainment

3. National Income and Product: GDP, GNP composition and change, financial institution and their role in sectoral and overall development with respect to Bangladesh.

Books Recommended:

1. Coe, N., Kelly, P. and Yeung, HWC, 2012. Economic Geography: A Contemporary Introduction, 2nd edition, Wiley-Blackwell: Singapore.
2. Wood, A. and Roberts, SM, 2011. Economic Geography- Places, Networks, and Flow. Routledge: New York.
3. Alexander, JW, 1988: Economic Geography, Prentice-Hall, New Delhi.
4. চৌধুরী, সিই, ১৯৯৫: আর্থনীতিক ভূগোলঃ বিশ্ব ও বাংলাদেশ, ঢাকা বিশ্ববিদ্যালয়, ঢাকা।

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-----------------------------------|-------|---------|
| 123201 | Paper-III | Population and Cultural Geography | 100 | 4 |

1. **Introduction to Population Geography:** Definition and concept, development of Population Geography, Population and Demography

2. Sources of population data:

- i) Population census
- ii) Sample survey
- iii) Registration

3. Population Distribution:

- i) Population Density
- ii) Factors Affecting Population Distribution/Determinants

4. Population Composition

- i) Biological: Size, Age, Sex
- ii) Social: Marital Status, Language, Religion, Education

5. Population Dynamics

- i) Fertility
- ii) Mortality
- iii) Migration and its Determinants
- iv)

6. Introduction to Cultural Geography: Definition, Scope and Methods

6. Evolution of Human Races and Mankind

8. Processes of Culture Change: Invention/Innovation; Diffusion and Integration
Assimilation and Acculturation

Books Recommended:

1. Jones, HR 1990. Population Geography, Guilford Press.
2. Clarke, JI. 1978: Population Geography, London: Oxford Series
3. Zilensky, W I 1984: A Prologue to Population Geography. U.K.
4. Demko, CJ., H.M. Rose, and A.A. Schnell 1986: Population Geography: A Reader, NY.
5. Bogue, D.J..1978: Principles of Demography. NY.
6. Spencer, J.E. & Thomas (Jr.), W, L., 1969. *Introduction to Cultural Geography N.Y.*
6. তাহা, আ. ২০০০. জনসংখ্যা ও জনপদ ভূগোল, রাজশাহী বিশ্ববিদ্যালয়, রাজশাহী।
৭. বাকী, আ হ ম, ২০০৬। সাংস্কৃতিক ভূগোল, বঙ্গ প্রকাশনীঃ ঢাকা।

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------------|-------|---------|
| 123203 | Paper-IV | Geography of Bangladesh | 100 | 4 |

1. Location and Boundary; Administrative divisions and geographic regions

2. The Natural Environment

- 2.1 Geological Structure & Physiography
- 2.2 Climate and Soil
- 2.3 River Systems

3. Natural Resource Base

- 3.1 Natural Vegetation and Forest
- 3.2 Minerals and Energy Resources

4. Economic Base

- 4.1 Agriculture, Fisheries and Livestock
- 4.2 Industry: Nature, Growth, Location and Distribution
- 4.3 Trade and Commerce
- 4.4 Transport and Communication

5. Population

- 5.1 Size, Growth, Age and Sex Structure
- 5.2 Density and distribution
- 5.3 Population characteristics, Problems

6. Hazards and disasters: Floods, cyclones, droughts, and river bank erosion.

Books Recommended:

1. Rashid, H. 1995 : *Geography of Bangladesh, UPL, Dhaka.*
2. Rahman, A. Atiq. et al. : *Environment and Development in Bangladesh Vol: 1-2, UPL, Dhaka.*
3. Islam, M.A. 1995 : *Environment; Land use and Natural Hazards in Bangladesh, University of Dhaka, Dhaka.*
4. Islam, N and Choudhury S. I. 1992 (edited) : *Bangladesh Bhougolic Shomikhaya, Department of Geography, University of Dhaka (in Bangla), Dhaka.*
5. Nizamuddin, K. (ed.), (2000), *Disaster in Bangladesh: Selected Readings, Disaster Research Training and Management Centre, University of Dhaka.*
৬. হাসান , এম. ও অন্যান্য : *বাংলাদেশ প্রাকৃতিক ভূগোল ও পরিবেশ, বাংলা একাডেমী, ঢাকা।*
৭. ঈমাম, বি. : *বাংলাদেশের খনিজ সম্পদ, বাংলা একাডেমী, ঢাকা।*
৮. চৌধুরী, সিরাজুল ইসলাম, ১৯৯৫ : *আর্থনৌতিক ভূগোল: বিশ্ব ও বাংলাদেশ, ঢাকা বিশ্ববিদ্যালয়, ঢাকা।*

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|---|-------|---------|
| 133201 | Paper-V | Regional Geography of South Asia (Excluding Bangladesh) | 100 | 4 |

1. Introduction to South Asia

- 1.1 Geographical Location
- 1.2 Member Countries: National Boundaries, Socio-economic Database

2. Physical Environment of South Asia

- 2.1 Physiography
- 2.2 Climate
- 2.3 Drainage Systems
- 2.4 Vegetation
- 2.5 Mineral and Energy Resources

3. Cultural Environment of South Asia

- 3.1 Population: Growth, Distribution and Characteristics
- 3.2 Economic:
 - a) Major Crops (Rice, Wheat, Cotton, Sugarcane and Tea) Productions and Distributions
 - b) Major Industry (Iron and steel, Textile power and Energy) Production and Distributions
 - c) Transportation: Roads, Railways, Waterways and Airways.
 - d) Trade and Commerce: Internal and External Trade

4. Introduction to SAARC

- 4.1 Formation of SAARC
- 4.2 Aims and Objectives
- 4.3 Major Problems in regional Co-operations

Books Recommended:

1. Abbasi, Bushra Afza, 1991 : *Geography of South Asia, Sang-e-Meel Publication, Lahore*
2. Davis, K. 1951 : *The Population of India & Pakistan, University Press, London*
3. Spate O.H.K & A.T.A. : *India, Pakistan and Ceylon, The Regions, Methuen & Learmonth. 1967*
৪. রউফ , কাআ ও বিল্লাহ, মো ২০০৬ : *দক্ষিণ এশিয়া , সুজনেষু প্রকাশনী , ঢাকা ।*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--------------------------------|-------|---------|
| 133203 | Paper-VI | Geography of Human Settlements | 100 | 4 |

1. Definition, Scope, types and approaches of the study of human Settlement

2. Rural Settlement:

- a) Rural Settlements: Types, Forms and Characteristics
- b) Rural Periodic Markets: Origin, Growth, Characteristics and their role in Development

3. Urban Settlements:

- a) Definition, Scope, classification (types) of Urban Settlement,

4. Origin and History of Urban Centers:

- a) Factors of Urban Growth
- b) Urbanization process

5. Internal Structure of the City and Urban Land Use

- Concentric Zones
- Multiple Nuclei
- Sector Theory

6. Urban Environment

- Urban utility services
- Environmental Degradation

7. Urbanization in Bangladesh:

- Development, Problem and Prospects
- Rural- Urban Migration

Books Recommended:

- Carter, Harold, 2000 The Study of Urban Geography, London: Edward Arnold.
- Singh, R.L. (et.al.),1998 Geographic Dimensions of Rural Settlements
- Daniel, P.1990 The Geography of Settlement
- বাকী, আবদুল, ২০০২ পৌর বসতিঃ কাঠামো, জনগোষ্ঠী ও পরিকল্পনা প্রসঙ্গ, সুবঙ্গ প্রকাশ, ঢাকা
- ইলাহী, ম. ও রুমী,সৈ.র.আ. ২০০৫ নগর ভূগোল-সাম্প্রতিক ধারা, ঢাকা: সুজনেষু প্রকাশনী
- ইসলাম, এন. ও বাকী, আবদুল, ১৯৯৬ (সম্পাদিত) নগরায়ন বাংলাদেশ, আরবান স্টাডিজ প্রোগ্রাম, নগর গবেষণা কেন্দ্র, ঢাকা ।

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-------------|-------|---------|
| 133204 | Paper-VII | Practical | 100 | 4 |

Section A: Maps and Element of Maps Marks- 25

Marks distribution:
Written Examination = 15,
Laboratory Book=5,
Viva-Voce=5

- Scales: Simple, Diagonal and Comparative
- Drawing of Contours and Profiles
- Cartographic Representation of Geographical Data: Dot, Shade and Isopleth methods
- Introduction to use of Geographic Information Systems (GIS), Remote Sensing (RS), Geographic positioning system (GPS)

Section B: Elementary Surveying: Marks- 25

Marks distribution:
Written Examination (Fieldwork & Drafting Map) = 15,
Laboratory Book=5,
Viva-Voce=5

1. Principles of Surveying
2. Definition of Surveying: Types of Surveying: Geodetic, Plane
3. Methods of Surveying: Chain and Tape Surveying: Equipments, Recording of field data, open and closed Traverse surveying, Drawing procedure, Advantage and disadvantages.
Plane Table Surveying: Equipments Drawing procedure, Advantage and disadvantages.

Section C. Map Projection Marks- 25

Marks distribution:

Written Examination= 15
Laboratory Book=5,
Viva-Voice=5

1. Definition and Classification of Projections.
2. Construction of the following Projections.
 - 2.1 Cylindrical Projection: Simple Cylindrical and Cylindrical Equal Area projection
 - 2.2 Simple Conical Projection with One Standard Parallel
 - 2.3 Zenithal Equal Area projections (polar case)
3. Identification, Use, Merits & Demerits of Projections.

Section D. Quantitative Techniques in Geography: Marks- 25

Marks distribution:

Written Examination=15,
Laboratory Book=5,
Viva-Voice=5

1. Use of statistics in Geography
2. Sources of Geographic Data
3. Collection and Processing of Geographic data
4. Scales of Measurement
5. Frequency Distribution and Graphical Representation
6. Measures of Central Tendency: Mean, Median and Mode
7. Measures of Dispersion and measures of Association/ Relation

Books Recommended:

- | | | |
|----------------------|---|---|
| 1. Singh R.L, 1994 | : | <i>Elements of Practical Geography, India.</i> |
| 2 Singh, Gopal, 2005 | : | <i>Practical Geography, India</i> |
| 3. Aziz & Shahjahan | : | <i>Surveying, Dhaka.</i> |
| ৪. রউফ, কা. আ. ২০০৬ | ঃ | ফলিত ও ব্যবহারিক ভূগোল, সূজনেষু প্রকাশনী, ঢাকা। |
| ৫. ইলাহী, ম. ২০০৪ | ঃ | পরিসংখ্যান ভূগোল, বাংলা একাডেমী, ঢাকা। |

NATIONAL UNIVERSITY



Syllabus

Subject: Home Economics

Three Years B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Subject: Home Economics
Syllabus for Three Year B.Sc. Pass Course
Session: 2013-2014

Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|--------------|--|--------------|----------------|
| First Year | | | | |
| 113501 | Paper-I | Home Management and Housing | 100 | 4 |
| 113503 | Paper-II | Child Development and Family Relations | 100 | 4 |
| Second Year | | | | |
| 123501 | Paper-III | Food and Nutrition and Institutional Food Management | 100 | 4 |
| 123503 | Paper-IV | Clothing, Textile and Applied Art | 100 | 4 |
| Third Year | | | | |
| 133501 | Paper-V | Textile Weaving and Design of Art | 100 | 4 |
| 133503 | Paper-VI | Food Science and Technology | 100 | 4 |
| 133504 | Paper-VII | Practical | 100 | 4 |
| | | Total = | 700 | 28 |

Detailed Syllabus
First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-----------------------------|--------------|----------------|
| 113501 | Paper-I | Home Management and Housing | 100 | 4 |

1. Definition of home management, Philosophy and objectives.

- a) Role-Philosophy of management, definition
- b) Subjects of home management
- c) Relation of home management to other areas of home economics.
- d) Role of successful home maker
- e) Methods of home management
- f) Definition, importance and methods of making decision.

2. Motivation creating factors in home management

- a) Definition and classification of values.
- b) Importance and development of values.
- c) Importance and types of goals.
- d) Definition & types of standard-measurement of living and standard of living

3. Resources:

- a) Definition of resources and classification.
- b) Characteristics of resources.

- c) Indicators/influencing factors of using resources.
- d) Principles in the use of time and energy.

4. Money management:

- a) Family income-types of income.
- b) Means of increasing income.
- c) Family budget-characteristics of budget, advantages & disadvantages.
- d) Rules of making a family budget and factors influencing it.
- e) Savings-importance, means of increasing small savings.

5. Energy management:

- a) Conservation of energy-definition of fatigue and causes.
- b) Means of reducing fatigue.
- c) Methods of work simplification, methodical analysis of work- design plan methods, relaxing method etc.

6. Housing:

- a) Definition-need and principles of site and area selection for house.
- b) Factors to consider in planning a house-house plan in relation to money and family requirements, principles of light & colour, selection of equipments & their uses.

7. Materials for constructing houses:

- a) Concept of the availability of easily obtainable building materials in Bangladesh & their characteristics.
- b) Suitability of building materials in weather and location.

8. Furniture and materials for home decoration:

- a) Need, standard, suitability and beauty in selecting furniture.
- b) Concept of furniture and their arrangement, other materials for home decoration.

9. Reserving healthy environment in house:

- a) Definition of environment; causes and prevention of environmental pollution.
- b) Causes & harmful effect of pollution in homes.
- c) Means & roles of family member in preserving healthy environment.

Books Recommended:

- | | |
|--------------------------------|------------------------------------|
| 1. Nickeel, Rice and Toker | : Management in Family Living |
| 2. Gidbreeth Thomas and Clymer | : Management in the Home |
| 3. Goodyear and Klobor | : Managing for Effective Living |
| 4. অধ্যাপক মমতাজ খান | : পারিবারিক জীবন ও গৃহ ব্যবস্থাপনা |
| 5. অধ্যাপক মমতাজ খান | : পারিবারিক সম্পদের ব্যবস্থাপনা |
| 6. ড. ফিরোজ সুলতানা | : গৃহ ব্যবস্থাপনা ও বাসস্থান |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 113503 | Paper-II | Child Development and Family Relations | 100 | 4 |

1. Child's growth and development

- a) Definition of growth and development; stages of growth and development.
- b) Characteristics of different stages of development; infancy, childhood, preadolescence and adolescence.

- c) Developmental tasks of different stages.
- d) Stage of prenatal development.
- e) Importance and effect of maturation and learning in child's development.

2. Importance & effect of family relations in child's development.

- a) Child and Parents relationship and factors influencing it.
- b) Principles of child guidance; effect of discipline and care & Love of parents on child's behaviour.
- c) Juvenile delinquency-causes and preventive measures. Role of family & society in eliminating juvenile delinquency.

3. Family life cycle:

- a) Stage of family life cycle-developmental task & effects of each stages of development.
- b) Responsibility of family in the development of intelligence & pursuing a future career & profession of children.

4. Family crisis:

- a) Family crisis-definition & types. Effect of family crisis on child's development. Reactions of crisis-unemployment, long term illness, desertion, madness, physical abuse, divorce, death.
- b) Meaning of preserving family stability & resolving conflict.

5. Drug addiction and mental retardation:

- a) Causes of drug addiction-prevention and remedial measures.
- b) Causes & types of mental retardation.
- c) Role of family & society in rehabilitating the mentally retarded.

6. Child welfare in Bangladesh:

- a) Child homes-day care center, rehabilitation centre, children's village etc.
- b) Government and nongovernment efforts in child welfare in Bangladesh.

7. Importance & methods of child observation:

- a) Importance of child observation.
- b) Description of the methods of child observation-running, selective, anecdotal record, quick method & case study.

Book Recommended:

- | | |
|-------------------------------------|---|
| 1. Mussen P.H. Conger J J and Kagan | : Child Development and Personality |
| 2. Smart S. and Smart R.C. | : Children Relationship and Development |
| 3. Crow and Crow | : Child Development and Adjustment |
| 4. Strong R | : Introduction to child Study |
| 5. Breekenidge and Smith | : Child Study |
| 6. দরিয়ানুর বেগম | : শিশুর আচরণ ও ক্রমবিকাশ, বাংলা একাডেমি |
| 7. দরিয়ানুর বেগম | : শিশু পালন |
| 8. মোঃ আলী আযম | : শিশু মন |
| 9. সুলতানা বানু | : বিকাশ মনোবিজ্ঞান ১ম ও ২য় খন্ড |
| 10. সুলতানা সারওয়ার্জারা জামান | : মানব বিকাশে মনোবিজ্ঞান |
| 11. শাহীন আহমেদ | : শিশু বর্ধন বিকাশ ও পরিচালনা |
| 12. উত্তম কুমার দাস | : মানবীয় বিকাশ আচরণ ও সামাজিক পরিবেশ |
| 13. মোঃ আতিকুর রহমান ও সালমা জোহরা | : মানবীয় বিকাশ আচরণ ও সামাজিক পরিবেশ |

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|--|-------|---------|
| 123501 | Paper-III | Food and Nutrition and Institutional Food Management | 100 | 4 |

1. Food and Nutrition:

Relation of food and nutrition to health; Functions of food in maintaining health; classification of nutrients- their characteristics, functions, food sources and requirements- carbohydrates, lipids, protein, vitamins, mineral elements and water.

2. Determining energy requirements of the body:

Measurement of energy, methods for determining energy requirement, factors influencing energy requirement. Determining energy value of foods.

3. Assessment of nutritional status and nutritional requirements at different ages:

Different methods for determining nutritional states of the body; height and weight, mid-arm circumference, biochemical tests and evaluation of clinical tests, concept of nutritional requirements of different ages- infants, children, adults, pregnancy, lactation and old age- relation of requirements to physiological changes.

4. Basic Food group and planning of balanced diet:

Concept and importance of balanced diets; Principles of planning balanced diets- Factors to consider sample of meal plan for different ages. Meal planning for institutions- planning menu and serving- hostels, hospitals, school tiffin etc.

5. Buying, Storage and preservation of foods:

General rules for buying foods, process of storage of perishable and non-perishable foods. Causes of food spoilage- concept of different methods of food preservation.

6. Diet planning for different diseases and Physiological conditions:

Importance and types of diet, principles of diet planning. Principles of diet planning in different diseases- diabetes, high blood pressure, heart diseases, jaundice, kidney diseases, diarrhoea, typhoid etc. Pregnancy and lactation.

Book Recommended:

1. Bogarl Brigges and Callouay : Nutrition and Physical Fitness
2. Devidson and Passmore : Human Nutrition and Dietetics
3. Cooper, Barbers, Mitchell Rynbergen and greene : Nutrition in Health and Disease
4. ড. মুহাম্মদ আবদুর রহমান : শিশুর আচরণ ও ক্রমবিকাশ, বাংলা একাডেমি
5. দেবজ্যোতি দাস : পারিবারিক বিপাক ও পুষ্টি
6. সৈয়দা হালিমা রহমান : খাদ্য ও পুষ্টি
7. সৈয়দা হালিমা রহমান : খাদ্য ও পুষ্টি
8. শাহীন আহমেদ : খাদ্য ও পুষ্টি বিজ্ঞান
9. সিদ্দিকা কবীর : খাদ্য ও পুষ্টি
10. সিদ্দিকা কবীর : খাদ্য ও পুষ্টি ব্যবস্থা
11. সৈয়দা হালিমা রহমান : বিপাক ও পুষ্টি বিজ্ঞান

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-----------------------------------|--------------|----------------|
| 123503 | Paper-IV | Clothing, Textile and Applied Art | 100 | 4 |

Clothing and Textile:

1. Introduction:

- a) Definition of cloth.
- b) Definition of dress.
- c) Classification of fibre.
- d) Study of textile fibre-Making cotton, Linen, Wool, Silk, Asbestos, Nylon, Rayon, Polyester.
- e) Identification of fibre: Physical, Chemical & Microscopic Test.

2. Selection of Clothing for the family:

- a) Economic factors.
- b) Physiological factors.
- c) Psychological factors.
- d) Social factors.

3. Decision making in selecting Clothing:

- a) process of decision making.
- b) Influencing factors in decision making.
- c) Steps of decision making.

4. Social significance of fashion on clothing:

- a) Fashion concept
- b) Change in fashion.
- c) Factors influencing fashion.
- d) Fashion cycle.
- e) Effect of fashion and advertisement in the development of garments industry.

5. Development of Garments and textile Industry of Bangladesh.

- a) Historical Background of textile industry of Bangladesh from ancient time till now.
- b) Hand loom industry in Bangladesh Economy.

6. Cultural and regional textile background of Bangladesh

- a) Monipuri Textile.
- b) Zamdhani Saree.
- c) Saree of Tangail.
- d) Silk and Benarashi Saree
- e) Rajshahi Bank.
- f) Comilla Khaddar.

7. Consumer Technique (Shopping practices & Consumer ethics)

- a) Study of market & price.
- b) Effective shopping practice.
- c) Problems of buyer.
- d) Ways of problem solution for the buyer.
- e) Study of labels and their uses.

Applied Art:

8. Introduction:

- a) Definition, Classification and Sources of Art.
- b) Importance of Art in Human life.

9. Study of art elements and principles.

10. Use of art elements and principles in architecture and home decoration.

11. Applied art as a significant factor in economic development and fruitful leisure activity.

a) Self employment.

b) Female employment.

12. Indigenous materials used in applied art-Jute, Clay fabric, Bamboo and Cane, Shell and Cone, Wood etc.

13. Overview of traditional craft of Bangladesh.

a) Nakshi Kantha

b) Shika

c) Pottery Painting and clay toys.

d) Wooden toys and wood craft.

14. Making decorations on fabrics and dresses.

a) Methods of decoration-Embroidery, Dyeing, Printing, Painting etc.

b) Dyeing- Definition, Elements, Methods, Use of etc.

c) Printing- Definition, Elements, Methods, Use of etc.

d) Printing- Definition, Elements, Methods, Use of etc.

e) Painting- Definition, Elements, Methods, Use of etc.

15. Problems and its solution of the art of Bangladesh.

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|-----------------------------------|--------------|----------------|
| 133501 | Paper-V | Textile Weaving and Design of Art | 100 | 4 |

1. Weaving:

- a) History of Weaving
- b) Steps of Weaving

2. Basic weaves and their characteristics:

- i) Simple ii) Twill iii) Satin and Sateen

3. Decorative weaves:
Basket, Rib, Herring bone, Broken twill, Dobby weaves, Jaquard weaves, leno weaves, Stop weaves, Lappet weaves, Swivel weaves and pile weaves.
4. a) Definitions of design, Classification of design, Sources decorative
b) Source of design, functions of design, Evaluation of design.
5. Role of design in enriching the life of individual
6. Factors of responsible for the change of design
7. Time, money and energy saving characteristics of design
8. Use of design in everyday life – Health and food, clothing, housing and home decoration, education, recreation, Social welfare, Physically and mentally retarded people.

Books Recommended:

1. Essentials of Textiles – Marjory L. Joshep
2. Textile fibers and their use – Hes'S
3. Fibre to Fabric – Patter and Corbman
4. Meaning of crafts – Edward L. Muttall
5. Creative hands – Dorris and CoxBardara
6. বস্ত্র ও পরিচ্ছদ - তাহমিনা জামান

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-----------------------------|-------|---------|
| 133503 | Paper-VI | Food Science and Technology | 100 | 4 |

1. Introduction to food science – Definition and scope of food science. Functions of food.
2. Cereals – Structure of grains (rice and wheat) and their composition. Changes in processing.
3. Meat, fish – Structure of muscle, composition, postmortem changes and tenderness of meat, Changes in meat on cooking.
4. Eggs – structure of egg, composition and nutritive value of egg. Uses of egg in food preparation.
5. Milk – Composition of milk, chemical analysis of milk and checks for purity.
6. Pulses and legumes & oil seeds – composition, chemical and physical changes during cooking, toxic constituents in legumes.
7. Vegetables and fruits – Classification, composition, structure and changes occurring during cooking. Nutritive value of fruits.
8. Food borne illness – bacterial, food borne poisonings, infections and nonbacterial intoxications.
9. Food adulterations – Common adulterants & their ill effects, Simple tests to detect adulterations.

Reference:

1. Shakuntalas Manay, N. and Shadaksharas Wamy, M. 2005. Food Facts and Principles. 2nd edition. New Age International Publishers.
2. Potter N. Norman. 2003 Food Science. 3rd edition. New Age International (P) Limited.
3. Mudambi, Sumati R. and Rao, Shalini M. Food Science.
4. William, Frazier C. 1997. Food Microbiology. Tata MC Graw – Hill Publishing Company Limited.
5. Srilakshami. Food Science
6. Parker, Rick. 2003. Introduction to food Science. Thomson Learning, Inc.
7. Food chemistry – L.H. Meyaeer
8. Food Science and Tecnology – M. Puke
9. উচ্চতর পুষ্টিবিজ্ঞান শাহীন আহমেদ

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------|--------------|----------------|
| 133504 | Paper-VII | Practical | 100 | 4 |

1. Drawing, making & evaluating a house plane.
2. Drawing & constructing a storage unit & evaluating it.
3. Furniture arrangement (room wise)
4. Child observation – recording child’s observation following any one methods.
5. Presenting a research repord on mentally retarded.
6. Food preservation by different methods: Pickles using vinegar, fruit jelly, achar, squash etc.
7. Planning menu and making food list for different ages. Diet planning for different diseases. Planning menus for hostels.
8. Simple tests to detect adulteration in milk, tea, oil and spices.
9. Drafting & construction of blouse and petticote.
10. Textile printing – Prepare usable clothes with the method of block printing, batik and tie-dye.
11. Preparing craft work by using decorative stitch.
12. Preparing craft work by using indigenous raw material.

NATIONAL UNIVERSITY



Syllabus

Subject: Madar Bux Home Economics

Three-Years B.Sc. (Pass) Course
Effective from the Session: 2013–2014

National University

Subject: Home Economics

Syllabus for Three Years B.Sc. Pass Degree Course

Session: 2013-2014

Compulsory Subjects

| Paper Code | Paper Title | Marks. | Credit |
|------------|--|--------|--------|
| 111501 | History of the Emergence of independent Bangladesh | 100 | 4 |
| 121001 | বাংলা জাতীয় ভাষা | 100 | 4 |
| 131101 | English (Compulsory) | 100 | 4 |
| | Total | 300 | 12 |

Sub: Basic Home Economics

| Paper Code | Paper Title | Marks | Credits |
|--------------------|--------------------------------------|-------|---------|
| First Year | | | |
| 116001 | Home Management | 100 | 4 |
| 116003 | Child Development | 100 | 4 |
| Second Year | | | |
| 126001 | Interior Decoration | 100 | 4 |
| 126003 | Early Childhood Education | 100 | 4 |
| Third Year | | | |
| 136001 | Advanced Home Management and Housing | 100 | 4 |
| 136003 | Child Welfare and Family Relations | 100 | 4 |
| 136012 | Practical (Basic Home Economics) | 100 | 4 |
| | Total | 700 | 28 |

Sub: General Science Food and Nutrition

| Paper Code | Paper Title | Marks | Credits |
|--------------------|--|-------|---------|
| First Year | | | |
| 116005 | Food and Nutrition | 100 | 4 |
| 116007 | Food Science and Microbiology | 100 | 4 |
| Second Year | | | |
| 126005 | Community Nutrition and Health Education | 100 | 4 |
| 126007 | Meal Management | 100 | 4 |
| Third Year | | | |
| 136005 | Biochemistry and Elementary Physiology | 100 | 4 |
| 136007 | Human Nutrition and Dietetics | 100 | 4 |
| 136014 | Practical (General Science Food and Nutrition) | 100 | 4 |
| | Total | 700 | 28 |

Sub: Applied Home Economics

| Paper Code | Paper Title | Marks | Credits |
|--------------------|---|-------|---------|
| First Year | | | |
| 116009 | Applied Art | 100 | 4 |
| 116011 | Clothing and Textile | 100 | 4 |
| Second Year | | | |
| 126009 | Creative Art | 100 | 4 |
| 126011 | Principles of Family Clothing | 100 | 4 |
| Third Year | | | |
| 136009 | Art and Craft – Income generating sources for women | 100 | 4 |
| 136011 | Fashion Designing | 100 | 4 |
| 136016 | Practical (Applied Home Economics) | 100 | 4 |
| | Total | 700 | 28 |

National University

Subject: Home Economics

Syllabus for Three Years B.Sc. Pass Degree Course

Session: 2013-2014

Course Content and Marks Distribution

First Year

| Paper Code | Paper Title | Marks | Credits |
|------------|--|-------|---------|
| 111501 | History of the Emergence of independent Bangladesh | 100 | 4 |
| 116001 | Home Management | 100 | 4 |
| 116003 | Child Development | 100 | 4 |
| 116005 | Food and Nutrition | 100 | 4 |
| 116007 | Food Science and Microbiology | 100 | 4 |
| 116009 | Applied Art | 100 | 4 |
| 116011 | Clothing and Textile | 100 | 4 |
| | Total | 700 | 28 |

Second Year

| Paper Code | Paper Title | Marks | Credits |
|------------|--|-------|---------|
| 121001 | বাংলা জাতীয় ভাষা | 100 | 4 |
| 126001 | Interior Decoration | 100 | 4 |
| 126003 | Early Childhood Education | 100 | 4 |
| 126005 | Community Nutrition and Health Education | 100 | 4 |
| 126007 | Meal Management | 100 | 4 |
| 126009 | Creative Art | 100 | 4 |
| 126011 | Principles of Family Clothing | 100 | 4 |
| | Total | 700 | 28 |

Third Year

| Paper Code | Paper Title | Marks | Credits |
|------------|---|-------|---------|
| 131101 | English (Compulsory) | 100 | 4 |
| 136001 | Advanced Home Management and Housing | 100 | 4 |
| 136003 | Child Welfare and Family Relations | 100 | 4 |
| 136005 | Biochemistry and Elementary Physiology | 100 | 4 |
| 136007 | Human Nutrition and Dietetics | 100 | 4 |
| 136009 | Art and Craft – Income generating sources for women | 100 | 4 |
| 136011 | Fashion Designing | 100 | 4 |
| 136012 | Practical (Basic Home Economics) | 100 | 4 |
| 136014 | Practical (General Science Food and Nutrition) | 100 | 4 |
| 136016 | Practical (Applied Home Economics) | 100 | 4 |
| | Total | 1000 | 40 |

National University
Madar Bux Home Economics College
Syllabus for 3 years B.Sc. Pass Degree Course
Subject: Home Economics
Session: 2013-2014

First Year

| Paper Code | Paper Title | Marks | Credits |
|------------|--|-------|---------|
| 111501 | History of the Emergence of Independent Bangladesh | 100 | 4 |
| 116001 | Home Management | 100 | 4 |
| 116003 | Child Development | 100 | 4 |
| 116005 | Food and Nutrition | 100 | 4 |
| 116007 | Food Science and Microbiology | 100 | 4 |
| 116009 | Applied Art | 100 | 4 |
| 116011 | Clothing and Textile | 100 | 4 |
| | Total = | 700 | 28 |

First Year
Detailed Syllabus

| Paper Code | 111501 | Marks: 100 | Credits: 4 | Class Hours: 60 |
|--------------|--|------------|------------|-----------------|
| Paper Title: | History of the Emergence of Independent Bangladesh | | | |

স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস

ভূমিকা: স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস-পরিধি ও পরিচিতি

- ১। দেশ ও জনগোষ্ঠীর পরিচয়
 - ক) ভূ প্রকৃতির বৈশিষ্ট্য ও প্রভাব
 - খ) নৃতাত্ত্বিক গঠন
 - গ) ভাষা
 - ঘ) সংস্কৃতির সমন্বয়বাদিতা ও ধর্মীয় সহনশীলতা
 - ঙ) অভিন্ন বাংলার পরিপ্রেক্ষিতে তৎকালীন পূর্ববঙ্গ ও বর্তমান বাংলাদেশের স্বকীয় সত্তা
- ২। অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের প্রয়াস ও উপমহাদেশের বিভক্তি, ১৯৪৭
 - ক) ঔপনিবেশিক শাসন আমলে সাম্প্রদায়িকতার উদ্ভব ও বিস্তার
 - খ) লাহোর প্রস্তাব, ১৯৪০
 - গ) অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের উদ্যোগ, ১৯৪৭ ও পরিণতি
 - ঘ) পাকিস্তান সৃষ্টি, ১৯৪৭
- ৩। পাকিস্তান: রাষ্ট্রীয় কাঠামো ও বৈষম্য
 - ক) কেন্দ্রীয় ও প্রাদেশিক কাঠামো
 - খ) সামরিক ও বেসামরিক আমলাতন্ত্রের প্রভাব
 - গ) অর্থনৈতিক, সামাজিক ও সাংস্কৃতিক বৈষম্য
- ৪। ভাষা আন্দোলন ও বাঙালির আত্মপরিচয় প্রতিষ্ঠা
 - ক) মুসলিম লীগের শাসন ও গণতান্ত্রিক রাজনীতির সংগ্রাম
 - খ) আওয়ামী লীগের প্রতিষ্ঠা, ১৯৪৯
 - গ) ভাষা আন্দোলন: পটভূমি ও ঘটনা প্রবাহ
 - ঘ) হক-ভাসানী-সোহরাওয়ার্দীর যুক্তফ্রন্ট, ১৯৫৪ সালের নির্বাচন ও পরিণতি

- ৫। সামরিক শাসন: আইয়ুব খান ও ইয়াহিয়া খানের শাসনামল (১৯৫৮-৭১)
- ক) সামরিক শাসনের সংজ্ঞা ও বৈশিষ্ট্য
- খ) আইয়ুব খানের ক্ষমতা দখল ও শাসনের বৈশিষ্ট্য (রাজনৈতিক নিপীড়ন, মৌলিক গণতন্ত্র, ধর্মের রাজনৈতিক ব্যবহার)
- গ) আইয়ুব খানের পতন ও ইয়াহিয়া খানের শাসন, এক ইউনিট বিলুপ্তিকরণ, সার্বজনীন ভোটাধিকার, এলএফও (Legal Framework Order)
- ৬। জাতীয়তাবাদের বিকাশ ও স্বাধিকার আন্দোলন
- ক) সাংস্কৃতিক আগ্রাসনের বিরুদ্ধে প্রতিরোধ ও বাঙালি সংস্কৃতির উজ্জীবন
- খ) শেখ মুজিবুর রহমানের ৬-দফা আন্দোলন
- গ) ৬-দফা আন্দোলনের প্রতিক্রিয়া, গুরুত্ব ও তাৎপর্য
- ঘ) আগরতলা মামলা, ১৯৬৮
- ৭। ১৯৬৯-এর গণঅভ্যুত্থান ও ১১-দফা আন্দোলন
- ক) পটভূমি
- খ) আন্দোলনের কর্মসূচী, গুরুত্ব ও পরিণতি
- ৮। ১৯৭০ এর নির্বাচন, অসহযোগ আন্দোলন ও বঙ্গবন্ধুর স্বাধীনতা ঘোষণা
- ক) নির্বাচনের ফলাফল এবং তা মেনে নিতে কেন্দ্রের অস্বীকৃতি
- খ) অসহযোগ আন্দোলন, বঙ্গবন্ধুর ৭ই মার্চের ভাষণ, অপারেশন সার্চলাইট
- গ) বঙ্গবন্ধুর স্বাধীনতা ঘোষণা ও শ্রেফতার
- ৯। মুক্তিযুদ্ধ ১৯৭১
- ক) গণহত্যা, নারী নির্যাতন, শরণার্থী
- খ) বাংলাদেশ সরকার গঠন ও স্বাধীনতার ঘোষণাপত্র
- গ) স্বতঃস্ফূর্ত প্রাথমিক প্রতিরোধ ও সংগঠিত প্রতিরোধ (মুক্তিফৌজ, মুক্তিবাহিনী, গেরিলা ও সম্মুখ যুদ্ধ)
- ঘ) মুক্তিযুদ্ধে প্রচার মাধ্যম (স্বাধীন বাংলা বেতার কেন্দ্র, বিদেশী প্রচার মাধ্যম ও জনমত গঠন)
- ঙ) ছাত্র, নারী ও সাধারণ মানুষের অবদান (গণযুদ্ধ)
- চ) মুক্তিযুদ্ধে বৃহৎশক্তি ও মুসলিম রাষ্ট্র সমূহের ভূমিকা
- ছ) দখলদার বাহিনী, শান্দিড়কমিটি, আলবদর, আলশামস, রাজাকার বাহিনী, রাজনৈতিক দল ও দেশীয় অন্যান্য সহযোগীদের স্বাধীনতাবিরোধী কর্মকান্ড ও বুদ্ধিজীবী হত্যা
- জ) পাকিস্তানে বন্দি অবস্থায় বঙ্গবন্ধুর বিচার ও বিশ্বপ্রতিক্রিয়া
- ঝ) প্রবাসী বাঙালি ও বিশ্বের বিভিন্ন দেশের নাগরিক সমাজের ভূমিকা
- ঞ) মুক্তিযুদ্ধে ভারতের অবদান
- ট) যৌথ বাহিনী গঠন ও বিজয়
- ঠ) স্বাধীনতা সংগ্রামে বঙ্গবন্ধুর নেতৃত্ব এবং অবদান
- ১০। বঙ্গবন্ধু শেখ মুজিবুর রহমানের শাসনকাল, ১৯৭২-১৯৭৫
- ক) স্বদেশ প্রত্যাবর্তন
- খ) সংবিধান প্রণয়ন
- গ) যুদ্ধ বিধ্বস্ত দেশ পুনর্গঠন
- ঘ) সপরিবারে বঙ্গবন্ধু হত্যা ও আদর্শিক পটপরিবর্তন

History of the Emergence of Independent Bangladesh

Introduction: Scope and description of the emergence of Independent Bangladesh.

1. Description of the country and its people.

- Geographical features and their influence.
- Ethnic composition.
- Language.
- Cultural syncretism and religious tolerance.
- Distinctive identity of Bangladesh in the context of undivided Bangladesh.

2. Proposal for undivided sovereign Bengal and the partition of the Sub Continent, 1947.

- a. Rise of communalism under the colonial rule,
- b. Lahore Resolution 1940.
- c. The proposal of Suhrawardi and Sarat Bose for undivided Bengal : consequences
- d. The creation of Pakistan 1947.

3. Pakistan: Structure of the state and disparity.

- a. Central and provincial structure.
- b. Influence of Military and Civil bureaucracy.
- c. Economic, social and cultural disparity

4. Language Movement and quest for Bengali identity

- a. Misrule by Muslim League and Struggle for democratic politics.
- b. Foundation of Awami league, 1949
- c. The Language Movement: context and phases.
- d. United front of Haque – Vasani – Suhrawardi: election of 1954, consequences.

5. Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971)

- a. Definition of military rules and its characteristics.
- b. Ayub Khan's rise to power and characteristics of his rule (Political repression, democracy, Islamisation) Basic
- c. Fall of Ayub Khan and Yahia Khan's rule (Abolition of one unit, universal suffrage, the Legal Framework Order) the Legal

6. Rise of nationalism and the Movement for self determination.

- a. Resistance against cultural aggression and resurgence of Bengali culture.
- b. The six point movement of Sheikh Mujibur Rahman
- c. Reactions; Importance and significance of the six Point movement.
- d. The Agortola Case 1968.

7. The mass-upsurge of 1969 and 11 point movement:

- a. background
- b. programme significance and consequences.

8. Election of 1970 Non-cooperation movement of March 1971 and the Declaration of Independence by Bangobondhu

- a. Election result and centres refusal to comply
- b. The non co-operation movement, the 7th March Address of Bangobondhu, Operation Searchlight
- c. Declaration of Independence by Bangobondhu and his arrest

9. The war of Liberation 1971

- a. Genocide, repression of women, refugees

- b. Formation of Bangladesh government and proclamation of Independence
- c. The spontaneous early resistance and subsequent organized resistance (Mukti Fouz, Mukti Bahini, guerillas and the frontal warfare)
- d. Publicity Campaign in the war of Liberation (Shadhin Bangla Betar Kendra, the Campaigns abroad and formation of public opinion)
- e. Contribution of students, women and the masses (Peoples war)
- f. The role of super powers and the Muslim states in the Liberation war.
- g. The Anti-liberation activities of the occupation army, the Peace Committee, Al-Badar, Al-Shams, Rajakars, pro Pakistan political parties and Pakistani Collaborators, killing of the intellectuals.
- h. Trial of Bangabondhu and reaction of the World Community.
- i. The contribution of India in the Liberation War
- j. Formation of joint command and the Victory
- k. The overall contribution of Bangabondhu and his leadership in the Independence struggle.

10. The Bangabondhu Regime 1972-1975

- a. Homecoming
- b. Making of the constitution
- c. Reconstruction of the war ravaged country
- d. The murder of Bangabondhu and his family and the ideological turn-around.

সহায়ক গ্রন্থ

১. নীহার রঞ্জন রায়, *বাঙালীর ইতিহাস*, দে' জ পাবলিশিং, কলকাতা ১৪০২ সাল।
২. সালাহ উদ্দিন আহমেদ ও অন্যান্য (সম্পাদিত), *বাংলাদেশের মুক্তি সংগ্রামের ইতিহাস ১৯৪৭-১৯৭১*, আগামী প্রকাশনী, ঢাকা ২০০২।
৩. সিরাজুল ইসলাম (সম্পাদিত), *বাংলাদেশের ইতিহাস ১৭০৪-১৯৭১*, ৩ খন্ড, এশিয়াটিক সোসাইটি অব বাংলাদেশ, ঢাকা ১৯৯২।
৪. ড. হারুন-অর-রশিদ, *বাংলাদেশ: রাজনীতি, সরকার ও শাসনতান্ত্রিক উন্নয়ন ১৭৫৭-২০০০*, নিউ এজ পাবলিকেশন্স, ঢাকা ২০০১।
৫. ড. হারুন-অর-রশিদ, *বাঙালির রাষ্ট্রচিন্তা ও স্বাধীন বাংলাদেশের অভ্যুদয়*, আগামী প্রকাশনী, ঢাকা ২০০৩।
৬. ড. হারুন-অর-রশিদ, *বঙ্গবন্ধুর অসমাপ্ত আত্মজীবনী পুনর্পঠ*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১৩।
৭. ড. আতফুল হাই শিবলী ও ড.মোঃ মাহবুবুর রহমান, *বাংলাদেশের সাংবিধানিক ইতিহাস ১৭৭৩-১৯৭২*, সুবর্ণ প্রকাশন, ঢাকা ২০১৩।
৮. মুনতাসির মামুন ও জয়ন্ত কুমার রায়, *বাংলাদেশের সিভিল সমাজ প্রতিষ্ঠার সংগ্রাম*, অবসর, ঢাকা ২০০৬।
৯. আতিউর রহমান, *অসহযোগ আন্দোলনের দিনগুলি: মুক্তিযুদ্ধের প্রস্তুতি পর্ব*, সাহিত্য প্রকাশ, ঢাকা ১৯৯৮।
১০. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস, ১৯০৫-৪৭*, তম্রলিপি, ঢাকা ২০১১।
১১. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস, ১৯৪৭-১৯৭১*, সময় প্রকাশন, ঢাকা ২০১২।
১২. সৈয়দ আনোয়ার হোসেন, *বাংলাদেশের স্বাধীনতা যুদ্ধে পরাশক্তির ভূমিকা*, ডানা প্রকাশনী, ঢাকা ১৯৮২।
১৩. আবুল মাল আবদুল মুহিত, *বাংলাদেশ: জাতিরাষ্ট্রের উদ্ভব*, সাহিত্য প্রকাশ, ঢাকা ২০০০।
১৪. শেখ মুজিবুর রহমান, *অসমাপ্ত আত্মজীবনী*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১২।
১৫. সিরাজ উদ্দীন আহমেদ, *একাত্তরের মুক্তিযুদ্ধ: স্বাধীন বাংলাদেশের অভ্যুদয়*, ইসলামিক ফাউন্ডেশন, ঢাকা ২০১১।
১৬. জয়ন্ত কুমার রায়, *বাংলাদেশের রাজনৈতিক ইতিহাস*, সুবর্ণ প্রকাশন, ঢাকা ২০১০।
১৭. Harun-or-Roshid, *The Foreshadowing of Bangladesh: Bengal Muslim League and Muslim Politics, 1906-1947*, The University Press Limited, Dhaka 2012.
১৮. Rounaq Jahan, *Pakistan: Failure in National Integration*, The University Press Limited, Dhaka 1977.

১৯. Talukder Maniruzzaman, *Radical Politics and the Emergence of Bangladesh*, Mowla, Brothers, Dhaka 2003.

২০. মেসবাহ কামাল ও ঈশানী চক্রবর্তী, *নাচালের কৃষক বিদ্রোহ, সমকালীন রাজনীতি ও ইলা মিত্র*, উত্তরণ, ঢাকা ২০০৮।

২১. মেসবাহ কামাল, *আসাদ ও উনসত্তরের গণঅভ্যুত্থান*, বিবর্তন, ঢাকা ১৯৮৬।

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|---------------------|------------------------|-------------------|-------------------|------------------------|
| Paper Code | 116001 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Home Management | | | |

- 1. Meaning of Home Management:**
 - a. As a responsibility of home Maker.
 - b. As a Paper of study
- 2. Management in General:**
 - a) Definition
 - b) Misconception
- 3. Concept of Home Management:**
 - a) Family goals, values
 - b) Standards, needs and wants
 - c) Attitudes and skills, knowledge and interest
- 4. Process of Management:**
 - a) Planning
 - b) Organization
 - c) Implementation and evaluation
- 5. Decision Making:**
 - a) Definition
 - b) Importance
 - c) Classification
 - d) Process
- 6. Resources:**
 - a) Definition
 - b) Classification
 - c) Process
- 7. Time Management:**
 - a) Importance of time
 - b) Plan to use time
 - c) Wise use of leisure time
- 8. Money Management:**
 - a) Importance
 - b) Sources of income
 - c) Students expenditure
 - d) Importance of daily account keeping
- 9. Financial Management:**
 - a) Saving-types, advantages and disadvantages
 - b) Credit-kinds, advantages and disadvantages

Books Recommended:

1. Nickell, Rice, Tacker : *Management in family living*
2. Goodyear : *Effective Home Management*
3. Gross, Crandall and Knoll : *Management in Modern Families*
4. মমতাজ খান : “পারিবারিক জীবন ও গৃহ ব্যবস্থাপনা” ২য় সংস্করণ, ১৯৯৮ইং

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|---------------------|--------------------------|-------------------|-------------------|------------------------|
| Paper Code | 116003 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Child Development | | | |

- 1. Introduction:** The practical importance of child development. Some historical perspectives and principles. Meaning of Development; Principles of development, States of development; Growth measurements by head, chest, height and weight. Curves of normal growth.
The prenatal stage- Beginning of life Genetic factors in development; heredity and environment controversy. Pattern of physical development (physical defects and disorders). Factors influencing development of the child.
- 2. Infancy and Babyhood-** pattern of physical and behavioral development (sensory, motor, intellectual and emotional development).
- 3. Preschool years-** Developmental tasks-physical growth and health social and emotional development. Intelligence and its measurement, language development. Play activities guidance, problems of development.
- 4. Middle childhood-**Developmental tasks, motor skills moral and --spiritual development, mental development, play and games, developmental problems.
- 5. Late childhood pre-adolescence-**physical development, intelligence. Attitudes and interests social development, Emotional development, Developmental problems.

Books Recommended:

1. E.Hurlock : *Child Development*
2. Garrison : *The Psychology of Adolescence*
3. Berzonsky : *Adolescent development*
4. Breekenridge and Vincent : *Child Study*
5. Mussen, P.H. Conger J.J and Kagan J. : *Child Development*
6. Stone and Church : *Childhood and Adolescence*
7. Stone and Church : *Introduction to child study*
8. Jersild, A. Y. : *The Psychology of Adolescence*
9. শাহীন আহমেদ : *শিশু বর্ধন, বিকাশ ও পরিচালনা*

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|---------------------|---------------------------|-------------------|-------------------|------------------------|
| Paper Code | 116005 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Food and Nutrition | | | |

- 1.** Basic concept of food and nutrition, Relation of food and nutrition to health.
- 2.** Classification of foods according to function, energy yielding. Body building and protective foods. Nutritive value of common foodstuffs.
- 3.** Classification of nutrients, carbohydrates, proteins, fats, vitamins, mineral their chemical nature, functions food sources and requirements.
- 4.** Planning of balanced diets-Principles of meal planning for different age groups and physiological conditions infancy, childhood, adults, old age pregnancy, lactation.
- 5.** Food selection and food preparation. Different methods of cooking, effects of cooking on nutritive value of foods. Selection, preparation and storage of foods, milk and milk products, meat, fish, vegetables and cereals.
- 6.** Therapeutic nutrition therapeutic diets. Dietary management in fever, constipation, infections, liver disease, heart disease, diabetes.]
- 7.** Nutritional problems of Bangladesh. Malnutrition-etiology of PEM, IDD, micronutrients and their remedies.

Books Rdocmmended:

1. M. Swaminathan : *Essentials of Food and Nutrition Vol.I*
2. Shubhangini AJoshi : *Nutrition and dietetics*
3. Bogert : *Nutrition and Physical fitness*
4. শাহীন আহমেদ : *খাদ্য ও পুষ্টি বিজ্ঞান (প্রথম সংস্করণ)*

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|---------------------|--------------------------------------|-------------------|-------------------|------------------------|
| Paper Code | 116007 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Food Science and Microbiology | | | |

1. **Approximate composition of the following food stuffs for protein, carbohydrate and fats:**
a) Cereals b) Meat and Fish c)Eggs d)Milk e) Fruits and Vegetables g)Oil and seeds and nuts.
2. **The study of color and flavor in foods:**
a) Properties of natural color in foods: carotenoids, chlorophylls, anthoeyanins, falvonoids, tannis.
b) Changes of colour in different processing and cooking.
c) Function of flavour and taste, natural and artificial flavouring substances.
d) Effect of processing on flavour changes.
3. **Food and spoilage and preservation:** causes of food spoilage, principles and methods of food preservation.
4. **Food adulteration:** Common adulterants and their ill-effects, simple test to detect adulteration.
5. Microbiology of air, water, sewerage and food.
6. Transmission of diseases. Modes of transmission, Body resistance, common infections diseases: typhoid, paratyphoid, dysentery, food infections.

Books Recommended:

1. Norman Potter : *Food Science*
2. L. H. Meyer : *Food Chemistry*
3. M. W. Desrosier : *Elements of Food Technology*
4. W. C. Frarier : *Food Microbiology*
5. Fabin d : *Home Food Preservation*
6. Gerold J. Tortora, Funke and Case : *Microbiology an Introduction*
7. Michad J. Pelegar, Chan Krieg : *Microbiology*

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|---------------------|--------------------|-------------------|-------------------|------------------------|
| Paper Code | 116009 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Applied Art | | | |

1. **Art Education:**
a) Definition, aim and objecttives of Art.
b) Principles and elements of Art and color theories.
c) Development of good taste in home decoration and personally expressed through selection and arrangement of articles in home.
2. **Outline of History of Art and Culture Heritage of Bangladesh:** Origin of History of Art- Prehistoric, ancient and medieval Art. Influence of magic, Religion and culture in Art, Art of East and West, folk-Arts and Crafts of Bangladesh.
3. **Essence of Design:** Structural and Decorative design. Evolution of design, Textile Arts and designs, Furniture design.
4. **Home Furnishing:** Selection and arrangements of furniture, picture decorative wall hangings mats, fixing of cushions, floor coverings, curtains and other articles and accessories with emphasis of aesthetic and practical value, Arrangements of room in local styles as adopted to the modern conditions of living. Making the best of ones possesssion through elimination, rearrangement and concealment. Study of the effect of color and other art elements and principles

in Home decoration interior, exterior and other and other parts of the house (Home furnishing, architecture and landscape)

5. **Flower arrangement:** Following beauty of line and color for different seasons and occasions. Artistic arrangements of leaves, foliage, roots, tubes, twigs, berries, seedpods, Selection of Vase and Accessories.

Books Rdocmmended:

1. Maitland graves : *The art of colour design*
2. Donald M. Anderson : *History of World Art*
3. Marjoie Elliot Belivin : *Design through Discovery*
4. Nora Proud : *Textile printing Design*
5. Victoria Kloss Ball : *The art of Interior Design.*

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|---------------------|-----------------------------|-------------------|-------------------|------------------------|
| Paper Code | 116011 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Clothing and Textile | | | |

1. History of Costume-East and West:

- a) The development of costume from ancient to modern times with consideration of the historic, social and economic settings.
- b) Historic fabrics of Bangladesh
- c) Historic costume of Bangladesh-Cultural and economic significance.

2. Clothing needs for family members.

- a) Consumer problems in family clothing.
- b) Problems of clothing consumption as encountered during various stages of the family life cycle.
- c) Economic, Psychological, Physiological and Social factors involved in Clothing the family.

3. Textile fibres:

- a) Technical methods of identification, basic performance characteristics.
- b) Textile yarn productions.
- c) Fabrics- Construction, finishes and finishing.
- d) Dying and Printing of fabrics.

4. Tailoring Techniques: Garments Techniques and Training.

- a) Planning-making (Care, upon design) Patterns and taking measurement for garments, pattern, attraction and fitting and construction of garments.
- b) Experiments with techniques of tailoring.
- c) Role of color, texture and good designs in clothing. Design analysis and creative approach for designing clothes.

5. a) Teaching materials for the clothing class. Investigation preparation and evaluation of teaching materials for students planning to teach of demonstrate home economics.
- b) Cultural, functional and technological development in textile clothing.
- c) Aiming for careers in clothing and fashion, study of fashion trends.

Books Recommended:

1. Harriell T. Mc. Jinsey : *Art in clothing selection*
2. Harrison S. Hillhouse : *Dress selection and design*
3. Boxter : *Our clothing*
4. Carson : *How you look and dress*
5. Rohr M. : *Pattern drafting, childrens garment design*
6. Gately Olive : *Your future in the fashion world*

National University
Madar Bux Home Economics College
Syllabus for 3 years B.Sc. Pass Degree Course
Subject: Home Economics
Session: 2013-2014

Second Year

| Paper Code | Paper Title | Marks | Credits |
|------------|--|-------|---------|
| 121001 | বাংলা জাতীয় ভাষা | 100 | 4 |
| 126001 | Interior Decoration | 100 | 4 |
| 126003 | Early Childhood Education | 100 | 4 |
| 126005 | Community Nutrition and Health Education | 100 | 4 |
| 126007 | Meal Management | 100 | 4 |
| 126009 | Creative Art | 100 | 4 |
| 126011 | Principles of Family Clothing | 100 | 4 |
| | Total = | 700 | 28 |

Second Year
Detailed Syllabus

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|----------------------------|--------------------|--------------------|-------------------------|
| Paper Code : 121001 | Marks : 100 | Credits : 4 | Class Hours : 60 |
| Paper Title : | বাংলা জাতীয় ভাষা | | |

ক : সাহিত্য

১) নির্বাচিত কবিতা

নম্বর-২৫

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|------------------------|--------------------|
| ক) মাইকেল মধুসূদন দত্ত | : আত্ম-বিলাপ |
| খ) রবীন্দ্রনাথ ঠাকুর | : ঐক্যতান |
| গ) কাজী নজরুল ইসলাম | : চৈতী হাওয়া |
| ঘ) জীবনানন্দ দাশ | : বনলতা সেন |
| ঙ) ফররুখ আহমদ | : ডাহুক |
| চ) শামসুর রাহমান | : বার বার ফিরে আসে |
| ছ) আল মাহমুদ | : সোনালী কাবিন: ৫ |

২) নির্বাচিত প্রবন্ধ

নম্বর-২৫

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| ক) বঙ্কিমচন্দ্র চট্টোপাধ্যায় | : বাঙ্গালা ভাষা |
| খ) হরপ্রসাদ শাস্ত্রী | : তৈল |
| গ) রবীন্দ্রনাথ ঠাকুর | : সভ্যতার সংকট |
| ঘ) প্রমথ চৌধুরী | : যৌবনে দাও রাজটিকা |
| ঙ) কাজী আবদুল ওদুদ | : বাংলার জাগরণ |
| চ) কাজী নজরুল ইসলাম | : রাজবন্দীর জবানবন্দী |
| ছ) মোতাহের হোসেন চৌধুরী | : সংস্কৃতি-কথা |

৩) নির্বাচিত গল্প

নম্বর-২৫

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| ক) রবীন্দ্রনাথ ঠাকুর | : একরাত্রি |
| খ) বিভূতিভূষণ বন্দ্যোপাধ্যায় | : পুঁই মাচা |
| গ) আবুল মনসুর আহমদ | : ছয় কেবলা |
| ঘ) মানিক বন্দ্যোপাধ্যায় | : প্রাগৈতিহাসিক |
| ঙ) সৈয়দ ওয়ালীউল- হা | : নয়নচারা |
| চ) শামসুদ্দীন আবুল কালাম | : পথ জানা নাই |
| ছ) হাসান আজিজুল হক | : আত্মজা ও একটি করবী গাছ |

খ : ভাষা শিক্ষা

নম্বর-২৫

- ১। পত্র রচনা : ব্যক্তিগতপত্র, দায়িত্বরিকপত্র, ব্যবসায়-সংক্রান্তপত্র, আবেদনপত্র ও মানপত্র
- ২। গদ্যরীতি : সাধু, চলিত ও আঞ্চলিক
- ৩। প্রমিত বাংলা বানানের নিয়ম (বাংলা একাডেমি, ঢাকা)
- ৪। অনুবাদ : ইংরেজি থেকে বাংলা
- ৫। সারসংক্ষেপ।

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|---------------------|----------------------------|-------------------|-------------------|------------------------|
| Paper Code | 126001 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Interior Decoration | | | |

1. Introduction:

- a) Meaning of interior design and interior decoration
- b) Difference between interior design and interior decoration
- c) Elements of interior design
- d) Purpose of interior design
- e) Specialization and Specialities (Home interior, restaurant interior, hotel interior, institute interior)

2. Basic Principles of Interior Design:

- a) Function b) Proportion c) Harmony and Balance d) Color e) Centre of interest f) Rhythm g) Unity with variety.

3. Defining Interior Space:

- a) Floor b) Enclosures, walls, Partitions and other barriers c) Ceiling Roof d) Pattern of space use.

4. Basic Design Elements:

- a) Furniture arrangement b) Wood c) Steel d) Glass e) Composite elements (artifacts and curtains etc.)

5. Color As An Essence of Interior Design:

- a) Psychological impact of color
- b) Color scheme, types of color scheme, use of color scheme.
- c) Factors influencing the color scheme
- d) Use of color on accordance to mood and purpose of space.

6. Light-An Essential Consideration of Interior Design:

- a) Definition to light.
- b) Biological needs of light
- c) Lighting design
- d) Principles of lighting
 - i) Planning of lighting
 - ii) Effective use of light source
 - iii) Planning for visual comfort
 - iv) Reducing of shortcomings of artificial light
 - v) Consideration of safety
- e) Lighting of various interiors
 - i) Living room ii) Kitchen iii) Dining table iv) Bathroom v) Offices.

Books Recommended:

1. Your Home outdoors
2. Colour-Martha gill
3. Your Home-Kitchen
4. Your Home Furniture fitness
5. Interior Design-Ruth Morton
6. Art of Ideas-William Fleming

7. The art of Interior Design – Victoria Kloss Ball
8. The art of Colour and Design – Maitland Crraves
9. Design through Discovery – Marjoric Elloit Bevlin
10. ডিজাইন নীতি ও স্থাপত্য ধারা - আবু এইচ ইমাম উদ্দিন
11. গৃহসজ্জা - বি বি রায়।

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|---------------------|----------------------------------|-------------------|-------------------|------------------------|
| Paper Code | 126003 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Early Childhood Education | | | |

1. The importance of early years:
Early childhood defined- Ecology of early childhood- Understanding the child you teach- characteristics and guidance of two to six years.
2. Characteristics of a Good nursery school. Development of nursery education. Friendrick Withelm Froebel- Maria Montessori.
3. People in the nursery School
 - a) Introducing the people.
 - b) Helping children adjust to new experiences
 - c) Adults guidance system- Adult role in child compliances.
 - d) Methods of involving parents- activities for involving parents- Parent-Teacher conference- Recognizing perental responsibilities in the nursery school.
4. Love and understanding for the child:
 - a) Developing a feeling of trust and security- learning to depend upon self- Developing a feeling of autonomy and initiative.
 - b) Building feelings of confidence and adequacy.
5. Importance of guidance principles:
 - a) The positive value of limits- Difficulty in setting limits- Acceptable limits.
 - b) Initial support through guides to speech and action.
 - c) Developing relationship in groups.
 - d) Rogerian approach to guidance.
6. Handling aggressive behaviour
 - a) Types of aggression-Age and sex difference in Aggression- Sources of Aggression- Aggression in family- Aggression in peer group- keeping good and clean- Failure to get attention and response- Hursh method of control- Threat of friendly adults.
 - b) Relesing and reducing hostility and aggression.
 - c) Controlling and modifying aggression- Individual level- Family level- Community level.
7. Developing the curriculum and evaluating the programme:
 - a. The role of teacher in nursery school
 - b. Planning the daily programme
 - c. Organizing the curriculum
 - d. Areas in cthe curriculum- Listenign- reading- Creative activites- Art- Story and Music time- Guiding play and Physical Activity.
 - e. Dvaluating the progress- Evaluative techniques- Parents in evaluation.

References:

1. Katherine Read. The Nursery School, Saunders company NY.
2. Logan, LM, Teaching the young child. Houghtonn Miffling Co. Boston.
3. Leavit JE Nursery Kindergarten Education McGraw-Hill Book Company, NY
4. Ludlum CR. The Nursery School-Houghtonn Mifflin co. Boston.
5. Marion M. Guidance of young Children- Merrill Publishing company.
6. Hedrick J. The whole child. The C.V Mosby company ST. Louis.
7. Kawin A. Early and Middle Childhood. The Mac Millian Company NY.

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|---------------------|---|-------------------|-------------------|------------------------|
| Paper Code | 126005 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Community Nutrition and Health Education | | | |

- 1. Etiology of malnutrition:** Insufficient food production, social, economic and cultural factors influencing malnutrition.
2. Practical improvement of community nutrition: Health and nutrition education, food distribution and its implication, food enrichment and fortification, improving household food security.
3. The importance of health education: Signs of fitness: balanced diet, exercise and weight control.
4. Health education in family health care: Advice for pregnant women complication of pregnancy. Birth injuries, Health education for school age children and adolescent girls.
5. Health education in the control of communicable and non communicable diseases – causative agents mode of transmission and preventive measures bacterial and viral infections, “AIDS”, SID etc.
6. Protection and Promotion of good health.
 - Primary healthcare, rehabilitation of malnutrition.
 - PEM, IDD etc.
 - Growth monitoring and promotion immunization, supplementary feeding of children and pregnant women.

Books Recommended:

1. Michael C. Latham : *Human nutrition in the developing world. FAO food and nutrition series.*
2. Jelliffe & Jelliffe : *Community Nutrition Assessment*
3. Pieter Streelland & Jad Chabol : *Implementing primary health care*
4. Warner wek Hoeget & Shaman A Hoeger : *Fitness & well being.*

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|---------------------|------------------------|-------------------|-------------------|------------------------|
| Paper Code | 126007 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Meal Management | | | |

1. General diet and modification

- a) Approximate Composition of common foods stuff grains. pulses and fruits.
- b) Vegetable, leafy vegetables, tubers, fresh food milk and egg.
- c) Nutritional basis for food classification. How food groups contribute nutrient.
- d) Basic food groups and menu planning.
- e) Recommended dietary allowances.
- f) High caloric and low caloric diet. High protein and low protein diet, High vitamin diet.

2. Planning diet for different physiological conditions

- a) Infancy
- b) Childhood and adolescence
- c) Pregnancy and Lactation
- d) Old age
- e) Obesity and under weight
- f) Different disease condition (specially diabetes mellitus, diarrhoea, fever, Kidney and liver disease and constipation).

3. Quantity food service

- a) The development of food service in institution.
- b) Meal planning. Food standards and service.
- c) Food selection, Buying and storing.
- d) Food products and their preparation.

4. Planning food service facilities

- a) Factors influencing planning.
- b) Food service facilities for the school, college cafeteria and university dining hall.
- c) Floor planning and layout for dining room and kitchens

5. Organization and administration in the food service institute

- a) Organization and management
- b) Administrative leadership.
- c) Personal management
- d) Cost control.

Book Recommended:

1. Wert and Wood : *Food Service Institution*
2. Beth Balley Melean : *Meal Planning and table service*
3. Brytacarson marue
Carson Raince : *How you plan and prepare meals*
4. Flower B.F : *Food for fifty*
5. Vera Clanssen Crusins : *Quality food management*
6. Mohini Settign Surjeet
Malhan : *Catering Managemet and Integrated Approach*
7. Ronal Kinton &
Victor Ceserani : *The theryory of Catering*
8. অধ্যাপিকা সিদ্দিকা কবীর : *রান্না খাদ্য পুষ্টি*

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|---------------------|---------------------|-------------------|-------------------|------------------------|
| Paper Code | 126009 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Creative Art | | | |

1. Meaning and definition of creative art.
2. Objectives of creative art.
3. Crative stitch craft
 - a) Selection of design for creative stitch.
 - b) Tools and material for creative stitch.
 - c) Traditional and modern use of creative stitch craft.
4. Flower Arrangement
 - a) Flower arrangement for different season and occasion.
 - b) Flower arrangement following beauty of line and colour.
 - c) Selection of uses and accessories.
 - d) Important factors for artistic flower arangement.
 - e) Artistic arrangements of leaves foliage roots, twigs etc.
 - f) Different style of flower arrangement – free style western style.
Easter Japanese style
 - i. Style – A
 - ii. Style – B
 - iii. Style – C
 - iv. Style – D
 - g) Dried flower arrangement.
5. The art of paper- Mache
 - a) Definition & objectives of paper-Mache.
 - b) Tools and equipments and various methods of making paper Mache craft.
 - c) Use, advantages and disadvantages of paper Mache craft.
6. The creative art of Macrame
 - a) Definition and introduction of Macrame

- b) Knotts used in Macrame
- c) Calculation of thread.
- 7. Art of card making
 - a) Definition & objectives of card making.
 - b) Selection of card making
 - c) Tools and equipments and various methods of making crad craft.
- 8. Paper craft and origami.
- 9. Creativity of candle making.
- 10. Art of Lether craft.
 - a) Selection of Lether.
 - b) Tools and equipment for lether craft.
 - c) Techniques of lether craft.
 - d) Dyeing and decorating lather craft.

References:

1. Art of everyday experience – Esther S. Warner.
2. Macrame the of creative knotting – Verginian Hervery.
3. Decorative Wall Hangins – Davids B. Van Domonile.
4. Everyone’s Flower Arrangement – Hoyn Ohara
5. Guide book of Hobbies – Longare press Ltd.
6. Paper craft and origami – Paul Jackson A Court.
7. ব্যবহারিক শিল্পকলা এবং বস্ত্র ও পোষাক শিল্প - শাহেদা খানম, মোর্শেদ খানম
8. The art of making – Handrich Willieam Vahaloom.
9. Interior Decoration - Promila Mehara.

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|---------------------|--------------------------------------|-------------------|-------------------|------------------------|
| Paper Code | 126011 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Principles of Family Clothing | | | |

1. Factors involved in clothing the family:

- a) Needs for clothing
- b) Economic, Social and Psychological factors involved in clothing.
- c) Clothing and health
- d) Clothing consumption at different stages of the family life cycle
- i) Beginning ii) Expanding family iii) Contracting family

2. Budgeting for the family clothes:

- a) Family income, ideals and the individual allowances for the clothes.
- b) Family’s clothing budget
- c) Clothing expenditure

3. Decision making in selection for clothing:

- a) How to make clothing decision
- b) Factors affecting clothing decision
- c) Steps in decision making

4. Planning the family’s wardrobe:

- a) Wardrobe planning with special emphasis on budget, occasion, climate, occupation and interests, community, family income number family members, age, figure, fashion, quality and accessories.
- b) Art elements and art principles in relation to choice of clothing for various family members.
- c) Color, prints, lines, cheeks and plaids
- d) Principles applied to special problems

5. Children clothing:

- a) Principles of selecting suitable fabrics, colours and textiles for children of different age group, viz. infant, creeping, pre-school.

- b) Designing for child's cloth safety measure, functional and self help garment.
- 6. Garments for different age and different purposes:**
- Teen age
 - Working people
 - Old age
- 7. Consumer problem in family clothing:**
- Family size and income
 - Individual difference
- 8. Care of clothing in household:**
- Characteristics of washing agent such as water, soap, and detergent.
 - General process of laundering.
 - Stain removal
 - Ironing and pressing
- 9. Proper storage of clothing**
- Brushing and airing
 - Anti insect treatment
 - Principles of storing clothes

Books Recommended:

- Family clothing – Tate and Clisson
- Clothing for Moderns – Drwin and Kinchen
- Experiences with clothing – L. Belle Pollored
- Clothing constructure and Wardrobe planning – Dora S. Lewis
- বস্ত্র ও পরিচ্ছদ - তাহমিনা জামান
- Art in clothing selection – Harriet T. Mc. Jinsey
- Dress selection and design- Harison S. Hillhoiuse
- Our clothing – Boxter
- How you look and dress – Carson
- Pattern draftin, children's garment design – Rohr M.
- Your future in fashion world – Gately Olive
- Practical Dress Design – Erwin M. D.
- আধুনিক ডিজাইনের কাটিং সেলাই শিক্ষা - শ্রী দেবেন্দ্র বন্দোপাধ্যায়
- পোশাক পরিচ্ছদ ও শিল্পনীতি - তাহমিনা জামান
- Testile and their care – Shushila Dhantiyagi

National University
Madar Bux Home Economics College
Syllabus for 3 years B.Sc. Pass Degree Course
Subject: Home Economics
Session: 2013-2014

Third Year

| Paper Code | Paper Title | Marks | Credit |
|------------|---|-------|--------|
| 131101 | English (Compulsory) | 100 | 4 |
| 136001 | Advanced Home Management and Housing | 100 | 4 |
| 136003 | Child Welfare and Family Relations | 100 | 4 |
| 136005 | Biochemistry and Elementary Physiology | 100 | 4 |
| 136007 | Hunam Nutrition and Dietetics | 100 | 4 |
| 136009 | Art and Craft–Income Generating Sources for Women | 100 | 4 |
| 136011 | Fashion Designing | 100 | 4 |
| 136012 | Practical (Applied Home Economics) | 100 | 4 |
| | Total = | 800 | 32 |

Third Year

| | | | | |
|--------------------|----------------------|-------------------|-------------------|------------------------|
| Paper Code | 121101 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title | English (Compulsory) | | | |

Aims and objective of this Paper: To develop students' English language skills, to enable them to benefit personally and professionally. The four skills- listening, speaking, reading and writing will be integrated to encourage better language use

1. Reading and understanding 5x4=20
 Students will be expected to read passages so that they might come across in their everyday life, such as newspapers, magazines, general books etc. Simple stories will also be included to give students a familiarity with different uses of the language.

[N.B. 5 Detailed Syllabus Questions are to be answered. Each question will carry 4 marks. There may be division in each question]

- a) Understanding different purposes and types of readings
- b) Guessing word- meaning in context.
- c) Understanding long sentences
- d) Recognizing main idea and supporting ideas
- e) Answering comprehension questions
- f) Writing summaries

2. Writing

- a) Writing correct sentences, completing sentences and combining sentences. 05

- b) Situational Writing: Posters, notices, slogans, memos, advertisements etc. 04
- c) Paragraph Writing :Structure of a paragraph; to topic sentence; developing ideas; writing a conclusion; types of paragraphs (narrative, descriptive, expository, persuasive); techniques of paragraph development (such as listing, cause and effect, comparison and contrast) 08

Or,

d) Newspaper writing: Reports. Press realize, dialogue etc

e) Writing resume 8

Or,

f) Writing letters : Formal and Informal letters, letters to the editor, request letter, job applications, complaint letter etc.

g) Essay : Generating ideas; outlining, Writing a Thesis sentence; writing the essay: writing introduction, developing ideas, writing conclusion, revising and editing. 15

3. Grammar 25

a) Word order of sentences.

b) Framing questions.

c) Tenses, articles, subject –verb agreement, noun-pronoun agreement, verbs, phrasal verbs, conditionals, prepositions and prepositional phrases, infinitives, participles; gerunds. (Knowledge of grammar will be test through contextualized, passages).

d) Punctuation

4. Developing Vocabulary: Using the dictionary, suffixes, prefixes, synonyms, antonyms, changing word forms (from verb to noun etc.) and using them in sentences. 10

5. Translation from Bengali to English. 1x5=5

6. Speaking Skills: Speaking skill should be integrated with writing and reading in classroom activities.

The English sound system; pronunciation skills; the IPA system; problem sounds; vowels; consonant and diphthongs; lexical and syntactic stress.

(Writing dialogue and practice it orally students can develop their speaking skill. Dialogue writing can be an item in writing test.)

| | | | | |
|---------------------|---|-------------------|-------------------|------------------------|
| Paper Code | 136001 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Advanced Home Management and Housing | | | |

1. Purpose and Philosophy of Home management in Bangladesh.

2. Ecological aspects of Management.

- a) The relation of nature to Man, Ecology and Human Ecology. Models definitions, components and interrelationship and functions of each in the system.
- b) Family and Ecosystem: Family decision making process. Types of decision and its interrelatedness. Reducing uncertainty in decision making family community interaction. Changes family in life Managing change.
- c) Environment Hazards to Human life: Factors and effects. Family's effort to cope with problems. Population explosion, Pollution, Managing environmental resource-
 - i) Population and environmental quality (Pollution, resource depreciation).
 - ii) Principles of energy use.
 - iii) Social components of the Environment.
 - iv) Economic institutions as environmental resources.
 - v) People as environmental resources.
 - vi) Other cultural, institutional and social resources.
 - vii) Search for environmental solution.
 - viii) Managing Biological components of the environment.

3. An over all view fo Home Management.

- a) Critical analysis of values, goals and use of resources as effecting manatement practices in Bangladesh homes.
- b) Role of decision making in Home Management.
- c) Historical evidences of Home Management practice in Bangladesh homes.
- d) Socio-cultural and economics changes and their effect upon Home Management.

4. Energy Management

- a) Sources of fuel and energy
- b) Requirements and availability of energy resources.
- c) Energy crisis.
- d) Measures to be taken for energy management. Nationwide and Household sector.

5. Analysis of consumer behavior (consumption and standard of living)

Analysis of housing:

- a) Home comfort (Light, colour, home furnishing).
- b) Housing design

Books Recommended:

- | | |
|----------------------------|---|
| 1. P.S. Verma | : Journal of Home Economics Ecology |
| 2. Nickel, Rice and Tucker | : Management in Family Living |
| 3. অধ্যাপক মমতাজ খান | : পারিবারিক সম্পদের ব্যবস্থাপনা |
| 4. মমতাজ খান | : পারিবারিক জীবন ও গৃহ ব্যবস্থাপনা, ২য় সংস্করণ, ১৯৯৮ ইং, প্রকাশক আরিফ রশিদ, ঢাকা। |
| 5. ড. ফিরোজা সুলতানা | : গৃহ ব্যবস্থাপনা ও বাসগৃহ, ৪র্থ সংস্করণ, ১৯৯৭; সোলার বুকস এন্ড বুকস, বাংলাবাজার, ঢাকা। |
| 6. গৌতম পাল | : পরিবেশ ও দূষণ |
| 7. এ. বি. এম. রেজাউল হক | : মানুষ ও পরিবেশ। |

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|---------------------|---|-------------------|-------------------|------------------------|
| Paper Code | 136003 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Child welfare and Family Relations | | | |

1. Meaning and aim of child welfare.

2. Basic factors in welfare:

- a) Economic Security.
- b) Enlightening parenthood
- c) Strengthening home life.
- d) Physical and mental Health facility.
- e) Education and recreation. f. Special care for children.

- 3. Importance of welfare in Bangladesh. Rights of children as described by UNO.**
- 4. Disadvantaged children of Bangladesh:** Definition of disadvantaged children, Types of disadvantages – Physical,- mental Facilities available for thd disadvantaged – both government and private. Poverty alleviation and education for the disadvantaged.
- 5. Welfare agencies for child and families:-**
 - a) Preventive Services – Play centre, Baby care, Foster home, Adoption centre, Day care centre, Planned Parenthood organizations.
 - b) Curative Services – Homes for the crippled., Correction centers, Vagrant homes and homes for the aged.
- 6. Ministry of Child and Women’s Welfare in Bangladesh.**
- 7. International welfare agencies:** WHO, UNICEF, CARE, UNFPA, family agencies.
- 8. The family as a Social institution -** Definition and origin of the family – Existing family pattern in Bangladesh – Functions of the family, size and structure of the family – Individuals place in the family, Recognizing one’s own place in relation to other family members – contributions of individual member to the family – Ability to take responsibility and decision making – Conflict and stress in the family. Family life cycles.
- 9. Socio-economic considerations which influence – family living – income – living standards – family crisis – unemployment- illness – working mother.**

References:

1. Social Stratification and Social Welfare Services in Bangladesh – Mia & Others.
2. Problems of Children and Adolescents in Bangladesh – M. A. Gafur, Samaj Kalyan Porikroma.
3. The Disable Children in Dhaka – M.A. Sobhan & M. Rahman.

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|---------------------|---|-------------------|-------------------|------------------------|
| Paper Code | 136005 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Biochemistry and Elementary Physiology | | | |

1. Cell and Tissue:

- a) Cell: Chemical components-Their structures and biological functions.
- b) Tissue: Classification & functions of various tissues.

2. Bimolecules:

- a) Carbohydrates: Classification, Chemical nature, metabolism of carbohydrate in the body.
- b) Lipids: Classification, Chemical nature, Matabolism of fats in the body, Reaction of fat, Fatty acids of sterols.
- c) Proteins: Classification based on structure and functions, chemical properties. Metabolism of amino acids in the body.

3. Enzymes: Chemical nature, Classification

- a) Mode of enzyme action.
- b) Enzymes in Clinical diagnosis and food industry.

4. Classification, Chemistry and functions of vitamins and minerals.

5. System of the human body:

- a) Alimentary system: Structure and function of various parts of the human gastrointestinal tract.
- b) Circulatory system: Structure of heart, components of blood.
- c) Respiratory system: Lungs structure and the physiology of breathing.

6. General idea of the following organs:

- a) Pancreas: Structure and functions
- b) Liver: Structure and function.
- c) Kidneys: Structure and function, Physiology of urine formation.

7. Endocrine system:

Introduction of hormones and mechanism of hormones action and function of pituitary, thyroid adrenal and sex hormones.

Books Recommended:

1. A.L. Lehninger : *Biochemistry*
2. Guyton and Hall : *Text Book of Medical Physiology*
3. D.W. Martin, P.A. Mayes
V. W. Rodwell : *Harpers Review of Biochemistry*

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|---------------------|--------------------------------------|-------------------|-------------------|-----------------------------|
| Paper Code | 136007 | Marks: 100 | Credits: 4 | Class Hours: 60 hrs. |
| Paper Title: | Human Nutrition and Dietetics | | | |

1. Nutritional requirements & Recommended Dietary Allowance:

- a. Body fitness, body wet management.
- b. Factors affecting RDA
- c. Principles of deriving RDA
- d. Requirement & RDA.
- e. Energy requirement – Determination of Energy requirement of individual, factors affecting energy requirement – age, sex, physical activity health condition.

2. Nutritional food requirements during infancy & early childhood:

- a) Growth & Development
- b) Food requirements – breast feeding, supplementary feeding & weaning diets for infants
- c) Feeding young Children – developing good food habits – Packed lunches & School lunch programme.
- d) Nutritional related problems of Children – diarrhea, Malabsorption & appropriate diets in food allergy.

3. Nutrition and food requirements expected & lactating mothers:

- a) Food requirement & dietary modifications.
- b) Complications of pregnancy & dietary advice.
- c) General dietary guidelines.

4. Nutritional & food requirements during old age:

- a) Physiological changes in old age.
- b) Dietary modification in old age.
- c) Nutritional problems of old age.

5. Dietetics:

- a) Therapeutic diets – its importance, types and factors to consider in planning therapeutic diet.
- b) Routine hospital diets.
- c) Special feeding methods – tube feeding parenteral feeding.
- d) Pre and post operative diet.

6. Diet for infection and fever:

- a) Effect of short term and long term fever on body metabolism.
- b) Dietary modification in infection & fever –Typhoid, influenza, tuberculosis.

7. Diet in Diabetes mellitus:

- a) Etiology & metabolic changes.
- b) Symptoms & diagnosis & complications.
- c) Diabetic diet prescription – in IDDM and NIDDM

8. Diet in diseases of liver:

- a) Agents responsible for liver disease.
- b) Infective hepatitis & dietary modification.

c) Dietary modification in liver cirrhosis.

9. Diseases of blood vessels & Heart – Hypertention, Atherosclerosis, Heart Attack and Stroke
10. Kindney Disease, Electrolyles balance

Recommended Books:

1. খাদ্য ও পথ্য ----- সৈয়দা হালিমা রহমান
2. Dietetics ----- B. Srilakshmi.
3. Nutrition & Dietetics ----- Shubhangini A. Joshi.
4. Nutrition Science ----- B. Srilakshmi.

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|---------------------|--|-------------------|-------------------|------------------------|
| Paper Code | 136009 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Art and Craft – Income Generating Sources for Women | | | |

1. Status of Women in Bangladesh

- a) Woman of rural area
b) Woman of urban area
2. Sources of income for women
- a) Types of family income
- i) Real income
ii) Money income
iii) Psychic income
- b) Source of income
- i) Household activities – House keeping, painting, writing etc.
ii) Professional activities – Teacher, Doctor, Nurse, IT Specialist, pilots, Defense personal, Engineer, Architect, Mechanics, Technicians, Journalist, Artist, Designer, etc.
iii) Business activites – Cottage Industry, Garments, Boutique, Beauty Parlors, Interior Decoration Export and Import business etc.
3. Importance of financial security for women
- a) Health
b) Education
c) Marriage
d) Family living
4. Income generating sources through Art and Craft
- a) Fine Art – Music, Dance, Painting, Sculpture, Acting, Literature.
Craft – Stichery, Weaving, Pottery, Dress designing and making, Interior decoration, Small scale cottage industry items such as – Hand made paper, Packet food spices, pickles and other home made products, candle making etc.
5. Women Entrepreneurs of art craft products.
- a) Definition and qualities of women entrepreneurs.
b) Problems of women entrepreneurs and ways of solution of those problems.
c) Selection of business for women entrepreneurs.
d) Role of micro-credit organizations, Banks SME's and EPB in income generating. activities of women.
6. Govt. and Non-Govt. Organizations helpful to women entrepreneurs of Bangladesh.
- a) Women development programme under department of women affairs.
b) Youth development programme
c) BSCIC – Function
d) Grameen Bank – Aims and Objectives loan service

- e) MIDAS
 - f) BRAC
 - g) ASA
 - h) Proshika
 - i) Probartona
 - j) Dhaka Ahsania Mission
 - k) CARE
7. Marketing management for women entrepreneurs of art and craft products-
- a) Definition of market
 - b) Importance of marketing
 - c) Market study and market demand
 - d) Product supply methods
 - e) Price decision
 - f) Promotion of products
8. Training for efficiency improvement for the women entrepreneurs.

References:

1. বিপন্ন যুগে যুগে
2. কুটির শিল্প জাতীয় শিক্ষাক্রম ও পাঠ্য পুস্তক বোর্ড, ঢাকা।
3. The Art of interior Desing – Victoria Kloss Ball.
4. The Art of Making – Hendrick Nilliam Vanloon.
5. Basic Crafts – John R. Lind beet.

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|---------------------|--------------------------|-------------------|-------------------|------------------------|
| Paper Code | 136011 | Marks: 100 | Credits: 4 | Class Hours: 60 |
| Paper Title: | Fashion Designing | | | |

1. Fashion Terminology
Areas and scope; Sources for ideas; fashion figure and proportions introduction to seam-and balance lines.
2. Fashion Figure
Basic block figure for female, male and child; regular VS fashion figures; fleshing-out.
3. Freehand drawing
Types of line and tone practice movement figure analysis; posesstatic and action; face, hands, feet, head and hair styles; mood and style of garment and relevent poses.
4. Fashion Accessories
Scarves, hats, shoes, jewellery and handbags.
5. Rendering of Testures and Fabrics
Velvet, fur, leather, satin, knit, twill and print.
6. Decoration and Detailing
Belts, cuffs, waistbands hemlines, bias, drape, gather, drawstring embroideries, fastenings, frills, flounces, pleats, pockets, seams, vents, slits & zips.
7. Design Brief
Formulation; concept direction, ideas sourcing, research and adaption; fabric theme and color story.
8. Consolidation of Ideas
Idea sheets; illustrated designs; prevention of drawing working drawing for sample development.
9. Presentation of Collection
Creation of concept, mood, story and illustration board.

References:

1. Albert. G. Garie – Figure Drawing techniques.

2. Draxe, N. Fashion – Illustration Today.
3. Jounals – Donna; Elle; Itarpers; Vogue
4. Holborn, M. Lessev Miyake – Taschen.
5. Lagerfele. K; Karl Lagerfeld Taschen
6. Lawson. B-How Designers Think.

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|----------------------|---|-------------------|-------------------|--|
| Course Code | 136012 | Marks: 100 | Credits: 4 | |
| Course Title: | Practical (Food & Nutrition and General Science) | | | |

1. Weight and measures in Cookery.
2. Use of food composition table.
3. Food substitution Recipes.
4. Scientific principles and techniques applicable to quality cookery; Soup, fish, meat, vegetable salads, cereals, sweets, beverage etc.
5. Planning, preparation and serving school lunch.
6. Plan, prepare and serve dishes suitable for different diseases, constipation, diarrhoca, diabetes etc.
7. Plan a balanced diet and estimate its cost for a family.
8. Experiment on food preservation using different chemicals and preservatives.
9. Use of compound microscope.
10. Determination of suitability of water, milk, fruits and vegetables for human consumption.
11. Development of materials for teaching health & nutrition to different groups.
12. Basic tools of laboratory analysis, laboratory tools handling.
13. Detection of elements in organic substances C. H. N. S & halogens.
14. Detection of glucose, lactose, maltose, sucrose and starch.
15. Acid – base titration
16. Blood Pressure – measurment and make a chart.

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|----------------------|--|-------------------|-------------------|--|
| Course Code | 136014 | Marks: 100 | Credits: 4 | |
| Course Title: | Practical (Home Management & Housing and Child Development) | | | |

1. Studying students own family pattern and functions and its relation to management.
2. Studying families time plan, budget, procedures and decision making procedures.
3. Preparation of pollution free smokeless chulla, solar, sryer or cooker, shopping bag,
4. Simple house plan.
5. Sketching different ways of aranging dinning room, bed room, drawing room and kitchen.
6. Flower arrangement and dinnig table arrangement.
7. Designing interior space of a Residential Building.
 - Kitchen
 - Bathroom
 - Living room
 - Dinning room
 - Bed room
8. Designing interior spaces of a library building
 - Office space
 - Reading space

- Lobby/Lounge

9. Observe several Pre school children of the same age in the Nursery school and assess their height, weight, social and emotional development.
10. Observe several problem behaviors of children (Temper tantrums, Negativism and Thumbsucking) and suggest some guidance and help for these (if possible observe in mental retardation centre).
11. Evaluate the growth and behavior of a neonate.
12. Evaluate the growth and motor activities of four babies of 6 months, 12 months, 18 months and 24 months.
13. Visits to different families viz-Traditional family, Nuclear family and prepare and comparative statement on the existing trend.
14. Visits some welfare centers and write a report on their applicability.

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|----------------------|---|-------------------|-------------------|--|
| Course Code | 136016 | Marks: 100 | Credits: 4 | |
| Course Title: | Practical (Clothing & Textile And Applied Art) | | | |

1. Printing and decorative stitchery. Screen printing, Batik Block, Tie dye (Sarce, wall hanging, bed covers, Table mats, pieces, cushion covers).
2. Pottery and quilt making (traditional and modern).
3. Leather craft and jute craft (Bags, toys, mats).
4. Creative designs (using various Art media).
 - a) Pottery painting
 - b) Alpana
 - c) Embroidery work
 - d) Making flower
 - e) Making decoration piece
 - f) Paper Mache
 - g) Arrangement of Japanese Style – A, B, C, D.
 - h) Candle making
5. Making color wheel from primary colors.
6. Make clothing inventory and analyze clothing needs for various family members.
7. Make a clothing budget for one year for a family stating income and family description.
8. Draft pattern or patterns including sleeves, collars and pockets.
9. Construct garments for boy's and girl's considering their personal likes and dislikes. Make at least two sets of dresses both for boy's and girl's.
10. Repair, alter for various family members.
11. Draw five different types of pose, consider the mood and style of the garment with appropriate features.

NATIONAL UNIVERSITY



Syllabus

Subject: Marine Engineering

Three Years B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: Marine Engineering
Session: 2013-2014
Course content and marks distribution

| FIRST YEAR | | | |
|-------------------|--|--------------|---------------|
| Paper Code | Paper Title | Marks | Credit |
| 111501 | স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস (History of the Emergence of Independent Bangladesh) | 100 | 4 |
| 114801 | Mechanics and Hydromechanics | 100 | 4 |
| 114803 | Thermodynamics and Heat Transmission | 100 | 4 |
| 114805 | Basic Electro Technology | 100 | 4 |
| 114807 | Mathematics-I | 100 | 4 |
| 114809 | Physics-I | 100 | 4 |
| 114811 | Chemistry | 100 | 4 |
| Total = | | 700 | 28 |

| SECOND YEAR | | | |
|--------------------|--|--------------|---------------|
| Paper Code | Paper Title | Marks | Credit |
| 131001/ 121103 | বাংলা জাতীয় ভাষা (National Language)/ English (Compulsory Alternative) | 100 | 4 |
| 124801 | Marine Engineering Knowledge (General) | 100 | 4 |
| 124803 | Engineering Drawing | 100 | 4 |
| 124805 | Marine Workshop Process & Engineering Materials | 100 | 4 |
| 124807 | Mathematics-II | 100 | 4 |
| 124809 | Physics-II | 100 | 4 |
| 124811 | Fishing Vessel Technology | 100 | 4 |
| Total = | | 700 | 28 |

| THIRD YEAR | | | |
|-------------------|--|--------------|---------------|
| Paper Code | Paper Title | Marks | Credit |
| 121101 | English (Compulsory) | 100 | 4 |
| 134801 | Marine Engineering Knowledge (Motor) | 100 | 4 |
| 134803 | Marine Electro Technology | 100 | 4 |
| 134805 | Naval Architecture and Ship Construction | 100 | 4 |
| 134807 | Marine Resources, Management and Maritime Law & Convention | 100 | 4 |
| 134809 | Computer Science | 100 | 4 |
| 134811 | Safety, Environmental Protection & Leadership | 100 | 4 |
| 134812 | Marine Engineering Knowledge (Workshop Practical Workshop Training at the Academy workshop) | 50 | 2 |
| 134814 | Ship-board Training & Marine Engineering Knowledge (Practical) (Ship-board Training at sea and documented in a TRAINING RECORD BOOK) | 100 | 4 |
| 134816 | Marine Engineering Practice-II (A) Repair and Mountings (B) Electrical & Electronic Laboratory) | 50 | 2 |
| 134818 | Physics -III (Practical) | 50 | 2 |
| 134820 | Chemistry (Practical) | 50 | 2 |
| Total = | | 1000 | 40 |

Instruction: All courses are compulsory. Student should be completed at least 80% (Eighty Percent) of the total credits set for each year and secure a GPA of at least 2.00 (Two) to be considered eligible for promotion to the next class. Any pending credit from previous year has to be completed and minimum grade of D must be achieved.

Detailed Syllabus

First Year

| | | | | |
|--------------|--|------------|------------|---------------------|
| Paper Code | 111501 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | History of the Emergence of Independent Bangladesh | | | |

স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস

ভূমিকা: স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস-পরিধি ও পরিচিতি

১। দেশ ও জনগোষ্ঠীর পরিচয়

- ক) ভূ প্রকৃতির বৈশিষ্ট্য ও প্রভাব
- খ) নৃতাত্ত্বিক গঠন
- গ) ভাষা
- ঘ) সংস্কৃতির সমন্বয়বাদিতা ও ধর্মীয় সহনশীলতা
- ঙ) অভিন্ন বাংলার পরিপ্রেক্ষিতে তৎকালীন পূর্ববঙ্গ ও বর্তমান বাংলাদেশের স্বকীয় সত্তা

২। অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের প্রয়াস ও উপমহাদেশের বিভক্তি, ১৯৪৭

- ক) ঔপনিবেশিক শাসন আমলে সাম্প্রদায়িকতার উদ্ভব ও বিস্তার
- খ) লাহোর প্রস্তাব, ১৯৪০
- গ) অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের উদ্যোগ, ১৯৪৭ ও পরিণতি
- ঘ) পাকিস্তান সৃষ্টি, ১৯৪৭

৩। পাকিস্তান: রাষ্ট্রীয় কাঠামো ও বৈষম্য

- ক) কেন্দ্রীয় ও প্রাদেশিক কাঠামো
- খ) সামরিক ও বেসামরিক আমলাতন্ত্রের প্রভাব
- গ) অর্থনৈতিক, সামাজিক ও সাংস্কৃতিক বৈষম্য

৪। ভাষা আন্দোলন ও বাঙালির আত্মপরিচয় প্রতিষ্ঠা

- ক) মুসলিম লীগের শাসন ও গণতান্ত্রিক রাজনীতির সংগ্রাম
- খ) আওয়ামী লীগের প্রতিষ্ঠা, ১৯৪৯
- গ) ভাষা আন্দোলন: পটভূমি ও ঘটনা প্রবাহ
- ঘ) হক-ভাসানী-সোহরাওয়ার্দীর যুক্তফ্রন্ট, ১৯৫৪ সালের নির্বাচন ও পরিণতি

৫। সামরিক শাসন: আইয়ুব খান ও ইয়াহিয়া খানের শাসনামল (১৯৫৮-৭১)

- ক) সামরিক শাসনের সংজ্ঞা ও বৈশিষ্ট্য
- খ) আইয়ুব খানের ক্ষমতা দখল ও শাসনের বৈশিষ্ট্য (রাজনৈতিক নিপীড়ন, মৌলিক গণতন্ত্র, ধর্মের রাজনৈতিক ব্যবহার)
- গ) আইয়ুব খানের পতন ও ইয়াহিয়া খানের শাসন, এক ইউনিট বিলুপ্তিকরণ, সার্বজনীন ভোটাধিকার, এলএফও (Legal Framework Order)

৬। জাতীয়তাবাদের বিকাশ ও স্বাধিকার আন্দোলন

- ক) সাংস্কৃতিক আগ্রাসনের বিরুদ্ধে প্রতিরোধ ও বাঙালি সংস্কৃতির উজ্জীবন
- খ) শেখ মুজিবুর রহমানের ৬-দফা আন্দোলন

- গ) ৬-দফা আন্দোলনের প্রতিক্রিয়া, গুরুত্ব ও তাৎপর্য
ঘ) আগরতলা মামলা, ১৯৬৮

৭। ১৯৬৯-এর গণঅভ্যুত্থান ও ১১-দফা আন্দোলন

- ক) পটভূমি
খ) আন্দোলনের কর্মসূচী, গুরুত্ব ও পরিণতি

৮। ১৯৭০ এর নির্বাচন, অসহযোগ আন্দোলন ও বঙ্গবন্ধুর স্বাধীনতা ঘোষণা

- ক) নির্বাচনের ফলাফল এবং তা মেনে নিতে কেন্দ্রের অস্বীকৃতি
খ) অসহযোগ আন্দোলন, বঙ্গবন্ধুর ৭ই মার্চের ভাষণ, অপারেশন সার্চলাইট
গ) বঙ্গবন্ধুর স্বাধীনতা ঘোষণা ও হ্রেফতার

৯। মুক্তিযুদ্ধ ১৯৭১

- ক) গণহত্যা, নারী নির্যাতন, শরণার্থী
খ) বাংলাদেশ সরকার গঠন ও স্বাধীনতার ঘোষণাপত্র
গ) স্বতঃস্ফূর্ত প্রাথমিক প্রতিরোধ ও সংগঠিত প্রতিরোধ (মুক্তিফৌজ, মুক্তিবাহিনী, গেরিলা ও সম্মুখ যুদ্ধ)
ঘ) মুক্তিযুদ্ধে প্রচার মাধ্যম (স্বাধীন বাংলা বেতার কেন্দ্র, বিদেশী প্রচার মাধ্যম ও জনমত গঠন)
ঙ) ছাত্র, নারী ও সাধারণ মানুষের অবদান (গণযুদ্ধ)
চ) মুক্তিযুদ্ধে বৃহৎশক্তি সমূহের ভূমিকা
ছ) দখলদার বাহিনী, শান্তিকমিটি, আলবদর, আলশামস, রাজাকার বাহিনী, রাজনৈতিক দল ও দেশীয় অন্যান্য সহযোগীদের স্বাধীনতাবিরোধী কর্মকান্ড ও বুদ্ধিজীবী হত্যা
জ) পাকিস্তানে বন্দি অবস্থায় বঙ্গবন্ধুর বিচার ও বিশৃঙ্খলিতিক্রিয়া
ঝ) প্রবাসী বাঙালি ও বিশ্বের বিভিন্ন দেশের নাগরিক সমাজের ভূমিকা
ঞ) মুক্তিযুদ্ধে ভারতের অবদান
ট) যৌথ বাহিনী গঠন ও বিজয়
ঠ) স্বাধীনতা সংগ্রামে বঙ্গবন্ধুর নেতৃত্ব

১০। বঙ্গবন্ধু শেখ মুজিবুর রহমানের শাসনকাল, ১৯৭২-১৯৭৫

- ক) স্বদেশ প্রত্যাবর্তন
খ) সংবিধান প্রণয়ন
গ) যুদ্ধ বিধ্বস্ত দেশ পুনর্গঠন
ঘ) সপরিবারে বঙ্গবন্ধু হত্যা ও আদর্শিক পটপরিবর্তন

History of the Emergence of Independent Bangladesh

Introduction: Scope and description of the emergence of Independent Bangladesh.

Writing on this topic.

1. Description of the country and its people.

- Geographical features and their influence.
- Ethnic composition.
- Language.
- Cultural syncretism and religious tolerance.

e. Distinctive identity of Bangladesh in the context of undivided Bangladesh.

2. Proposal for undivided sovereign Bengal and the partition of the Sub Continent, 1947.

- a. Rise of communalism under the colonial rule, Lahore Resolution 1940.
- b. The proposal of Suhrawardi and Sarat Bose for undivided Bengal : consequences
- c. The creation of Pakistan 1947 .

3. Pakistan: Structure of the state and disparity.

- a. Central and provincial structure.
- b. Influence of Military and Civil bureaucracy.
- c. Economic , social and cultural disparity

4. Language Movement and quest for Bengali identity

- a. Misrule by Muslim League and Struggle for democratic politics .
- b. The Language Movement: context and phases .
- c. United front of Haque – Vasani – Suhrawardi: election of 1954, consequences.

5. Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971)

- a. Definition of military rules and its characteristics.
- b. Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy, Islamisation)
- c. Fall of Ayub Khan and Yahia Khan's rule (Abolition of one unit, universal suffrage, the Legal Framework Order)

6. Rise of nationalism and the Movement for self determination .

- a. Resistance against cultural aggression and resurgence of Bengali culture.
- b. Sheikh Mujibur Rahman and the six point movement
- c. Reactions: Importance and significance
- d. The Agortola Case 1968.

7. The mass- upsurge of 1969 and 11 point movement: background,programme and significance.

8. Election of 1970 and the Declaration of Independence by Bangobondhu

- a. Election result and centres refusal to comply
- b. The non co-operation movement, the 7th March , Address , Operation Searchlight
- c. Declaration of Independence by Bangobondhu and his arrest

9. The war of Liberation 1971

- a. Genocide, repression of women, refugees
- b. Formation of Bangladesh government and proclamation of Independence

- c. The spontaneous early resistance and subsequent organized resistance (Mukti Fouz, Mukti Bahini, guerillas and the frontal warfare)
- d. Publicity Campaign in the war of Liberation (Shadhin Bangla Betar Kendra, the Campaigns abroad and formation of public opinion)
- e. Contribution of students, women and the masses (Peoples war)
- f. The role of super powers and the Muslim states in the Liberation war.
- g. The Anti-liberation activities of the occupation army, the Peace Committee, Al-Badar, Al-Shams, Rajakars, pro Pakistan political parties and Pakistani Collaborators , killing of the intellectuals.
- h. Trial of Bangabondhu and reaction of the World Community.
- i. The contribution of India in the Liberation War
- j. Formation of joint command and the Victory
- k. The overall contribution of Bangabondhu in the Independence struggle.

10. The Bangabondhu Regime 1972-1975

- a. Homecoming
- b. Making of the constitution
- c. Reconstruction of the war ravaged country
- d. The murder of Bangabondhu and his family and the ideological turn-around.

সহায়ক গ্রন্থ

১. নীহার রঞ্জন রায়, *বাঙালীর ইতিহাস*, দে' জ পাবলিশিং, কলকাতা ১৪০২ সাল।
২. সালাহ উদ্দিন আহমেদ ও অন্যান্য (সম্পাদিত), *বাংলাদেশের মুক্তি সংগ্রামের ইতিহাস ১৯৪৭-১৯৭১*, আগামী প্রকাশনী, ঢাকা ২০০২।
৩. সিরাজুল ইসলাম (সম্পাদিত), *বাংলাদেশের ইতিহাস ১৭০৪-১৯৭১*, ৩ খন্ড, এশিয়াটিক সোসাইটি অব বাংলাদেশ, ঢাকা ১৯৯২।
৪. ড. হারুন-অর-রশিদ, *বাংলাদেশ: রাজনীতি, সরকার ও শাসনতান্ত্রিক উন্নয়ন ১৭৫৭-২০০০*, নিউ এজ পাবলিকেশন্স, ঢাকা ২০০১।
৫. ড. হারুন-অর-রশিদ, *বাঙালির রাষ্ট্রচিন্তা ও স্বাধীন বাংলাদেশের অভ্যুদয়*, আগামী প্রকাশনী, ঢাকা ২০০৩।
৬. ড. হারুন-অর-রশিদ, *বঙ্গবন্ধুর অসমাপ্ত আত্মজীবনী পুনর্পাঠ*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১৩।
৭. ড. আতফুল হাই শিবলী ও ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের সাংবিধানিক ইতিহাস ১৭৭৩-১৯৭২*, সুবর্ণ প্রকাশন, ঢাকা ২০১৩।
৮. মুনতাসির মামুন ও জয়ন্ত কুমার রায়, *বাংলাদেশের সিভিল সমাজ প্রতিষ্ঠার সংগ্রাম*, অবসর, ঢাকা ২০০৬।
৯. আতিউর রহমান, *অসহযোগ আন্দোলনের দিনগুলি: মুক্তিযুদ্ধের প্রস্তুতি পর্ব*, সাহিত্য প্রকাশ, ঢাকা ১৯৯৮।
১০. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস, ১৯০৫-৪৭*, তাম্রলিপি, ঢাকা ২০১১।
১১. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস, ১৯৪৭-১৯৭১*, সময় প্রকাশন, ঢাকা ২০১২।
১২. সৈয়দ আনোয়ার হোসেন, *বাংলাদেশের স্বাধীনতা যুদ্ধে পরাশক্তির ভূমিকা*, ডানা প্রকাশনী, ঢাকা ১৯৮২।
১৩. আবুল মাল আবদুল মুহিত, *বাংলাদেশ: জাতিরাত্তরের উদ্ভব*, সাহিত্য প্রকাশ, ঢাকা ২০০০।
১৪. শেখ মুজিবুর রহমান, *অসমাপ্ত আত্মজীবনী*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১২।
১৫. সিরাজ উদ্দীন আহমেদ, *একাত্তরের মুক্তিযুদ্ধ: স্বাধীন বাংলাদেশের অভ্যুদয়*, ইসলামিক ফাউন্ডেশন, ঢাকা ২০১১।
১৬. জয়ন্ত কুমার রায়, *বাংলাদেশের রাজনৈতিক ইতিহাস*, সুবর্ণ প্রকাশন, ঢাকা ২০১০।

17. Harun-or-Roshid, *The Foreshadowing of Bangladesh: Bengal Muslim League and Muslim Politics, 1906-1947*, The University Press Limited, Dhaka 2012.
18. Rounaq Jahan, *Pakistan: Failure in National Integration*, The University Press Limited, Dhaka 1977.
১৯. Talukder Maniruzzaman, *Radical Politics and the Emergence of Bangladesh*, Mowla, Brothers, Dhaka 2003.
২০. মেসবাহ কামাল ও ঈশানী চক্রবর্তী, *নাচালের কৃষক বিদ্রোহ, সমকালীন রাজনীতি ও ইলা মিত্র*, উত্তরণ, ঢাকা ২০০৮।
২১. মেসবাহ কামাল, *আসাদ ও উনসত্তরের গণঅভ্যুত্থান*, বিবর্তন, ঢাকা ১৯৮৬।

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|---------------------|-------------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 114801 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Mechanics And Hydromechanics | | | |

- 1.1 **WORK POWER AND ENERGY:**
Work, graphical representation, Power, Transmission of power by belt and gears. Energy, Potential and kinetic.
- 1.2 **CENTRIPETAL ACCELERATION:**
Centripetal and centrifugal force. Side-skidding and overturning of vehicles,. Balancing, Conical pendulum,
- 1.3 **PRESSURE VESSEL:**
Circumferential and longitudinal stresses in thin cylinders. Working pressure. Effect of seam strength.
- 1.4 **LIFTING MACHINES:**
Velocity ratio, mechanical stress, efficiency, Rope pulley blocks, wheel and axle, differential pulley blocks, worm and worm wheel, screw jack, screw, crab winches, hydraulic jack, Experimental results, linear law.
- 1.5 **STRESS AND STRAIN:**
Ultimate tensile strength, working stress, factor of safety. Strain, Modulus of elasticity, Tensile test.
Compound bars, Restricted expansion, Resilience. Suddenly applied and shock loads.
- 1.6 **BENDING MOMENT AND SHEARING FORCES:**
Conditions of equilibrium, Simply supported beams and cantilevers. Concentrated and distributed loading, Shearing force and bending moment diagrams.
- 1.7 **STRESS AND STRAIN:**
Neutral axis. Fundamental bending equation, Modulus of section. Deflection, Combined bending and direct stress.
- 1.8 **TORSION:**
Fundamental torsion equation, relationships between torque, stress and power. Torsional resilience, maximum and mean torque, Coupling bolts.

- 1.9 **TRANSMISSION OF POWER BY BELTS:**
Types of belts, velocity ratio of a belt drive, compound belting, slip of belt, types of belt drives, length of open belt drives, cross belt drives, power transmitted by belt, ratio of tensions and problem for above; Rope drive, advantages of rope bolts.
- 1.10 **GEAR TRAINS:**
Introduction, friction wheels, Technical terms such as pitch circle; Addendum, Dedendum, Pitch, clearance, Depth of the tooth etc; types of Gears, velocity ratio of a simple gear drive and its problem; Train of wheels, simple train of wheels, compound train of wheels, Train wheels for the hour and minute of a twelve hour clock, Epicyclical gear train with bevel gear.
- 1.11 **HYDROSTATICS:**
Equilibrium of floating bodies. Variation of fluid pressure with depth. Total force due to liquid pressure on immersed plane surfaces horizontal; and vertical.
- 1.12 **HYDRAULICS:**
Density, specific gravity, volumetric expansion, Apparent loss of weight, floating bodies, Pressure head, pressures on immersed surfaces, centre of pressure. Flow through pipes and orifices. Bernouilli's equation venturi meter.

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 114803 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Thermodynamics And Heat Transmission | | | |

- 2.1 **FUNDAMENTALS:**
Mass, force of gravity, work power energy, mechanical efficiency, pressure, pressure gauges, manometer, gauge pressure & absolute pressure. Barometer, Vaccum gauge. Volume & specific volume, Temperature & absolute temperature swept volume & clearance volume, system & boundary. Cycles, Heat & specific heat. Mechanical equivalent of heat, water equivalent, latent heat & sensible heat, thermal expansion of metals, Linear expansion, expansion of liquids, Apparent cubical expansion.
- 2.2 **HEAT TRANSFER:**
General conduction equation, General Conduction equation in cylindrical co-ordinates, hallow cylinder, hallow sphere etc. Steady state one-dimensional conduction for plane wall. Non uniform thermal conductivity for plane wall, cylinder, sphere, composite wall, composite cylinder; Critical insulation thickness; Convection : Heat transfer from extended surface, fins; Radiation; Heat exchanger, parallel flow; counter flow, cross flow etc. Coefficient of thermal conductivity, co-efficient of heat transfer, Steffan-Boltzman law, Furrier law and its problem.
- 2.3 **PERFECT GASES:**
Boyle's & Charles' laws, Combination of Boyle's & Charles' laws. Characteristic equation of a perfect gas, Specific heat of gases. Energy equation, relationship between specific heats, Ratios of specific heat. Compression & expansion of a gas in closed system. Ratios of expansion & compression. Relationship between temperature , volume and pressure for Isothermal and Adiabatic process. Work transfer. Relationship between heat energy supplied & works done and problems.

- 2.4 **INTERNAL COMBUSTION ENGINES:**
Elementary principle. Cycles of operation of four & two stroke engines. Mean effective pressure & power. Brake power and mechanical efficiency. Morse tests. Thermal efficiency, heat balance.
- 2.5 **IDEAL CYCLES:**
Ideal thermal efficiency, constant volume and constant pressure cycle. Diesel cycle, Dual combustion cycle.
- 2.6 **RECIPROCATING AIR COMPRESSOR:**
Working principle & Pv diagram. Effect of clearance. Workdone per cycle. Multi stage compression.
- 2.7 **STEAM:**
Properties & formation of steam. Use of steam tables. Mixing of steam & water. Throttling of steam Throttling & separating calorimeter.
- 2.8 **STEAM PLANT:**
Basic Rankine cycle. Elementary principle of steam turbine, power & thermal efficiency, isotropic efficiency. Enthalpy drops in turbine. Nozzle, velocity diagram for impulse and reaction turbine, Forces on blades.
- 2.9 **BOILER:**
Capacity & equivalent Evaporation, Boiler efficiency; Plant cycle: Fire tube and Water tube boilers, main boiler, auxiliary boiler, waste heat/exhaust/gas boiler, Composite boiler, Package boiler. Marine boiler; Boiler mountings and Feed system, Boiler corrosion, Boiler water treatment and tests.
- 2.10 **FUELS & COMBUSTION:**
Combustion, Elements, compounds, atomic weight, molecular weight, stoichiometry, Calorific value, chemical equation. composition flue gases.
- 2.11 **REFRIGERATION:**
Introduction; simple vapour compression refrigeration systems; Working cycle. T-S diagram and Pv diagram of refrigeration system and its problem. Properties of common refrigerants; Compound vapour compression system; Condenser; Expansion device; Evaporator; Absorption refrigeration system; Circuit of the Refrigerator, Capacity; Thermal insulation & performance.

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|---------------------|---------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 114805 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Basic Electro Technology | | | |

1.1 **THE OHM'S LAW & ELECTRIC CIRCUIT**

Electron theory; Concept of Electricity & it's kinds; Definition & units of EMF, Voltage, Current, Resistance; Specific resistance; Calculation of resistance, Effect of temperature on resistance; Diagrams, Symbols & Electrical tools; Ohm's law , Electrical circuit & Ideal electrical circuit; Series, Parallel & Mixed circuits; Ammeter & Voltmeter; Effect of Electricity.

1.2 POWER AND ENERGY:

Concept of Work, Power, Energy and Relation among them; Wattmeter & Energy meter; Calculation of electrical energy of an existing load system; The heating effect of Electricity; Joule's formula.

1.3 ELECTROMAGNETISM:

Fundamentals of Magnetism, Electromagnetism; Magnetic circuit: Discussion about different terms; Electromagnetic induction & Laws: Faraday's, Lenz's, Ampere's & Maxwell's Screw. Various curves related to topics; Application of Electromagnetism: Generator & Motor principle.

1.4 BASIC ELECTRO-CHEMISTRY:

Quantitative laws of Electrolysis (Faraday's); Concept of cell & Battery ; Types & Principle of operation (Voltaic cell, Lead acid cell, etc) ; PH value; Electrochemical Corrosion: Series and Parallel grouping.

1.5 ELECTROSTATICS & CAPACITANCE

Concept of Electrostatics & Terms related to it; The Capacitor & Capacitance; Series and parallel connection; Energy stored in Electric field/Dielectric; Permittivity; Capacitance of a parallel- plate Capacitor; Transient effect in DC circuit(Capacitive).

1.6 ALTERNATING CURRENT THEORY:

Simple continuous periodic waves: frequency, amplitude, instantaneous, maximum r.m.s. and average values, or factor; Phase representation of AC quantities; Phase difference; Parameters of AC circuit; Relationship between resistance, reactance and impedance; Concept of different power in ac circuit Power in single phase AC circuit; Power factor ; Simple treatment of power factor & improving Power factor. Simple series and parallel circuits.

Three phase system: Concept of Single & Poly phase system; Delta/star Connection & Power; Simple treatment of three phase circuit. Balanced and Unbalanced system.

1.7 WIRES & CABLES:

Concept of electrical Wire & Cable; Construction and uses of PVC, VIR, TRS/CTS & flexible wires; Measuring the size of Wires & Cables using wire gauge; Current carrying capacity of a wire. Wire or Cable used in Marine sector.

1.8 ELECTRICAL WIRING WITH JOINTS & SPLICES:

Concept of electrical Wiring ; Electricity act in electrical wiring; Types of electric wiring (Channel, Surface conduit, concealed); Types of wiring used in : (i) Marine system (ii) Residential building (iii) Workshop iv. Temporary shed etc; List of electrical wiring fittings; Concept of Joint and Splice; Procedure and example of Pig tail, Western union, Britannia, Duplex, Tap joints and simple Splice.

1.9 SAFETY & MAINTENANCE WITH ELECTRICAL ACT:

Basic safety; Protection against Electrical Shock or Hazards; List of performance

Of safety practices for electrical equipment, machines and accessories; Electrical Equipment: Rules, Standard, Regulation, Recommendations; Importance of the Electricity Act/Rule, Protecting & Controlling Devices, Earthing.

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 114807 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Mathematics-I (Algebra And Trigonometry) | | | |

A. ALGEBRA:

1. **Elementary set theory**
 - a. Sets and Subsets
 - b. Set operations
 - c. Cartesian product of two sets
 - d. Relations order relations
 - e. Equivalence relation
 - f. Functions injective
 - g. Subjective and objective function
 - h. Inverse function
2. **Theory of equations**
 - a. Relation between roots and Co-efficients
 - b. Sums and the powers of the roots.
 - c. 'Descartes' rule of Signs.
 - d. Removal of any term.
 - e. System of linear equation.
3. **Vectors**
 - a. Vectors and Scalars
 - b. The Dot and Cross product
 - c. Vector Differentiation
 - d. Gradient, Divergence and Curl
 - e. Vector Integration
 - f. The Divergence theorem, Stockes theorem and relative integral theorems.
4. **Matrix**
 - a. Different kinds of Matrices.
 - b. Elementary properties.
 - c. Solution of systems of equations.
5. **Determinants**
 - a. Determinants up to the third order.
 - b. Elementary properties.
 - c. Solution of systems of equations.

6. **Summation of series**

B. **TRIGONOMETRY:**

- a. De Moivre's theorem.
- b. Deduction from De Moivre's theorem.
- c. Trigonometrical and exponential functions of complex arguments.
- d. Gregory's Series.

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|---------------------|------------------|-------------------|-------------------|----------------------------|
| Paper Code | 114809 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Physics-I | | | |

GROUP – A : 40 MARKS

11.1.1 PROPERTIES OF MATTER :

- a. **Vectors:**
Scalars & vectors and their products, Vector Addition and resolution, Gradient, divergence and curl. Vector differentiation & Integration. The divergence theorem & Stock's theorem.
- b. **Particle motion :**
Particle kinematics, motion in a plane, Projectile motion, Uniform circular motion rotational kinematics, angular acceleration, Relation between linear and angular kinematics of a particle Dynamics of rigid bodies: angular velocity, angular momentum, kinetic energy of rotation: theorem of parallel and perpendicular axes.
- c. **Oscillation:**
Simple harmonic motion, pendulum, free. damped and forceful oscillations.
- d. **Gravitation and gravity:**
Law of universal gravitation – Gravitational intensity and potential – Motion of planets and Satellites, - Kepler's law of planetary motion-Velocity of escape.
- e. **Elasticity-**
Stress and strain- Hook's Law-Elastic constants Relation concerning elastic constants-Poisson's ratio-Determination of young's Modulus-Determination of poisson's ratio or Rubber.
- f. **Surface tension-**
Surface energy, Surface tension and molecular theory of surface tension – Potential energy due to a surface tension – Pressure with a curved film- Angle of contact-Capillarity-Measurement of surface tension by Capillary method.
- g. **Viscosity-**
Viscosity and coefficient of viscosity- Flow of fluid through a narrow tube-Poiseuille's equation.

GROUP – B : 60 MARKS

11.1.3 HEAT AND THERMODYNAMICS :

- a. THERMOMETRY-**
Temperature- Temperature scale-Resistance thermometer- Thermocouple.
- b. Calorimetry-**
Specific heats of solids and liquids by the method of mixture-Newton's Law of cooling.
- c. Transmission of heat-**
Thermal conductivity- Determination of thermal conductivity's of good and bad conductors- Freezing of a pond.
- d. Thermodynamic system-**
First law of thermodynamics-Isothermal and adiabatic expansions.
- e. The second law of thermodynamics-**
Reversible and Irreversible process-Carnot cycle-Efficiency of reversible engines.

2.2 WAVES: SOUND AND OPTICS

- a. Wave and Sound:**
`Superposition principle, wave velocity, Beat, Velocity of sound, Doppler effect.
- b. Optics:**
Fermat's principle of stationary time, Combination of very thin lenses, Equivalent of lenses, Minimum deviation and dispersion of Prism, Nature of light.

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|---------------------|------------------|-------------------|-------------------|----------------------------|
| Course Code | 114811 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Course Title | Chemistry | | | |

1. **Measurements and the Scientific Method:** Measurements, units, SI units, reliability of measurements – precision and accuracy, rounding off, significant figures, significant figures in calculation, mean and median, errors, sources of errors.
2. **Structure of atom:** Atom, isotopes, Atomic masses, Mass spectroscopy, Atomic nucleus, Nuclear binding energy, Nuclear reactions –fission and Fusion reactions, Bohr atom model, Spectrum of atomic hydrogen, Dual nature of electron, Heisenberg uncertainty principle, Quantum numbers, Atomic orbitals, Aufbau principle, Pauli exclusion principle, Hund's rule of maximum multiplicity, Electronic configuration of atoms.
3. **Periodic Table:** Periodic law, Periodic table, Electronic configurations from the periodic table, Periodic properties of the elements such as ionization energies, Electron affinity, Electro negativity, Atomic/ionic radius along a period and down a group, Diagonal relationship
4. **Chemical Bonds:** Chemical bond, Types of chemical bonds – ionic, Covalent coordination, Metallic, Hydrogen, Polar and non polar covalent bonds, Lewis dot structure, Shapes of molecules, VSEPR theory, Valence bond theory, Hybridization, σ - and δ -bonding in compounds, Molecular orbital theory.
5. **Oxidation and reduction:** Redox reactions, Writing and balancing Redox reactions,

6. **States of Matter:** Comparison between solids, Liquids and gases, Changes of state, m.p. and b.p, phase transition, Phase diagram of water.
7. **Gaseous and Their Properties:** The gas laws , The perfect gas equation, the kinetic theory of gases, Van der waals equations, Real gases, Graham's laws of diffusion and Effusion.
8. **Solutions:** Solubility and intermolecular forces, Solubility product, types of concentration units, Colligative properties of solutions, Henry's law, Nernst distribution law.
9. **Acids and Bases:** Various concepts on acids and bases, Conjugate acids and bases, Neutralization reactions acid- base strength, pH, Acid-base titrations, Acid-base indicators, Acid-base properties of salts, The common ion effect, Buffer solutions, Hard and soft acids and bases.
10. **Chemical Equilibrium:** Reversible reactions and the equilibrium state, the equilibrium law, Reaction quotients and equilibrium constants, Calculations using K_c , K_p , Homogeneous and heterogeneous equilibria, The principle of Le Chatelier and Brown.
11. **Hydrocarbons:** Hydrocarbons, Saturated and unsaturated hydrocarbons, Alkanes, Alkenes, And Alkynes, Nomenclature of organic compounds-the IUPAC system natural gas, Petroleum, Petrochemicals.
12. **Study of different classes of organic Compounds:** Alcohols, Aldehydes, Ketones, Carboxylic Acids, Esters, Amines and Amides.

Books Recommended:

1. General Chemistry, D. D. Ebbing, Houghton Mifflin Co.
2. Chemistry – The Molecular Nature of Matter and Change, M. Silberberg. WCB /Mc Graw-Hill.
3. Introduction to Modern Inorganic Chemistry, S.Z. haider, Friends' International.
4. Principles of physical chemistry, M. M. Huque and M. A Nawab, students' publications.
5. Essentials of Physical chemistry, B.S Bahl, G.D Tuli and A Bahl, S. Chand & Co.Ltd.
6. Advanced Organic Chemistry, B.S. Bahl and A Bahl, S. Chand & Co. Ltd.
7. A Level chemistry by C.W. Ramsden
8. Organic Chemistry: T Morrison and R.N Boyed,
9. Fundamental of Organic Chemistry by W Solomons

2nd Year

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|----------------------|-----------------------------|-------------|----------------------|
| Course Code : 131001 | Marks : 100 | Credits : 4 | Class Hours : 60hrs. |
| Course Title : | বাংলা জাতীয় ভাষা (আবশ্যিক) | | |

ক : সাহিত্য

নম্বর-৭৫

১) নির্বাচিত কবিতা

নম্বর-২৫

- ক) মাইকেল মধুসূদন দত্ত : আত্ম-বিলাপ
খ) রবীন্দ্রনাথ ঠাকুর : ঐকতান
গ) কাজী নজরুল ইসলাম : চৈতী হাওয়া
ঘ) জীবনানন্দ দাশ : বনলতা সেন
ঙ) ফররুখ আহমদ : ডালুক
চ) শামসুর রাহমান : বার বার ফিরে আসে
ছ) আল মাহমুদ : সোনালী কাবিন: ৫

২) নির্বাচিত প্রবন্ধ

নম্বর-২৫

- ক) বঙ্কিমচন্দ্র চট্টোপাধ্যায় : বাঙ্গালা ভাষা
খ) হরপ্রসাদ শাস্ত্রী : তৈল
গ) রবীন্দ্রনাথ ঠাকুর : সভ্যতার সংকট
ঘ) প্রমথ চৌধুরী : যৌবনে দাও রাজটিকা
ঙ) কাজী আবদুল ওদুদ : বাংলার জাগরণ
চ) কাজী নজরুল ইসলাম : রাজবন্দীর জবানবন্দী
ছ) মোতাহের হোসেন চৌধুরী : সংস্কৃতি-কথা

৩) নির্বাচিত গল্প

নম্বর-২৫

- ক) রবীন্দ্রনাথ ঠাকুর : একরাত্রি
খ) বিভূতিভূষণ বন্দ্যোপাধ্যায় : পুঁই মাচা
গ) আবুল মনসুর আহমদ : হুয়ুর কেবলা
ঘ) মানিক বন্দ্যোপাধ্যায় : প্রাগৈতিহাসিক
ঙ) সৈয়দ ওয়ালীউল্লাহ : নয়নচারা
চ) শামসুদ্দীন আবুল কালাম : পথ জানা নাই
ছ) হাসান আজিজুল হক : আত্মজা ও একটি করবী গাছ

খ : ভাষা শিক্ষা

নম্বর-২৫

- ১। পত্র রচনা : ব্যক্তিগতপত্র, দাফতরিকপত্র, ব্যবসায়-সংক্রান্তপত্র, আবেদনপত্র ও মানপত্র
২। গদ্যরীতি : সাধু, চলিত ও আঞ্চলিক
৩। প্রমিত বাংলা বানানের নিয়ম (বাংলা একাডেমি, ঢাকা)
৪। অনুবাদ : ইংরেজি থেকে বাংলা
৫। সারসংক্ষেপ।

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| Course Code | 121103 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Course Title | English (Compulsory Alternative) | | | |

Group –A: Poetry (Norton Anthology of English Literature Vol. I and II)

Piece to be read:

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| 1. John Milton | : ‘When I consider How My Light Is Spent’ |
| 2. Thomas Gray | : ‘Elegy Written in a Country Churchyard’ |
| 3. William Blake | : ‘The Chimney Sweeper’(Songs of Experience) |
| 4. William Wordsworth | : ‘I Wander Lonely as a Cloud’ |
| 5. P.B. Shelly | : ‘Mutability’ |
| 6. John Keats | : ‘Ode to Autumn’ |
| 7. Tennyson | : ‘Ulysses’ |
| 8. A.E. Housman | : ‘When I was One and Twenty’ |
| 9. Emily Dickinson | : ‘Because I Could not Stop for Death’ |
| 10. Robert Frost | : ‘Stopping by Woods on a Snowy Evening’ |

Group –B: Drama

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| 1. William Shakespeare | : <i>Twelfth Night/ As You Like It</i> |
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Group –C: Novel

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| 1. Earnest Hemmingway | : <i>The Old Man and the Sea</i> |
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| Paper Code | 124801 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Marine Engineering Knowledge (General) | | | |

4.1 PUMPS AND PUMPING SYSTEMS:

Types of pumps in common use. Working principles and constructional details of pumps, H/Q characteristics & efficiency. General requirements for pumping systems. Principles involved with operation and maintenance of bilge and ballast pumps, pumping and priming systems.

4.2 PIPING SYSTEM:

Pipes, general piping system & layout; Pipes joint, valve and cocks, expansion joints, gaskets precaution on piping and handling safety aspects.

4.3 STEERING SYSTEMS:

Steering machinery; Construction and arrangement of steering system, working principles and details of control equipment, follow-up equipment, prime mover and transmission

gears. Methods used to control and operate rudder. Details of variable delivery pumps. Care & maintenance of steering systems.

- 4.4 **DECK MACHINERY AND CARGO HANDLING SYSTEMS:**
Deck machinery; Types and function of electric and hydraulic windlass, capstan. Construction and working principles of Electric and hydraulic trawl and cargo winches. Construction and arrangement of cargo handling system.
- 4.5 **VENTILATION AND HUMIDITY CONTROL SYSTEM:**
Ventilating equipment; Ventilating methods; Working principles constructional details of ventilator. Types of blower and arrangement of duct. Necessity of Humidity control; Methods of controlling humidity; Working principle and constructional details of humidity control apparatus. The precautions to be taken to prevent pollution of the marine environment.
- 4.6 **EVAPORATION AND DISTILLING PLANT:**
Methods used to make fresh water from salt water, Working principles and constructional details of evaporation/distilling equipment. Water making plants using the cooling water for diesel engine and using diesel engine exhaust gas waste heat to make water.
- 4.7 **REFRIGERATION AND AIR CONDITIONING SYSTEM:**
Classification of marine use refrigeration equipment. Theoretical principles of refrigeration and refrigerating cycle. Refrigerating capacity, physical and chemical requirements of refrigerant and its properties. Types of compressors, Condenser, Evaporators, Solenoid valves cut-outs, time switches common faults in the system & leak detection. Air conditioning equipment; Air conditioning for accommodation.
- 4.8 **SHIPBOARD HAZARDS AND SAFETY GEARS:**
Types, source and causes of fire on board a ship. Types of fire alarm; Fire fighting appliances and equipment, their location. Methods of extinguishing small fire, extensive fires and wash deck systems; Water proofing equipment, water draining equipment; Emergency measure against inundation.
- 4.9 **FUEL OIL:**
Liquid fuels-petroleum, distillation, refining; Properties of fuel oils- density, viscosity, flash point, calorific value, etc;
- 4.10 **LUBRICATION OIL AND PURIFICATION:**
Gravitation, separation; Filtration methods-types of filter; Clarification and separation-dixc and bowl centrifuges; Lubrication-fundamentals, additives; Oily water separators.
- 4.11 **INSTRUMENTATION AND CONTROL:**
The operating principles and working range of different types of thermometers for marine use. Pressure, level measuring instruments. The principle and fundamental of operation of tachometer, indicators, dynamometer, output measuring instrument and their types. Control theory-terminology.

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| Paper Code | 124803 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Engineering Drawing | | | |

GENERAL OBJECTIVES: ALL THE OBJECTIVES SHOULD BE UNDERSTOOD TO BE PREFIXED BY THE WORDS:
THE EXPECTED LEARNING OUTCOME IS THAT THE STUDENT

1. Understand the basic techniques involved in producing an engineering drawing.
2. Understand and apply geometrical construction which may be required in the drawing of engineering components.
3. Apply geometric principles to the construction of loci together with an appreciation of their practical applications.
4. Understand and apply the principles of first and third angle Orthographic projection, whilst considering the factors required when planning a drawing layout.
5. Understand and apply the principles of dimensioning as in B.S. 308: 72, part 2, clauses 1,2,3 and 4. Also the method of Indicating Machined Surfaces B.S. 308: 72, part 2, clause 8.
6. Draw isometric and oblique pictorial views of engineering components.
7. Produce well proportioned sketches of engineering components.
8. Know types, understand the difference and is able to draw a selection of permanent and non-permanent fastenings.
9. Apply geometric principles to produce parallel and radial line developments of folded shapes in sheet metal.
10. Construct sectional drawings of single part components in orthographic projection to facilitate manufacture.
11. Know and apply selected conventions and abbreviations from B.S. 308: 72, part 1, clauses 11 in respect of common features.
12. Produce and understand the function of a single part, detail or working drawing.
13. Construct and understand the need for simple sub-assembly drawing (3 parts)

A. BASIC DRAWING OFFICE TECHNIQUE.

- 1. Understands the basic techniques involved in producing an engineering drawing.**
 - 1.1 Selects and uses basic drawing office equipment to produce straight lines and curves.
 - 1.2 Norming-International norm (ISO) and Lettering, International standard letter-sizes.
 - 1.3 Lining and scales in mechanical drafting

B. GEOMETRIC PRINCIPLES.

- 2. Understands and uses the geometrical constructions which may be required in the drawing of engineering components.**
 - 2.1 Bisects a given line with the aid of straight edge & compass.
 - 2.2 Divides a line into a number of equal parts.
 - 2.3 Bisects an angle with the aid of straight edge and compass.
 - 2.4 Joins straight lines and given areas tangentially.

2.5 Constructs regular figures with 3,4 and 6 sides.

C. APPLIED GEOMETRIC PRINCIPLES (LOCI).

3. Applies geometric principles to the construction of loci, together with appreciation of their principal applications.

3.1 Constructs an ellipse using rectangular, concentric circle, focal point and trammel methods.

3.2 Constructs an involutes of circle and recognizes its importance in spur gear tooth formation.

3.3 Constructs helices and recognize they may be right or left hand.

3.4 Constructs loci of points on two and three bar mechanisms.

D. PRODUCTION AND USE OF DRAWINGS.

4. Understands the principals of first and third angle orthographic projection.

4.1 Explains with the aid of drawings the meaning of first and third angle orthographic projection in terms of the principal planes of projection.

4.2 Lists the factors to be considered when planning a drawing layout.

4.3 Produces orthographic drawings in third angle projection of single part components, without sectional views but with planned layout, allowing for dimensions to be added, title, scale and projection used.

5. Understands the principals of dimensioning as in B.S. 308: 72, part 1, clauses 1,2,3 and 4 as applied to Engineering Drawings.

5.1 Identifies with respect to dimensioning:-

a. Reference Lines.

b. Datum faces according to the function of a component (B.S. 308: 72, part 1, clauses 3.2).

5.2 Distinguishes between

a. Functional Dimensions,

b. Non-functional Dimensions (B.S. 308: 72, part 1, clauses 2.2 and 2.3).

5.3 Demonstrates, with application to drawings produced in 4.2, the use of projection lines, dimension lines and lead or lines (B.S. 308: 72, part 1, clauses 2,3 and 4).

5.4 Demonstrates the method of tolerance as in the B.S. 308: 72, part 2, clauses 5).

5.5 Identifies and applies, with application to drawings produced in 4.3 the symbol and surface texture numbers which indicated machined surfaces (B.S. 308: 72, part 1, clauses 8).

E. PICTORIAL DRAWING.

6. Produces pictorial views, form orthographic views of engineering components with plain and curved surfaces.

- 6.1 Draws isometric views of single part components.
- 6.2 Draws isometric views of single part components which include circles and curves.
- 6.3 Draws oblique views of single part components.
- 6.4 Draws oblique views of single part components which include circles and curves.

F. FREEHAND AND GUIDED SKETCHES.

- 7. Produce well proportioned sketches of engineering components.
- 7.1 Makes free hand sketches of single part components in orthographic or isometric projection from supplied items, or given orthographic or pictorial views.
- 7.2 With the aid of straight and curved edges

G. FASTENINGS.

- 8. **Knows the types and understands the difference between permanent and non-permanent fastenings.**
- 8.1 Distinguishes between permanent and non-permanent fastenings.
- 8.2 Identifies and produces thread representation.
- 8.3 Applies 8.2 to show front view, section, side view.
- 8.4 Identifies basic non-permanent fixings and fastenings:
a. Nuts b. Lock Nuts c. Studs e. Washers
- 8.5 Symbol for surface conditions and roughness category

H. PARALLEL AND RADIAL LINE DEVELOPMENTS.

- 9. Applies geometric principles to developments of folded shapes in sheet metal.
- 9.1 Produces developments for the surface areas of :-
 - a. Right prismatic solids-square.
 - b. Right prismatic solids-hexagon
 - c. Right prismatic solids- cylinder
- 9.2 Produces developments for a, b and c, incorporating cutting planes.

I. PRODUCTION AND USE OF SECTIONAL DRAWINGS.

- 10. Construct sectional drawing of single part components in orthographic projection to facilitate manufacture.
- 10.1 Demonstrates the advantages of sectioning in terms of:-
 - a. Clarification of internal detail.
 - b. Ease of dimensioning.

- 10.2 Draw sectional views of given parts
- 10.3 Assembly and detail drawing

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 124805 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Marine Workshop Process & Engineering Materials | | | |

(A) **MARINE WORKSHOP PROCESS:**

WORKSHOP MATERIAL:

1. Material in the past-Early technology, The stone age, The fire & bronze age, The Iron age
2. Materials-Metal & Nonmetal
3. Elements and Material properties and Iron-Carbon diagram
4. Ferrous Metals- Naming of Steel and cast iron
5. Process in steel production-Blast & Electric Arc Furnaces
6. Process in Cast Iron production- Grey, Nodular, Chill, Malleable Cast Iron
7. Nonferrous Metals- Heavy and Light metals

Introduction on working place and various process:

- a. Non-cutting : Casting, Rolling, Shearing, Drawing, Forging
- b. Cutting : Sawing, Drilling, Turning, Planning, Milling

Hand Tools:

- a. Non-edged : Hammer, Screwdriver, Plier, Spanner, etc,
- b. Edged : Chisel, File, Snips, Hacksaw, Tap, Die

Machine Elements:

- a. The Thread : Metric, Whitworth, Acme, Round, Buttress
- b. Elements : Bolt, Nut, Washer, Rivet

Cutting Tools : Angle on cutting tools.

Machine Tools : Introduction, parts, Operation, Accessories of Lathe, Milling machine, Drilling machine, Grinding machine, Shaper, Planer.

MEASURING TOOLS:

1. Measuring, Marking and Checking tools, Dividing of measuring tools
2. Measuring instrument- Scale, Try square, Accuracy
3. Vernier : Universal, Depth Vernier, Vernier scale- Measuring techniques
4. Gauges : Drill-lip, Center, Radius, Filler, Thread gauges. Caliper, Bevel protractor, Indicator, Plug & Ring Gauges
5. Micrometer : Parts, Range, Handling & Reading

SAFETY AND MAINTENANCE:

1. Safety and Maintenance- Safety Rules
2. Care of tools
3. Cleaning of working place
4. General and routine maintenance
5. Fault Indications-Overheating, Vibration
6. Fault analysis and Functional testing-Failure, Electrical & Mechanical testing

HEAT TREATMENT:

1. Microstructure of Steel- Crystal lattice
2. Conversion diagram- Iron carbon diagram
3. Behavior on heating and cooling

4. Heat Treatment process- Annealing, Hardening, Tempering
5. Hardness testing

WEIGHT AND MEASURES

1. Basic units in Metric system
2. Smaller and Larger units than basic unit
3. Formulae signs and symbols
4. Unit of measure

(B) **Strength of Material** : Introduction, Stress and strain , Safe working strength of material and factor of safety ,engineering strain, breaking stress, plasticity, stiffness, true stress, natural strain, normal strain, springs, beams, strut and column, shear centre, cupping test, cumulative damage law, methods of hardness testing, and related topics. Bending Moments and Shearing Forces in Beams, Centroid and Moment of Inertia, Bending Stress, Deflection due to Bending, Torsion, Strain Energy, Theories of Failure, Thin Cylinders and Spheres.

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 124807 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Mathematics-II (Calculus And Co-Ordinate Geometry) | | | |

A. CALCULUS

1. Differential Calculus

- a. Differentiation (Including successive differentiation)
- b. Mean value theorem, Taylor's theorem.
- c. Maxima and minima
- d. Tangents and Normals.

2. Integral Calculus (Including Differential equations)

- a. Indefinite Integrals.
- b. Definite Integrals.
- c. Beta and Gamma function
- d. Area of plane curves.
- e. Differential equation; Equations of first order and first degree. Linear equation with constant coefficients.

B. CO-ORDINATE GEOMETRY (TWO DIMENSIONAL)

- a. Pair of straight lines.
- b. General equation of second degree.

C. CO-ORDINATE GEOMETRY (THREE DIMENSIONAL)

a. Co-ordinate in three dimension, distance, direction, Cosines and direction ratios, Planes (Equation of a plane, angle between two planes, Distance of a point from a plane), Straight lines (Equation of a line, Relationship between plane and lines, Shortest distance).

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|---------------------|-------------------|-------------------|-------------------|----------------------------|
| Paper Code | 124809 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Physics-II | | | |

GROUP – A : 40 MARKS

11.1.5 ELECTRICITY AND MAGNETISM:

- a. Electrostatics-**
Coulomb's Law-Intensity and potential- Gauss's Law – Field due to a dipole- Capacitance- Conductor – Insulators and Dielectrics.
- b. Magnetic effect of current-**
Magnetic field accompanying a current – Laplace's Law- Fields due to a straight current-Intensity at the center of a circular current-Intensity at a point on the axis of a circular current – Field at a point on the axils of a solenoidal current.
- c. Electromagnetic Induction-**
Faraday's Law of induction- Lanz's Law-Self and mutual inductance varying current-LR and CR circuits.
- d. Alternating current-**
Calculation of e.m.f and current at any instant in a rotating coil- Average e.m.f- A.C circuit containing resistance inductance or capacitance-Resonance circuit- Power in A.C.

GROUP – B : 60 MARKS

11.1.6 ELECTRONICS:

- a. Thermoionic Emission and Valve-**
Vacuum tubes- Their parameters and characteristics- Cathode Ray tube (CRT) Electrostatic type and Electromagnetic type.
- b. Semiconductor and Transistor-**
Chemical bonds in semiconductor-Band gap- Intrinsic and extrinsic semiconductors-P type and N type semiconductors- Principles of the P-N junction – Theory of operation of Transistor characteristics.
- c. Electronic Circuits-**
Principles with circuit diagram of rectifier feed back, amplifier and oscillator.

d. Principles of Radio communication-

Modulation and De-modulation-Sidebands –A.M Transistor-Block study of a A.M radio

Transmitter- A.M radio receiver-Block study radio receiver – Superheterodyne principle-Block study of a superheterodyne radio receiver.

11.1.7 INTRODUCTION TO COMPUTER SCIENCE:

Concept of computer and its device-

- a. Type of computers- Microcomputer and its configuration-Terminology. Computer generation characteristics.
- b. Computer memory ROM, RAM, PROM –Disk operation system (DOS) Graphical user interface (Windows).
- c. Data base management system (DBMS), Management information system. EDP, MIS, DSS.
- d. System Analysis and Design – Data Flow Diagram (DFD)- Symbols, Flow chart symbols.
- e. Table (statistical)-Spread sheet; Data query-Database; Graphics and Printing- Graphics; Analyzing – Basic Computer of programming.

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|---------------------|----------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 1248011 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Fishing Vessel Technology | | | |

Types of sea fish for human consumption. Fishing methods and gear types: active and passive gears, advantages and disadvantages. Fish finding and communication equipment. General arrangement and space requirement of fishing craft. Stability, propulsion systems and sea-keeping characteristics of fishing craft. Fish hold architecture. Fish processing and preservation. Fishing harbor design. Fisheries economics.

Third Year

| | | | | |
|---------------------|-----------------------------|-------------------|-------------------|----------------------------|
| Course Code | 121101 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Course Title | English (Compulsory) | | | |

Aims and objective of this course: To develop students' English language skills, to enable them to benefit personally and professionally. The four skills- listening, speaking, reading and writing will be integrated to encourage better language use.

1. Reading and understanding 5x4=20
 Students will be expected to read passages so that they might come across in their everyday life, such as newspapers, magazines, general books etc. Simple stories will also be included to give students a familiarity with different uses of the language.

[N.B. 5 Questions are to be answered. Each question will carry 4 marks. There may be division in each question]

- a) Understanding different purposes and types of readings
 - b) Guessing word- meaning in context.
 - c) Understanding long sentences
 - d) Recognizing main idea and supporting ideas
 - e) Answering comprehension questions
 - f) Writing summaries
2. Writing
- a) Writing correct sentences, completing sentences and combining sentences. 05
 - b) Situational Writing: Posters, notices, slogans, memos, advertisements etc. 04
 - c) Paragraph Writing :Structure of a paragraph; to topic sentence; developing ideas; writing a conclusion; types of paragraphs (narrative, descriptive, expository, persuasive); techniques of paragraph development (such as listing, cause and effect, comparison and contrast) 08
- Or,
- d) Newspaper writing: Reports. Press realize, dialogue etc
 - e) Writing resume
- Or,
- f) Writing letters : Formal and Informal letters, letters to the editor, request letter, job applications, complaint letter etc.
 - g) Essay : Generating ideas; outlining, Writing a Thesis sentence; writing the essay: writing introduction, developing ideas, writing conclusion, revising and editing. 15

3. Grammar

25

- a) Word order of sentences.
- b) Framing questions.
- c) Tenses, articles, subject –verb agreement, noun-pronoun agreement, verbs, phrasal verbs, conditionals, prepositions and prepositional phrases, infinitives, participles; gerunds.
(Knowledge of grammar will be test through contextualized, passages).
- d) Punctuation

4. Developing Vocabulary: Using the dictionary, suffixes, prefixes, synonyms, antonyms, changing word forms (from verb to noun etc.) and using them in sentences. 10

5. Translation from Bengali to English. 1x5=5

6. Speaking Skills: Speaking skill should be integrated with writing and reading in classroom activities.

The English sound system; pronunciation skills; the IPA system; problem sounds; vowels; consonant and diphthongs; lexical and syntactic stress.

(Writing dialogue and practice it orally students can develop their speaking skill. Dialogue writing can be an item in writing test.)

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 134801 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Marine Engineering Knowledge (Motor) | | | |

8.1 INTERNAL COMBUSTION ENGINE

- 8.1.1 Introduction to Internal Combustion Engines:- Diesel Engines their classifications, Principal of operation of four-stroke and two-stroke cycle and Timing diagrams, Comparison according to cycle, cooling, speed, cross head, natural aspiration, scavenging and pressure charging.
- 8.1.2 Thermodynamics of Internal Combustion Engines:- Heat and mechanical work, change in state of gases, standard cycles of Internal Combustion Engines, performance of Internal Combustion Engines.
- 8.1.3 Mechanics of Internal Combustion Engines:- Motion of Piston; Piston displacement, piston velocity, piston acceleration, Turning moment of crank. Flywheel, coefficient of fluctuation of speed, torque versus angular velocity. Engine Balancing & Torsional vibration:- Vibration of engine, condition of engine balancing, natural frequency of shafting, elimination of torsional vibration.
- 8.1.4 Energy Generating Equipment- Structural Design of Cylinder liners, Cylinder jacket, Cylinder heads, Piston, Material for piston; Piston connecting bolts; Piston rings.

- 8.1.5 Power Transmission Equipment-Piston pin, Connecting rod, Crankshaft, Crank pin, Bearing, Flywheel.
- 8.1.6 Engine Structure: Cylinder block, Crankcase, Main bearing, Bed plates and framing.
- 8.1.7 Suction and Exhaust Equipment:- Inlet valve, Exhaust valve, Valve mechanism, Camshaft, Timing gear, Supercharger, Air cooler.
- 8.1.8 Starting and Reversing System:- Air starting system, Types of air compressor, Single and multistage, air receiver, air bottle; Starting air distributor; Starting air Valves, Electric starting system. Reversing system; Sliding cam shaft; Rotating camshaft. Reversing and Reduction Gears:- Reversing gear, reduction gear, shaft coupling, thrust bearing.
- 8.1.9 Fuel injection Systems:- Requirement of fuel oil system, metering, timing, distribution; Main component of fuel injection pump; Principal of operation of fuel pump, pump timing; Fuel cam; Fuel oil tank, strainer and filter; Fuel injection valve.
- 8.1.10 Governing Equipment:- System, governor, speed regulating mechanism.
- 8.1.11 Lubricating oil Equipment:- Lubricating oil system, pump, strainer and filter, gravitation separation and filtration methods, centrifugal separation and clarifying, oily water separators, oil cooler.
- 8.1.12 Cooling Equipment:- Piston and jacket cooling system, kingston valve, pump, thermostat.
- 8.1.13 Large –Bore (Two-stroke)Engine Details, Medium-Speed and High-Speed (four-stroke) Engine System and Operation.

8.2 RESISTANCE:

- 8.2.1 Frictional, residuary and total resistance.
- 8.2.2 Fuel co-efficient and fuel consumption

8.3 PROPULSION TRANSMISSION SYSTEMS:

- 8.3.1 General arrangements of a direct drive slow speed and geared medium speed diesel propulsion transmission systems.
- 8.3.2 Classification of Propellers, terms concerning the propeller. Horse power and efficiency, wake and slip, measurement of propeller pitch, engine output versus hull speed.

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|---------------------|----------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 134803 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Marine Electro Technology | | | |

1 Introduction about marine electro technology.

2 Marine electrical equipments.

3.1 NETWORK THEOREM

Voltage & Current source, Simple circuit, Kirchoff's Current & Voltage law, Superposition, Thevenin, Norton, Maximum power transfer Theorem, etc.

3.2 ELECTRIC SUPPLY SYSTEM(AC)

Single phase supply system, Poly phase supply system

3.2 GENERATION OF ELECTRICITY AND POWER SUPPLY IN SHIPS

DC Generator: Construction, Types, EMF Equation of DC Generator, Losses and Efficiency, The Magnetization Curve or O.C.C & Critical resistance, Load Characteristics, Parallel operation & Load Sharing, Testing & Maintenance, Construction, Winding & Armature reaction, The compensated cross field Generator: Voltage control, Current control, Stabilization. **DC Motor:** Back EMF of a motor; Voltage, Current, Speed equations; Types; Speed & torque controlling factors; Motor characteristics: Electrical, Mechanical; Speed control; Efficiency; Special DC machines.

AC Generator(Alternator): Construction; Types, Speed-frequency equation; EMF equation; Stator windings; Alternator on load: Voltage regulation & Phasor diagram; Prediction of voltage regulation. Alternator in parallel: Synchronising, The Synchronoscope, Synchronising lamps; Parallel operation ; Load sharing.

Motor: Principle, Kinds & Construction of them. **The Induction Motor:** Principal of operation; Relationship: Rotor & Stator; Rotor loss, Input, Output relationship. Torque conditions; Testing: No load & Locked rotor tests; Circle diagram; Starting of Induction motor; Speed & Torque control; Speed adjustment, 3-phase induction motor.

The Transformer: Principal of operation; The EMF equation; Transformer on no load; Transformer on load; Voltage Regulation; Testing: Open circuit, Short circuit; Direct-loading; Efficiency: Maximum, All-day; The instrument transformer: C.T, P.T; Auto-Transformer; Three phase Transformation: Single 3 phase, 1-phase units, Methods of connections.

3.3 ELECTRONICS

Qualitative treatment of : Atomic structure and bonding. Properties of Circuit parameters and basic circuit arrangements; Feedback concept and application; Integrated circuits. **Application:** Practical application and Numerical Problems.

Rectifiers: Half wave, Full wave, Full wave bridge; Ripple factor & Efficiency of different rectifiers.**Power supply & Filters:** Regulated(Block diagram) & Unregulated power supply. Filters: Types & Operation.**Special Diodes:** Zener diode: Biasing, VI Characteristics ; Zener diode as voltage stabilizer, Meter protection; Photo-electric diode; LED; LCD; Solar cell; Construction, Characteristics, Operation of DIAC, TRIAC, SCR.
Transistors: Types, Biasing, Load line, Basic relation of Currents, Configuration; & Equation of a transistor; Junction transistors and their operating characteristics, Configurations, Amplification factors and their relations. Transistor as a Switch, an Amplifier; Class A, B, C, AB Amplifiers; Class B push pull power amplifier; Cascade amplifiers.FET, MOSFET, CMOS
Digital Electronics: Analog & Digital signal; Advantages of digital system; Basic Logic gates: Symbol, Truth table & operation; Universal gate ; Design of basic gates by universal gates.
Communication: List of Electro navigational Aids & function of them.

3.4 ELECTRICAL EQUIPMENT AND CABLES IN SHIPS:

Rules, standard, regulation and recommendation. Temperature, humidity, dust, salt air and oil mist, mould and corrosion, rolling pitching and listing of hull, vibration, voltage and frequency, variation of voltage and frequency, protection against electrical shock, axes of rotation, types of protection from water for electrical equipment. High voltage (HV) and Standard voltage (SV) in AC system for ships. High voltage (HV) and Standard voltage (SV) in DC system for ships.

3.5 POWER DISTRIBUTION SYSTEM & EQUIPMENTS IN SHIPS :

Introduction, Distribution system AC and DC shipboard installations. Branch distribution system, Ring main system, Supply system for essential loads, Preference trip system, Protective devices such as fuses, Circuit Breaker, Main generator circuit breakers, earth lamps, Connection of shore supply. Transfer supply system with dual source, Sectionalized bus system. Supply system by emergency source, Switch board. Section board, Distribution board, Distribution system.

3.6 EMPHASIS STUDY ON “IMO” GUIDED TOPICS

Emphasis study on Competency Exam Class-3(Merchant) Syllabus according to latest “IMO” Guideline for Marine Electro technology.

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 134805 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Naval Architecture And Ship Construction | | | |

A. NAVAL ARCHITECTURE

60hrs.

MARKS

3.1.1 HYDROSTATICS:

- Density, relative density, pressure exerted by liquid, load on an immersed plane, center plane, center pressure, load diagram, shearing force on bulkhead stiffeners.
- Solves problems related to (a) above.

3.1.2 **DISPLACEMENT, T.P.C. COEFFICIENTS OF FORM:**

- (a) Archimedes principle, displacement, tonne per centimeter immersion, coefficient of form, wetted surface area, similar figures, shearing force and bending moment.
- (b) Solves problems related to (a) above.

3.1.3 **CALCULATION OF AREA, VOLUME, FIRST AND SECOND MOMENTS:**

- (a) Simpson's first rule, application to volume, use of intermediate ordinates, application to first and second moments of area, Simpson second rule.
- (b) Solves problems related to (a) above.

3.1.4 **CENTRE OF GRAVITY:**

- (a) Centre of gravity, effect of addition of mass, effect of movement of mass, effect of suspended mass.
- (b) Solves problems related to (a) above.

3.1.5 **INITIAL STABILITY OF SHIPS (STATICAL STABILITY):**

- (a) Understand the term stable, unstable and neutral equilibrium, statical stability at small angles of heel experiments, free surface effect.
- (b) Solves problems related to (a) above.

3.1.6 **STABILITY AT LARGE ANGLE OF SHIP (DYNAMICAL STABILITY):**

- (a) Stability at large angle of heel, cross curve of stability, curve of statical stability, dynamical stability, Angle of loll, stability of wall sided ship.
- (b) Solves problems related to (a) above.

3.1.7 **TRIM:**

- (a) Change in draughts due to added masses, change in mean draught and end draught due to density, change in mean draught and end draught due to bilging.
- (b) Solves problems related to (a) above.

3.1.8 **RUDDERS:**

- (a) Force on rudder, torque on stock, angle of heel due to force on rudder, angle of heel when turning.
- (b) Solves problems related to (a) above.

B. SHIP CONSTRUCTION

40 MARKS

3.2.1 TERMINOLOGY USED IN SHIP CONSTRUCTION:

- a. General definitions of main dimensions of oceangoing vessel such as length over all, length on water line, length between perpendiculars, sheer, molded beam, depth and draught.

- b. Defines structural terminology such as Camber, rise of floor, Flare, rake, scantlings, inter coastal, etc.
- c. Understand the term Net tonnage and gross tonnage, light and load displacement, deadweight, freeboard, etc.

3.2.2 **TRADING SHIP/FISHING VESSEL TYPES:**

- a. Classification of cargo ship/fishing vessel types according to types of cargo carried/fish caught.
- b. Classification of cargo ship/fishing vessel according to structural evolution/structural design.
- c. Show on the profile view the different parts of a modern cargo ship/fishing vessel.

3.2.3 **SHIPS STRUCTURAL COMPONENTS AND WELDING:**

- a. Sections used in shipbuilding
- b. Identifies structural component on ship's plan. Frames; floors. tank top, deck plating, deck beam, beam knees, Pillars, coaming, shell plating terminology, double bottom and arrangement for sounding pipes, striker plate etc. hatch girder, and beams, bulkhead and stiffening arrangement, stringer, cofferdams, deep & peak tanks, bulwarks, bow framing & stern framing.
- c. Welding of ship structural elements, weld defects.

3.2.4 **STRESSES IN SHIP'S STRUCTURE:**

- a. Types of stress & strain, stress concentration.
- b. Principal structural stress; Hogging & Sagging, racking, effect of water pressure and dry docking.
- c. Principal and local stress: Painting, pounding, effect of local weights and vibration.

3.2.5 **SHIP FRAMING SYSTEM:**

- a. Identifies longitudinal, transverse and combined system of framing.
- b. States the reasons & requirements for using different systems of framing.
- c. Describe and illustrates the arrangement of frames, side girders and transverse members in each system of framing.

3.2.6 **SINGLE BOTTOM AND DOUBLE BOTTOM STRUCTURE (FUNCTION AND CONSTRUCTION):**

- a. Describe functions and construction of a single bottom structure and double bottom structure.
- b. Draw diagram of amid ship transverse sections through double bottom tanks:
 - I. transverse framed ship

- II. longitudinally framed ship
- III. combined framed ship in way of each types of floors.
- c. Test of double bottom tank.

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 134807 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Marine Resources, Management and Maritime Law & Convention | | | |

1. Concept of Law and Contract Act: Concept of Law-Civil, Criminal Law, Statute Law, Admiralty court, Corner's court, Juries, Public Law, Private Law, Public and Private International Law; Understanding of Plaintiffs, Respondent, Summons, Affidavits, Arbitration.
2. Bangladesh Contract Act with reference to following: Agreement, Offer and Acceptance, consideration, consent, capacity to contract, valid void and voidable contracts, quasi contract, breach of contract, remedies for breach, discharge of contract, agency bailment, FOB & CIF contract, Invoice and consular Invoice, Letter of Credit, Bill of Lading, Bills of exchange, Way bill, Charter Parties.
3. Scope of Maritime Law: Sources, Subjects and objects. Continental Shelf, Exclusive Economic Zone, Sea Bed, Admiralty Jurisdiction, innocent passage, International aspects of Registration Ship building contracts and mortgage. Nationality of ships, flags of convenience and flag Discrimination.
4. Knowledge about classification, Recognized classification societies, character symbols of classification.
5. Knowledge about Tonnage, Weight Tonnage class, Measurement Tonnage class, Tonnage Mark.
6. Maritime Lien, Possessory Lien, Freight, General Average.
7. Marine Insurance and Marine Losses; Total Loss and Partial Loss, Constructive total Loss, Particular average loss, General Average Loss, General Average Sacrifice, General Average Expenditure.
8. Knowledge on Marine Fisheries Ordinance 1983, Marine Fisheries Rules of Bangladesh.
9. Knowledge on Fish & Fish Products (Inspection & Quality) control ordinance of Bangladesh with special reference to HACCP (Hazard Analysis Control Critical Point) for quality control on board the fishing vessel.
10. Bangladesh Merchant Shipping Ordinance 1983 in general with special reference to;
 - I. Definitions
 - II. Registration of Ships

- III. Shipping Master
 - IV. Fishing Vessel
 - V. Function of POMMD
 - VI. Seamen & Apprentices
 - VII. Limitation and Liability
 - VIII. Investigation and Inquiries, etc.
11. Primary knowledge on the role of UN organizations like IMO, ILO, FAO over fishing vessel operation and Maritime business.
 12. Simple knowledge on ILO conventions related to Fishing Vessel and Fisherman (ILO Work in Fishing Convention 2007), and Torremolinos Protocol, 1993, SOLAS, STCW-95 (as amended in 2010), STCW-F-95, MARPOL 73/78.
 13. Maritime Declaration of health and requirements of international health regulation.
 14. Knowledge about Food law, safety of food, Composition of food, Understanding about Codex, Standard documents of Codex, Specialist Committees of Codex Commission.
 15. Knowledge on the chapters on Fishing and Fisheries as covered in the UN convention on the Law of the Sea (UNCLOS),1982 with special reference to Territorial water, Exclusive Economic Zone, Continental Shelf, Coastal state, landlocked state.

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|---------------------|-------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 134809 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Computer Science | | | |

Computer Fundamentals:

Historical development of computers: an evolution. Classification of Computers on different norms such as generations, technology, etc. Different functional parts of a computer and their functions. Computer peripherals: Monitor, Printer, Key Board, Floppy disk drive, Floppy, Hard disk, Mouse. Computer arithmetic: Binary, Octal, Decimal & Hexadecimal number systems and mutual conversion: addition, 1's & 2's complementation in binary only. Units of memory measurement: Bits, Bytes, KB, MB, GB, and TB. Units of run-time measurement: sec, ms, s, ns, ps, fs, as. Different computer environments: Batch processing, Time-sharing, Interactive & Network, their functional details and differences. Computer connectivity: LAN, MAN, WAN, Internet. Internet activity in India and various facilities available on Internet, Satellite based Communication.

C Language 1:

Computer languages, their classification and compilation. C-Character set. Data Types. Constants and variables. Operators: Arithmetic, Increment & Decrement, Modulo division, Relational, Logical, Conditional and Comma. Expressions and. Assignment statements. Control statements: if, nested if, switch, while loop, for loop, do while loop. Arrays: single and two dimensional only.

C Language 2:

Functions: User-defined, Standard library functions of various types. Pointers: &, operators. Pointer expression: pointer assignment, pointer arithmetic, pointer comparison, Structures. File handling in C: opening a file, write into a file, reading from a file, closing a file

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 134811 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Safety, Environmental Protection & Leadership | | | |

1. PERSONAL SURVIVAL TECHNIQUES:

Introduction, Safety and Survival: Safety guidance, Principles of survival at sea. Definitions, Survival craft and appliances. SOLAS training manual, Safety symbols. Emergency situations: Types of emergencies, Precautions Fire prevention. Foundering, Crew expertise and initial familiarization.

Muster list and emergency Fire prevention. Foundering, Crew and emergency instructions. Extra equipment and survival, Abandoning ship-last resort, Personal preparation for abandoning ship. Need to prevent panic, Crew duties to passengers. Crew duties for launching survival craft. Master's order to abandon the ship, means of survival. Survival craft and Rescue boats: Life boats, Life rafts, Rescue boats. Personal Life saving appliances: Life buoys, Life Jackets, Immersion suits, Thermal protective aid. Boarding survival craft and demonstrations. Survival at sea: Portable radio apparatus for survival craft, EPIRBs, SARTs. Helicopter assistance.

2. FIRE PREVENTION AND FIRE FIGHTING:

Introduction, concept & application of Fire and explosion, Types & source of ignition, Flammable materials commonly found on board, Need for constant vigilance, fire hazards, Organization of shipboard fire-fighting, Location of fire-fighting appliances and emergency escape routes, Fire spread in different parts of a ship. Fire and smoke detection measures on ship and automatic alarm system, Classification of fire and applicable extinguishing agents. Selection of fire-fighting appliances and equipment, fire hoses and nozzles, Mobile apparatus, Portable fire extinguishers, fireman's outfit, Fire blankets, Fire alarms and first action. Fire fighting, Fire fighting mediums, Fire fighting procedures, Small fires and Extensive fires. Precautions for & use of fixed installations: General, CO2 and Foam system, Sprinkles, Pressure spray system.

3. PERSONAL SAFETY & SOCIAL RESPONSIBILITIES AND ENVIRONMENTAL PROTECTION:

Introduction, Ship familiarization, Nature of shipboard hazards, Equipment for counter the hazards, List of hazards, Hot work, Engine room watch keeping. Team building, Team work, Pollution, Effect of pollution on marine environment, International measures for pollution prevention. Fundamentals of communications, Methods of communication, Barriers in communication, Effective transmission skills, Effective listening skills, Effects of wrong communication. Rights and obligation of crew employment conditions, Health and Hygiene on board, Explanation of EMERGENCY, Drills and Muster, Value and need of drill and training, Internal communication. Loading and unloading of cargo,

Mooring and unmooring, Enclosed spaces, working aloft. Galley, Pantry, Fridge room, Drugs and alcohol, Periodical demonstration for preventing environmental pollution on board and sea.

4. ELEMENTARY FIRST AID:

Introduction, General principles. Body structure and functions. Positioning of casualty, The unconscious casualty. Resuscitation. Bleeding, Management of shock. Burns and scalds. Rescue and transport of casualty.

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|---------------------|---|------------------|-------------------|----------------------------|
| Paper Code | 134812 | Marks: 50 | Credits: 2 | Class Hours: 30hrs. |
| Paper Title: | Marine Engineering Knowledge (Workshop Practical Workshop Training at the Academy Workshop) | | | |

GENERAL OBJECTIVE:

THE EXPECTED OUTCOME OF PRACTICE JOB IS THAT THE CADET SHOULD BE ABLE TO:-

- a) HANDLE BASIC TOOLS USED ON WORKBENCH FOR FITTING WORK.
- b) HAZARD IN THE ENGINEERING WORKSHOP SAFE WORKING PRACTICES & THE USE OF PROTECTIVE CLOTHING'S

1. FITTING: The care and use of bench tools, methods of achieving required” finish” The use of simple templates and fixtures to maintain the required limit and fits together with practices in working to define limits.
2. DRILLING: Correct method of mounting and clamping work pieces for drilling. The use of various types of drilling machines such as hand driven, portable and bench type drilling machine.
3. GRINDING: Forming and sharpening of tools and general bench types. Use of double-ended. grinding machine.
4. TURNING: Use of centers, face plate/angle plate three and four jaw chuck and steadies.
5. MILLING: Plain and Milling: Parallel & square.
6. SHAPING: Plain shaping of faces, shaping faces square, cutting chamfers.
7. WELDING: Welding, brazing, fabrication & pipe work.

OPERATE DRILLING, GRINDING, TURNING, MILLING, SHAPING MACHINE TOOLS IN RELATION TO PRODUCTION OF FOLLOWING WORK PIECES/JOBS FROM WORKING

DRAWING:

1. NAME PLATE: The care in use bench tools, Filing process, Handling of marking tools, Hacksaw and sawing.
2. CUTTING TOOL: Operating bench grinder. Handling of vernier, bevel protractor
3. NAME PLATE BOLT: Operating lathe. Thread cutting by die
4. METAL BOX: Sheet metal work. Drilling and riveting.
5. HAMMER: Shaping and vertical milling.
6. TAP WRENCH: Adjustable tap wrench assembly-handle-V block. Thread cutting by tap
7. CENTRE PUNCH: Hardening and tempering of steel.
8. ADJUSTABLE SPACER: Operating power saw. Internal and external thread cutting.
9. V-BLOCK ASSEMBLY: V-block surface grinding. Handling of micrometer. Horizontal milling.
10. PARALLEL CLAMP ASSEMBLY:
 - a. Moving Plate
 - b. Fix plate
 - c. Adjusting rod
 - d. Tension rod
 - e. Rest plate
 - f. Bolt

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 134814 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Ship-Board Training & Marine Engineering Knowledge (Practical) (Ship-Board Training at sea and documented in a TRAINING RECORD BOOK) | | | |

MARINE ENGINEERING KNOWLEDGE (PRACTICAL):

5. **PREPARING AN ENGINE FOR SEA:**

Arriving at port; Overhauling at port
Overhauling and servicing-Temperature of engine room;
Fuel setting tank; Priming the fuel injection pump;
Cylinder head valves; Cylinder cooling system; Cylinder lubrication;
Piston-cooling system; Piston rod packing.
Lubrication oil system; Crankcase inspection;
Starting systems; Starting and reversing gears;
Thrust bearing; Speed governors; Turning gear;

2. **OPERATIONAL DUTIES AT SEA:**

Handling of engine- Starting; Running; Stopping;
Maintenance-maintenance cycle, daily inspection, inspection procedure;
Allowable limit of service;
Adjustment and assembling;
Trouble shooting-Cause of engine troubles and their countermeasures;
Engine installation.

3. **MANAGING THE SHIP ENGINE:**

Engine fails to start on air-Reasons for failing to start and their countermeasures;
Engines sluggish in starting on air-Reasons for slow rotational speed on starting air and their countermeasures;
Engine fails to begin working on fuel- Reasons for engine failing to begin working on fuel and their countermeasures;
Engine sluggish in starting on fuel-Reasons for engine failing to begin working promptly on fuel and their countermeasures.

4. **WATCH-KEEPING:**

Steering gears.
Fuel settling-tanks; Air injection fuel valves; Fuel injection pumps;
Cylinder cooling system; Cylinder-head valves; Bottom of cylinders; Knocking in cylinders;
Cross head guides; Bottom platform inspection;
Piston cooling; Bearing lubricating oil; Discoloured exhaust;
Breakdowns.

5. **FIRES IN ENGINE-ROOM:**

Concept and application of the fire triangle to fire and explosion.
Fire prevention and precautions.
Organization of shipboard fire fighting, fire fighting mediums and procedures.
Entering and working in enclosed spaces using breathing apparatus for fighting effecting rescue.
Entering and working in enclosed spaces using breathing apparatus for fighting effecting rescue.

6. **SAFETY AND OPERATION:**

Crankcase explosion- Mechanics of explosion; Crankcase safety arrangements.
Prevention and protection device.
Crankcase Oil mist detector-Operation of mist detector; CO₂ drenching system
Starting air explosion-Condition; Effects of explosion; Prevention
Scavenge fires- Causes, ignition, indication of fire, Action to follow upon detection of fire.
Cylinder relief valve- Description; maintenance; Causes of valve lifting.
Operational faults-Black exhaust smoke Detection and remedy.

7. **COURSE PROJECT THESIS:**

All the cadets will have individual sea practice/industrial attachment and they will have to submit course project on the subject/topic in form of thesis paper under guidance of Instructor.

[Ship-board Training Details :

Completion period - within minimum 6 months seagoing service

The tasks contained in the Ship-board Training Programme have been carefully designed to help ensure that cadets meet the requirements for certification stipulated by the 'competences'. Completion of the tasks/duties/projects of the Ship-board Training Record Book according to this SYLLABUS will provide sufficient documentary evidence that a cadet has Callipered a properly structured ship-board training record programme and demonstrated competence in the skills required by the STCW'95 Convention (International Convention on the Standards of Training, Certification and Watch keeping for Seafarers 1978, as amended in 1995).

Area 1: Mandatory safety and Shipboard familiarization Area 2: Safety at work

Area 3: Training tasks/duties

Area 4: Projects

Area 1: Mandatory safety and shipboard familiarisation

1.1 Be able to:

- Communicate with other persons on board elementary safety matters.
- Understand safety, information symbols, signs and alarm signals.

1.2 Know what to do if:

- A person falls overboard.
- Fire or smoke is detected.
- The fire or abandon ship alarm (verbal command) is sounded.

1.3 Be able to:

- Identify muster and embarkation stations and emergency escape routes.
- Locate and don life-jackets.
- Raise the alarm and have a basic knowledge of the use of portable fire extinguishers.
 - Take immediate action upon encountering an accident or other medical emergency before seeking further medical assistance on board.
 - Close and open the fire, weathertight and watertight doors fitted in the particular ship, other% than those for hull openings.

1.4 Watchkeeping procedures and arrangements:

- Visit engine room and other work areas
 - Get acquainted with main and auxiliary engines and other engine room equipment and displays.
 - Activate, under supervision, equipment to be used in routine duties

1.5 Safety and emergency procedures:

- Read and demonstrate and understanding of your Company's Fire and Safety Regulations.
- Demonstrate recognition of the alarm signals for FIRE, EMERGENCY and ABANDON SHIP.
- Locate medical and first aid equipment.
 - Locate fire-fighting equipment: alarm-activating points alarm bells, extinguishers, hydrants, fire axes and hoses.
 - Locate: Rocket line throwing apparatus.
 - Distress rockets, flares and other pyrotechnics.
 - Breathing apparatus and firefighter's outfits etc.
 - Locate and understand operation of emergency deck stop mechanism for main engines including other emergency stop valves.
 - Locate CO2 or Halon bottle room, and control valves for smothering apparatus in pump rooms, cargo tanks and holds.
 - Locate and *understand* the operation of the emergency pump.

1.6 Environmental protection:

- Get acquainted with:
 - the procedure for handling garbage, rubbish and other wastes.
 - the use of garbage compactor or other equipment as appropriate.

Area 2: Safety at Work

1 Competence: Maintain safe operations

Application of safe working practices on board

- 1.1 Describe a system of permits to work.
- 1.2 List items to be checked in a hot work permit.
- 1.3 Explain the use of gas analysis instruments to be Used prior to entering into cargo tanks.
- 1.4 Explain the use of gas analysis instruments to be used prior to entering into ballast tanks.
- 1.5 Explain the use of gas analysis instruments to be used prior to entering into void spaces.
- 1.6 Describe the procedure adopted on finding someone overcome as a result of an electric shock.
- 1.7 Describe the procedure adopted on finding someone overcome as a result of a gassing incident in an enclosed space.
- 1.8 Describe special safety precautions in dry dock.

Area 3: Training tasks and competences

Part 1: Marine Engineering

1 Competence: Use appropriate tools for fabrication and repair operations typically performed on ships.

- 1.1 Select and use special tools for work on machinery and equipment.

2 Competence: Use of hand tools and measuring equipment for dismantling, maintenance, repair and re-assembly of shipboard plant and equipment.

- 2.1 Select and use hand tools.
- 2.2 Select and use general and special measuring equipment.

3 Competence: Use of handtools, electrical and electronic measuring and test equipment for fault finding, maintenance and repair.

- 3.1 Locate and interpret relevant manuals including electrical and electronic control diagrams.
- 3.2 Take corrective actions with or without assistance, as appropriate. Select equipment and locate-faults.
- 3.3 Repair faults and correct malfunctions.

4 Maintaining a safe engineering watch

- 4.1 Relieve and hand over watch.
- 4.2 Conduct the watch.
- 4.3 respond to black-out and emergency situations.
- 4.4 Change over from remote-automatic to local control of all systems.
- 4.5 Maintain the machinery space log book and records.

5 Use of English in written and oral form.

- 5.1 Use English engineering publications, operational manuals and fault finding instructions.
- 5.2 Communicate with others in English language, as appropriate.

6 Operate main and auxiliary machinery and associated control systems.

- 6.1 Prepare machinery for departure.
- 6.2 Operate main and auxiliary machinery.

7 Operate pumping systems and associated control systems.

- 7.1 Plan the operations of auxiliary and piping systems and service plants.
- 7.2 Operate the systems for bilge, fuel, ballast, MARPOL equipment and cargo pumping.

Part 2: Electrical, Electronic and Control Engineering

1 Competence: Operate alternators, generators and control systems

- 1.1 Locate and use relevant manuals, drawings, diagrams and instructions.
- 1.2 Prepare for starting, paralleling and change-over of alternators or generators.
- 1.3 Start, couple and change-over alternators or generators.

Part 3: Maintenance and repair

1 Competence: Maintain marine engineering systems, including control systems.

- 1.1 Locate and use relevant data sources, manuals and drawings.
- 1.2 Ensure safety of all personnel working on plant or equipment.
- 1.3 Undertake maintenance and repair to the main engine.
- 1.4 Undertake maintenance and repair to the auxiliary engine.
- 1.5 Undertake maintenance and repair to the auxiliary boiler.
- 1.6 Undertake maintenance and repair to plant or equipment.
- 1.7 Undertake maintenance and repair to electrical equipment.
- 1.8 Undertake maintenance and repair to emergency equipment.

Part 4: Controlling the operation of the ship and care from persons on board

1 Competence: Ensure compliance with pollution prevention requirements.

- 1.1 Ensure that procedures are agreed and properly planned and all scuppers are blocked before bunkering.
 - 1.2 Initiate immediate investigation to detect the source on discovering any pollution around the ship.
 - 1.3 Stop or prevent leakages and spills of harmful liquids and solids substances.
 - 1.4 Sound all tanks and compartments if any damage is suspected.
 - 1.5 Carry out bilge, ballast and bunkering operations.

2 Competence: Maintain seaworthiness of the ship.

- 2.1 Inspect hull and hull openings, compartments, hatch covers and equipment, and take action where defects are detected.
 - 2.2 Ensure that all loose objects are securely fastened to avoid damage.
 - 2.3 Arrange for regular control measures to ensure watertight integrity.

3 Competence: Prevent, control and fight fires on board.

- 3.1 Operate fire and smoke detecting equipment.
- 3.2 Ensure that all persons on watch are able to detect and correct hazardous situations and actions and keep the ship clean and tidy.
- 3.3 Make the watch locate fire fighting appliances and emergency escape routes and sound alarm.
- 3.4 Locate fire stations and demonstrate proper use of fixed installations and other fire fighting appliances and agents.
- 3.5 Locate and use fire protective equipment (fire fighter's outfit, including breathing apparatus).
- 3.6 Demonstrate ability to act in accordance with the fire fighting plan during fire drills.
- 3.7 Carry out rescue operations wearing breathing apparatus.

4 Competence: Operate life-saving appliances.

- 4.1 Organise abandon ship drills.
- 4.2 Launch, handle and recover a lifeboat.
- 4.3 Launch or throw overboard a liferaft, and manoeuvre it clear of ship side.
- 4.4 Operate radio life-saving appliances
- 4.5 Ensure that all required equipment on board a rescue craft is functioning and maintained as specific in the SOLAS Training Manual.

5 Competence: Apply medical first aid on board ship.

- 5.1 During relevant drills, stop excessive bleeding, ensure breathing and put casualties in proper position; 5.2 Detect signs of shock and heat stroke and act accordingly.
- 5.3 Treat burns, scalds, fractures, and hypothermia.

6 Competence: Monitor compliance with legislative requirements.

- 6.1 State where law, rules and regulations concerning ship operation and pollution prevention are available.
- 6.2 Use legislation to ascertain due approach to solve questions encountered during on board operations
- 6.3 Searching for stowaways.

Area 4: Projects

1. Pipe Systems

Search out and make line diagrams of the following pipe systems. Use the correct symbols to show on the appropriate diagrams: valves (NRV, SDNR, SL, etc), remote or emergency controls and other arrangements. Identify pressure relief valves, bursting discs, drains, air cocks, filter units, sounding arrangements and vent pipes.

- 1.1 Main seawater
- 1.2 Bilge, including emergency bilge pumping arrangements
 - 1.3 Fire main
 - 1.4 Ballast
- 1.5 Fresh water (high temperature, low temperature)
- 1.6 Fuel-transfer system (HFO and MDO), including remote or emergency controls and overflow arrangements for fuel transfer
- 1.7 Main steam
- 1.8 Feedwater
- 1.9 Auxiliary steam
- 1.10 Fuel treatment service
 - 1.11 Lube oil
 - 1.12 Sewage
- 1.13 Compressed air systems fore and aft
- 1.14 Drain valves
- 1.15 Air cocks
- 1.16 Domestic refrigeration system

2 Scale Drawings

Draw approximately to scale:

- 2.1 A longitudinal section through the centre line of your ship showing and naming cargo holds (tanks), bunker, ballast and all other compartments/spaces,
- 2.2 A plan of the navigation bridge showing the position and the name of equipment,
- 2.3 A plan of each of the other decks showing and naming accommodation, store rooms etc.

3 Safety

On the deck plans drawn for 2.3 above:

- 3.1 Show the position by key letters of each type of life saving and fire fighting equipment,
- 3.2 List the above key letters used in (a) and alongside each one give a brief description of each item

4 Protection of the Marine Environment

Summarise the company's policy on Environmental Protection. What measures are taken aboard your ship to minimise the risk of pollution? This includes the disposal of plastics, galley waste, noise, smoke, oil, sludge etc. Investigate and list the main international regulations that aim to control and protect the marine environment.

5 Main Engine

Make a line diagram of the main lubricating system for the main engine. Indicate the types of valves, pumps and filters fitted with the aid of a diagram:

5.1 How oil is distributed to all moving parts within the engine; 5.2 The oil pressures and temperatures.

What is the average lube oil consumption? Why does loss of lube oil occur?

6 Steering Gear

Describe the tests normally carried out on the steering gear prior to leaving port. Explain how the telemotor system is purged of air and recharged. Why is it important to be stilled that there is no air in the system?

7 Electrical Systems

Describe the procedure for paralleling the ship's alternators or generators. Explain how load sharing is affected.

8 Bunkering

Describe the procedures adopted in taking bunkers in which you were involved. State clearly the sequence of events and the precautions taken. Present the results of any tests taken at the time or from analysis made by a laboratory ashore.

9 Bridge Watchkeeping

Describe very briefly the purpose and functions of the main items of bridge equipment. Observe procedures and assist on the bridge during manoeuvring operations

9.1 Entering port

9.2 Leaving port

9.3 When anchoring or weighing anchor, and 9.4 During one watch at sea.

Describe how orders are given, confirmed and executed and the interactions with the engine(63i) and other parts of the vessel.]

| | | | | |
|---------------------|---|------------------|-------------------|-----------------------------|
| Paper Code | 134816 | Marks: 50 | Credits: 2 | Class Hours: 30 hrs. |
| Paper Title: | Marine Engineering Practice-II [(A) Repair & Mounting & (B) Electrical Laboratory] | | | |

A. MARINE ENGINEERING PRACTICE (REPAIR & MOUNTING) 30 Marks

5.1.1 MATERIAL USED IN SHIP REPAIRING:

1. Material in the past- Early technology, The stone age, bronze age, The Iron age
2. Materials- Metal & Nonmetal
3. Elements and Material properties.
4. Ferrous Metals- Naming of Steel and cast iron
5. Nonferrous Metals- Heavy and Light metals

5.1.2. BENCH WORK AND THE MECHANIZATION OF REPAIR- ASSEMBLY-JOBS:

1. Measuring tools
2. Fitting Tools
3. Bench work.
4. Tolerances and Fits

5.1.3 ASSEMBLY AND REPAIR OF THE SHAFT LINE:

1. Repairing and Mounting of Shaft Line by means of hydro-pressure method.
2. Fitting and Removing screw propellers by the hydro-pressure method.

5.1.4 REPAIRING AND INSTALLING RECIPROCATING - PISTON MACHINERY:

1. Dismantling Reciprocating-Piston Engine.
2. Surveying the parts of Reciprocating - Piston Machine.
3. Repair the basic part of Reciprocating Machine.

4. Assembly of Reciprocating Machinery units.
5. Assembly of Reciprocating Machinery.
6. Securing Reciprocating Engine of their foundation
- 5.1.5 REPAIRING AND MOUNTING OF AUXILIARY MACHINERY:
 1. Repair of auxiliary Machinery
 2. Mounting of auxiliary machinery
- 5.1.6 REPAIR OF SHIPS GEAR AND DECK MACHINERY:
 1. Repair of Deck Machinery.
 2. Repair of Ships gear.
- 5.1.7 ADJUSTMENT AND TESTING OF A SHIP MACHINERY:
 1. Valve timing in Internal Combustion Engines.
 2. Test the main engine.

B. ELECTRICAL LABORATORY

20 Marks

5.2.

1. Practical demonstration of Ohm's Law
2. Characteristics of series & parallel circuit.
3. To determine the E M F of a cell with Potentio meter of known rersistance.
4. To determine the unknown resistance by wheatstone bridge/ Meterbridge.
5. To verify the laws of resistance by P. O. Box.
6. To determine the value of J Electrically.
7. To determine the value of resistance and inductance of a coil.
8. To determine the value of M & H by vibration magnetometer.
9. Construction and operation of a D C Motor
10. Power factor correction.
11. To measure the resistance of Electric Lamps at room temperature i. e. when cold and at working temperature i.e. when hot
12. Construction of a full wave bridge rectifier.
13. characteristics of inductive and capacitive circuit.
14. Characteristics of a Triod valve / transistor.
15. How to connect ammeter. voltmeter and AVO meter in different range and manner.
16. Characteristics of an inductor with air core, iron core and variable iron core.
17. Maintenance of batteries and charging procedure.

| | | | | |
|---------------------|-------------------------|------------------|-------------------|----------------------------|
| Paper Code | 134818 | Marks: 50 | Credits: 2 | Class Hours: 30hrs. |
| Paper Title: | Physics-III (Practical) | | | |

PRACTICAL EXPERIMENT :

1. Determination of 'g' by compound pendulum; kater's pendulum.
2. Determination of young's rigidity moduli by Searle's dynamic method.
3. Rigidity modulus by static method.
4. Surface tension of water by capillary tube method.
5. Surface tension and angle of contact of mercury by Quinke's method.
6. To determine to moment of inrcrtia of a Fly-wheel about its axis of rotation.

7. To determine the specific heat by the method of cooling.
8. To determine the thermal conductivity of a bad conductor by Lee's method.
9. To find the frequency of tuning fork by Melde's experiment.
10. Comparison of e.m.f's of two cells.
11. Verification of the law's of combination of resistances.
12. Calibration of a meter bridge wire.
13. Determination of galvanometer resistance by half deflection method.
14. Determination of figure of merit of a galvanometer.
15. Determine E.C.E. of copper/silver.
16. Determination of wave length of light by Newton's rings.
17. Specific rotation of sugar solution by polarimeter.
18. Study the variation of reactance due to L and C with frequency.
19. Plotting the characteristics curve for a diode valve/Semiconductor diode.
20. Construction of receiver and construction of transmitter.
21. Transistor characteristics curve.

Marks Distribution:

| | | |
|----------------------|---|-----------------|
| LABORATORY NOTE BOOK | : | 10 MARKS |
| VIVA | : | 10 MARKS |
| ONE EXPT. | : | |
| Theory | : | 08 Marks |
| Procedure | : | 07 Marks |
| Data Collection | : | 05 Marks |
| Calculation | : | 04 Marks |
| Result | : | 03 Marks |
| Discussion | : | 03 Marks |
| | | Total -50 Marks |

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|---------------------|-----------------------|------------------|-------------------|----------------------------|
| Paper Code | 134820 | Marks: 50 | Credits: 2 | Class Hours: 30hrs. |
| Paper Title: | Chemistry (Practical) | | | |

1. Preparation of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, Mohr's salt and potash alum.
2. Separation and identification of four radicals from a mixture of anions and cations. The cations are Pb^{2+} , Cu^{2+} , Cd^{2+} , Al^{3+} , Fe^{2+} , Fe^{3+} , Co^{2+} , Ni^{2+} , Zn^{2+} , Ca^{2+} , Ba^{2+} , Na^+ , K^+ , and NH_4^+ , the anions are NO_3^- , CO_3^{2-} , S^{2-} , SO_4^{2-} , Cl^- , Br^- and I^- .
3. Standardization of NaOH solution using standard oxalic acid solution,
4. Determination of Fe^{2+} using standard permanganate solution 5.
Iodometric determination of copper(II) using standard Na_2SO_3 solution.
6. Gravimetric determination of nickel as $\text{Ni}(\text{HDMG})_2$ complex 7.
Determination of the enthalpy change for the decomposition sodium dicarbonate into sodium carbonate.

8. Determination of the pH- neutralization curves of a strong acid by a strong base.
9. Investigation of the conductance behaviour of electrolytic solution and applications (acetic acid)
10. Determination of the presence of nitrogen, halogen and sulphur in organic compounds.
11. Identification of the functional groups (unsaturation, alcohol, phenol, carbonyl, aldehyde, ketone, carboxylic acid, aromatic amine, amide and nitro- groups) in organic compound.

Books Recommended:

1. A Text Book of Quantitative Inorganic Analysis, A.I. Vogel, 3rd/4th edition, ELBS and Longman Green & Co. Ltd.
2. A Text Book of Quantitative Inorganic Analysis, A.I. Vogel 3rd /4th edition, ELBS and Longman Green & Co. Ltd.
3. Practical physical chemistry, A Faraday.
4. A Text Book of practical organic chemistry, A.I. Vogel, ELBS edition.

NATIONAL UNIVERSITY



Syllabus

Subject: Marine Fisheries

Three Years B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: Marine Fisheries
Session: 2013-2014

Course content and marks distribution

| FIRST YEAR | | | |
|-------------------|--|--------------|---------------|
| Paper Code | Paper Title | Marks | Credit |
| 111501 | স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস (History of the Emergence of Independent Bangladesh) | 100 | 4 |
| 114701 | Fisheries Biology And Biotechnology | 100 | 4 |
| 114703 | Coastal Aquaculture | 100 | 4 |
| 114705 | Seamanship & Maritime Communication | 100 | 4 |
| 114707 | General Zoology Paper-I | 100 | 4 |
| 114709 | Botany Paper-I | 100 | 4 |
| 114711 | Biochemistry Paper-I | 100 | 4 |
| Total = | | 700 | 28 |

| SECOND YEAR | | | |
|--------------------|--|--------------|---------------|
| Paper Code | Paper Title | Marks | Credit |
| 131001/ 121103 | বাংলা জাতীয় ভাষা (National Language)/ English (Compulsory Alternative) | 100 | 4 |
| 124701 | Oceanography | 100 | 4 |
| 124703 | General Ship Knowledge | 100 | 4 |
| 124705 | Fishing Gear And Commercial Fishery | 100 | 4 |
| 124707 | General Zoology Paper-II | 100 | 4 |
| 124709 | Botany Paper-II | 100 | 4 |
| 124711 | Biochemistry Paper-II | 100 | 4 |
| Total = | | 700 | 28 |

| THIRD YEAR | | | |
|-------------------|--|--------------|---------------|
| Paper Code | Paper Title | Marks | Credit |
| 121101 | English (Compulsory) | 100 | 4 |
| 134701 | Fish Processing & Engineering | 100 | 4 |
| 134703 | Quality Control & HACCP Management | 100 | 4 |
| 134705 | Port, Harbour & HR Management | 100 | 4 |
| 134707 | Lab work, Industrial attachment & Independent Research | 100 | 4 |
| 134709 | Information and Communication Technology (ICT) | 100 | 4 |
| 134711 | Safety, Environmental Protection & Leadership | 100 | 4 |
| 134712 | General Zoology Paper-III (Practical) | 100 | 4 |
| 134714 | Botany Paper-III (Practical) | 100 | 4 |
| 134716 | Biochemistry Paper-III (Practical) | 100 | 4 |
| Total = | | 1000 | 40 |

Instruction: All courses are compulsory. Students should complete at least 80% (Eight Percent) of the total credits set for each year and secure a GPA of at least 2.00 (Two) to be considered eligible for promotion to the next class. Any pending credit from previous year has to be completed and minimum grade D must be achieved.

Detailed Syllabus First Year

| | | | | |
|--------------|--|------------|------------|---------------------|
| Paper Code | 111501 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | History of the Emergence of Independent Bangladesh | | | |

স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস

ভূমিকা: স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস-পরিধি ও পরিচিতি

১। দেশ ও জনগোষ্ঠীর পরিচয়

- ক) ভূ প্রকৃতির বৈশিষ্ট্য ও প্রভাব
- খ) নৃতাত্ত্বিক গঠন
- গ) ভাষা
- ঘ) সংস্কৃতির সমন্বয়বাদিতা ও ধর্মীয় সহনশীলতা
- ঙ) অভিন্ন বাংলার পরিপ্রেক্ষিতে তৎকালীন পূর্ববঙ্গ ও বর্তমান বাংলাদেশের স্বকীয় সত্তা

২। অখণ্ড স্বাধীন বাংলা রাষ্ট্র গঠনের প্রয়াস ও উপমহাদেশের বিভক্তি, ১৯৪৭

- ক) ঔপনিবেশিক শাসন আমলে সাম্প্রদায়িকতার উদ্ভব ও বিস্তার
- খ) লাহোর প্রস্তাব, ১৯৪০
- গ) অখণ্ড স্বাধীন বাংলা রাষ্ট্র গঠনের উদ্যোগ, ১৯৪৭ ও পরিণতি
- ঘ) পাকিস্তান সৃষ্টি, ১৯৪৭

৩। পাকিস্তান: রাষ্ট্রীয় কাঠামো ও বৈষম্য

- ক) কেন্দ্রীয় ও প্রাদেশিক কাঠামো
- খ) সামরিক ও বেসামরিক আমলাতন্ত্রের প্রভাব
- গ) অর্থনৈতিক, সামাজিক ও সাংস্কৃতিক বৈষম্য

৪। ভাষা আন্দোলন ও বাঙালির আত্মপরিচয় প্রতিষ্ঠা

- ক) মুসলিম লীগের শাসন ও গণতান্ত্রিক রাজনীতির সংগ্রাম
- খ) আওয়ামী লীগের প্রতিষ্ঠা, ১৯৪৯
- গ) ভাষা আন্দোলন: পটভূমি ও ঘটনা প্রবাহ
- ঘ) হক-ভাসানী-সোহরাওয়ার্দীর যুক্তফ্রন্ট, ১৯৫৪ সালের নির্বাচন ও পরিণতি

৫। সামরিক শাসন: আইয়ুব খান ও ইয়াহিয়া খানের শাসনামল (১৯৫৮-৭১)

- ক) সামরিক শাসনের সংজ্ঞা ও বৈশিষ্ট্য
- খ) আইয়ুব খানের ক্ষমতা দখল ও শাসনের বৈশিষ্ট্য (রাজনৈতিক নিপীড়ন, মৌলিক গণতন্ত্র, ধর্মের রাজনৈতিক ব্যবহার)
- গ) আইয়ুব খানের পতন ও ইয়াহিয়া খানের শাসন, এক ইউনিট বিলুপ্তিকরণ, সার্বজনীন ভোটাধিকার, এলএফও (Legal Framework Order)

৬। জাতীয়তাবাদের বিকাশ ও স্বাধিকার আন্দোলন

- ক) সাংস্কৃতিক আগ্রাসনের বিরুদ্ধে প্রতিরোধ ও বাঙালি সংস্কৃতির উজ্জীবন
- খ) শেখ মুজিবুর রহমানের ৬-দফা আন্দোলন
- গ) ৬-দফা আন্দোলনের প্রতিক্রিয়া, গুরুত্ব ও তাৎপর্য

- ঘ) আগরতলা মামলা, ১৯৬৮
- ৭। ১৯৬৯-এর গণঅভ্যুত্থান ও ১১-দফা আন্দোলন
ক) পটভূমি
খ) আন্দোলনের কর্মসূচী, গুরুত্ব ও পরিণতি
- ৮। ১৯৭০ এর নির্বাচন, অসহযোগ আন্দোলন ও বঙ্গবন্ধুর স্বাধীনতা ঘোষণা
ক) নির্বাচনের ফলাফল এবং তা মেনে নিতে কেন্দ্রের অস্বীকৃতি
খ) অসহযোগ আন্দোলন, বঙ্গবন্ধুর ৭ই মার্চের ভাষণ, অপারেশন সার্চলাইট
গ) বঙ্গবন্ধুর স্বাধীনতা ঘোষণা ও শ্রেফতার
- ৯। মুক্তিযুদ্ধ ১৯৭১
ক) গণহত্যা, নারী নির্যাতন, শরণার্থী
খ) বাংলাদেশ সরকার গঠন ও স্বাধীনতার ঘোষণাপত্র
গ) স্বতঃস্ফূর্ত প্রাথমিক প্রতিরোধ ও সংগঠিত প্রতিরোধ (মুক্তিফৌজ, মুক্তিবাহিনী, গেরিলা ও সম্মুখ যুদ্ধ)
ঘ) মুক্তিযুদ্ধে প্রচার মাধ্যম (স্বাধীন বাংলা বেতার কেন্দ্র, বিদেশী প্রচার মাধ্যম ও জনমত গঠন)
ঙ) ছাত্র, নারী ও সাধারণ মানুষের অবদান (গণযুদ্ধ)
চ) মুক্তিযুদ্ধে বৃহৎশক্তি সমূহের ভূমিকা
ছ) দখলদার বাহিনী, শান্তিকমিটি, আলবদর, আলশামস, রাজাকার বাহিনী, রাজনৈতিক দল ও দেশীয় অন্যান্য সহযোগীদের স্বাধীনতার বিরোধী কর্মকান্ড ও বুদ্ধিজীবী হত্যা
জ) পাকিস্তানে বন্দি অবস্থায় বঙ্গবন্ধুর বিচার ও বিশ্বপ্রতিক্রিয়া
ঝ) প্রবাসী বাঙালি ও বিশ্বের বিভিন্ন দেশের নাগরিক সমাজের ভূমিকা
ঞ) মুক্তিযুদ্ধে ভারতের অবদান
ট) যৌথ বাহিনী গঠন ও বিজয়
ঠ) স্বাধীনতা সংগ্রামে বঙ্গবন্ধুর নেতৃত্ব
- ১০। বঙ্গবন্ধু শেখ মুজিবুর রহমানের শাসনকাল, ১৯৭২-১৯৭৫
ক) স্বদেশ প্রত্যাবর্তন
খ) সংবিধান প্রণয়ন
গ) যুদ্ধ বিধ্বস্ত দেশ পুনর্গঠন
ঘ) সপরিবারে বঙ্গবন্ধু হত্যা ও আদর্শিক পটপরিবর্তন

History of the Emergence of Independent Bangladesh

Introduction: Scope and description of the emergence of Independent Bangladesh.

Writing on this topic.

1. **Description of the country and its people.**
 - a. Geographical features and their influence.
 - b. Ethnic composition.
 - c. Language.
 - d. Cultural syncretism and religious tolerance.
 - e. Distinctive identity of Bangladesh in the context of undivided Bangladesh.

2. Proposal for undivided sovereign Bengal and the partition of the Sub Continent, 1947.

- a. Rise of communalism under the colonial rule, Lahore Resolution 1940.
- b. The proposal of Suhrawardi and Sarat Bose for undivided Bengal : consequences
- c. The creation of Pakistan 1947 .

3. Pakistan: Structure of the state and disparity.

- a. Central and provincial structure.
- b. Influence of Military and Civil bureaucracy.
- c. Economic , social and cultural disparity

4. Language Movement and quest for Bengali identity

- a. Misrule by Muslim League and Struggle for democratic politics .
- b. The Language Movement: context and phases .
- c. United front of Haque – Vasani – Suhrawardi: election of 1954, consequences.

5. Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971)

- a. Definition of military rules and its characteristics.
- b. Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy, Islamisation)
- c. Fall of Ayub Khan and Yahia Khan's rule (Abolition of one unit, universal suffrage, the Legal Framework Order)

6. Rise of nationalism and the Movement for self determination .

- a. Resistance against cultural aggression and resurgence of Bengali culture.
- b. Sheikh Mujibur Rahman and the six point movement
- c. Reactions: Importance and significance
- d. The Agortola Case 1968.

7. The mass- upsurge of 1969 and 11 point movement: background,programme and significance.

8. Election of 1970 and the Declaration of Independence by Bangobondhu

- a. Election result and centres refusal to comply
- b. The non co-operation movement, the 7th March , Address , Operation Searchlight
- c. Declaration of Independence by Bangobondhu and his arrest

9. The war of Liberation 1971

- a. Genocide, repression of women, refugees
- b. Formation of Bangladesh government and proclamation of Independence
- c. The spontaneous early resistance and subsequent organized resistance (Mukti Fouz, Mukti Bahini, guerillas and the frontal warfare)

- d. Publicity Campaign in the war of Liberation (Shadhin Bangla Betar Kendra, the Campaigns abroad and formation of public opinion)
- e. Contribution of students, women and the masses (Peoples war)
- f. The role of super powers and the Muslim states in the Liberation war.
- g. The Anti-liberation activities of the occupation army, the Peace Committee, Al-Badar, Al-Shams, Rajakars, pro Pakistan political parties and Pakistani Collaborators , killing of the intellectuals.
- h. Trial of Bangabondhu and reaction of the World Community.
- i. The contribution of India in the Liberation War
- j. Formation of joint command and the Victory
- k. The overall contribution of Bangabondhu in the Independence struggle.

10. The Bangabondhu Regime 1972-1975

- a. Homecoming
- b. Making of the constitution
- c. Reconstruction of the war ravaged country
- d. The murder of Bangabondhu and his family and the ideological turn-around.

সহায়ক গ্রন্থ

১. নীহার রঞ্জন রায়, *বাঙালীর ইতিহাস*, দে' জ পাবলিশিং, কলকাতা ১৪০২ সাল।
২. সালাহ উদ্দিন আহমেদ ও অন্যান্য (সম্পাদিত), *বাংলাদেশের মুক্তি সংগ্রামের ইতিহাস ১৯৪৭-১৯৭১*, আগামী প্রকাশনী, ঢাকা ২০০২।
৩. সিরাজুল ইসলাম (সম্পাদিত), *বাংলাদেশের ইতিহাস ১৭০৪-১৯৭১*, ৩ খন্ড, এশিয়াটিক সোসাইটি অব বাংলাদেশ, ঢাকা ১৯৯২।
৪. ড. হারুন-অর-রশিদ, *বাংলাদেশ: রাজনীতি, সরকার ও শাসনতান্ত্রিক উন্নয়ন ১৭৫৭-২০০০*, নিউ এজ পাবলিকেশন্স, ঢাকা ২০০১।
৫. ড. হারুন-অর-রশিদ, *বাঙালির রাষ্ট্রচিন্তা ও স্বাধীন বাংলাদেশের অভ্যুদয়*, আগামী প্রকাশনী, ঢাকা ২০০৩।
৬. ড. হারুন-অর-রশিদ, *বঙ্গবন্ধুর অসমাপ্ত আত্মজীবনী পুনর্পাঠ*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১৩।
৭. ড. আতফুল হাই শিবলী ও ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের সাংবিধানিক ইতিহাস ১৭৭৩-১৯৭২*, সুবর্ণ প্রকাশন, ঢাকা ২০১৩।
৮. মুনতাসির মামুন ও জয়ন্ত কুমার রায়, *বাংলাদেশের সিভিল সমাজ প্রতিষ্ঠার সংগ্রাম*, অবসর, ঢাকা ২০০৬।
৯. আতিউর রহমান, *অসহযোগ আন্দোলনের দিনগুলি: মুক্তিযুদ্ধের প্রস্তুতি পর্ব*, সাহিত্য প্রকাশ, ঢাকা ১৯৯৮।
১০. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস*, ১৯০৫-৪৭, তাম্রলিপি, ঢাকা ২০১১।
১১. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস*, ১৯৪৭-১৯৭১, সময় প্রকাশন, ঢাকা ২০১২।
১২. সৈয়দ আনোয়ার হোসেন, *বাংলাদেশের স্বাধীনতা যুদ্ধে পরাজয়ের ভূমিকা*, ডানা প্রকাশনী, ঢাকা ১৯৮২।
১৩. আবুল মাল আবদুল মুহিত, *বাংলাদেশ: জাতিরাত্তরের উদ্ভব*, সাহিত্য প্রকাশ, ঢাকা ২০০০।
১৪. শেখ মুজিবুর রহমান, *অসমাপ্ত আত্মজীবনী*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১২।
১৫. সিরাজ উদ্দীন আহমেদ, *একাত্তরের মুক্তিযুদ্ধ: স্বাধীন বাংলাদেশের অভ্যুদয়*, ইসলামিক ফাউন্ডেশন, ঢাকা ২০১১।
১৬. জয়ন্ত কুমার রায়, *বাংলাদেশের রাজনৈতিক ইতিহাস*, সুবর্ণ প্রকাশন, ঢাকা ২০১০।
17. Harun-or-Roshid, *The Foreshadowing of Bangladesh: Bengal Muslim League and Muslim Politics, 1906-1947*, The University Press Limited, Dhaka 2012.
18. Rounaq Jahan, *Pakistan: Failure in National Integration*, The University Press Limited, Dhaka 1977.

১৯. Talukder Maniruzzaman, *Radical Politics and the Emergence of Bangladesh*, Mowla, Brothers, Dhaka 2003.
২০. মেসবাহ কামাল ও ঈশানী চক্রবর্তী, *নাচালের কৃষক বিদ্রোহ, সমকালীন রাজনীতি ও ইলা মিত্র*, উত্তরণ, ঢাকা ২০০৮।
২১. মেসবাহ কামাল, *আসাদ ও উনসত্তরের গণঅভ্যুত্থান, বিবর্তন*, ঢাকা ১৯৮৬।

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 114701 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Fisheries Biology and Biotechnology | | | |

1. Introduction, importance and opportunities of Fisheries Biology
2. Evolutionary history of fishes and other marine chordates
3. Fish & Shell- fish Morphology
4. Classification of fish & shell-fish
5. Ecological classification, adaptation, influence of environment and Geographical distribution of fishes
6. Organ systems of fish
 - 6.1 The digestive system: divisions of digestive tract, gas (swim) bladder, Webberain apparatus
 - 6.2 The Urogenital organs: Kidney, Gonads, Cloaca, Genital organs, Secondary sex-characters
 - 6.3 Circulatory system: Blood, Structure and function of the blood vessels, Blood vessels system
 - 6.4 Respiratory system: Gills, Accessory respiratory organs, Gas-exchange method
 - 6.5 Nervous system: Central and peripheral nervous system, cranial and bronchial nerves, sensory organs
7. Osmoregulation: Concepts, types, process & endocrine control of osmoregulation
8. Migration of Fishes: Causes, factors, types & significance, tags & tagging experiments for fish migration.
9. Fish Food & Food Chain: Marine plankton (types, distribution & abundance), food chain, energy re-cycling, fish-plankton relationship.
10. Fish Population Dynamics: Concepts, significance and population dynamics of fish.
11. Definitions; traditional and modern biotechnology, multidisciplinary nature of biotechnology. Applications of genetic engineering and biotechnology, Scope of biotechnology in developing countries
12. Agricultural biotechnology, applications; scope and opportunities of agricultural biotechnology in Bangladesh
13. Applications of biotechnology in the environment
14. Bioremediation of water, soil; waste disposal
15. Fish biotechnology, Improvement of culturable fish species

16. History and scope of animal and plant cell/tissue culture
17. Basics of rDNA technology; scope and applications
18. Gene cloning—concept and basic steps

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|---------------------|----------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 114703 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Coastal Aquaculture | | | |

- 1. Principles of Aquaculture:**
 - 1.1 Introduction to Aquaculture
 - 1.2 Objectives of Aquaculture
 - 1.3 History of aquaculture with special reference to Bangladesh
 - 1.4 Present status of aquaculture in Bangladesh
 - 1.5 Role of aquaculture in fishery development
 - 1.6 Different kinds of aquaculture systems
 - 1.7 Levels of aquaculture industry
 - 1.8 Food production through aquaculture
- 2. Site Selection:**
 - 2.1 Selection of sites for different types of aquaculture
 - 2.2 Basic principles for suitable farms
 - 2.3 Biofouling in aquaculture
 - 2.4 Impacts of pollutants on aquafarms
 - 2.5 Impacts of aquaculture development on the environment
- 3. Species Selection:**
 - 3.1 Desirable characteristics of aquaculture organisms
 - 3.2 Commonly cultivable species; fishes, crustaceans, molluscs and seaweeds
 - 3.3 Bio-logical features of commonly cultured, crustaceans and molluscs
 - 3.4 Criteria for the selection of species
 - 3.5 Indigenous vs exotic species
 - 3.6 Genetic selection for cultured species
- 4. Seed Production:**
 - 4.1 Wild seed collection, sorting, preservation, transportation of natural seed of fin-fish & shell fish, Hatchery seed
 - 4.1.1 Site selection, design, construction of fin-fish & shell fish hatchery
 - 4.1.2 Hatchery techniques - Induced breeding & hormone treatment, hypophysation, fertilization, incubation & hatching, larval & post-larval rearing, packing of PL & transportation, effluent management (ETP)
 - 4.1.3 Culture of larval food
 - 4.1.4 Economics
- 5. Pond Preparation and Management:** Pond preparation, fertilization & stocking, operation and management, control of predator and weed fishes, control of aquatic vegetation, harvesting, management, economics of different types of pond culture
- 6. Culture methods of commercially important marine fish & shell-fish**
- 7. Aquaculture Planning:** Major aspects, required basic data, EIA & SIA
- 8. Aquaculture Extension:** objectives, tools, methods, strategies, motivational tools, awareness program & extension farm

9. **Aquaculture Economics:** Concepts, significance, importance, cost management, economic return & economic appraisal evaluation
10. **Genetic Engineering:** Concepts, principles, importance, HYV, genetic selection, gene bank & significance of mono sex culture

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 114705 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Seamanship & Maritime Communication | | | |

Seamanship

1. Meaning of common nautical terms
2. Names and functions of various parts of the ship
3. Markings on a hand lead line, taking a cast of the lead and reporting the sounding obtained
4. Various parts of anchor & cables, marking on them and operations
5. Ropes & wires, their types, constructions and care in uses
6. Knots, hitches & bends in common use: reef not, rolling hitch, timber hitch, figure of eight, clove hitch, wall and crown, Bowline and bowline on the bight, sheet bend (double and single), Sheepshank, Round turn and two half hitches, Marline spike hitch.
7. Splicing plaited and multi-strand manila and synthetic fibre rope, eye splice, short splice and back splice, Splicing wire rope.
8. Slinging a stage, rigging a bosun's chair & pilot ladder

Signals

Morse Code:

1. Identification of the morse symbols for the alphabet and numerals - send and receive flashing at 6 w.p.m.
2. Ability to read and send plain language messages in morse using correct procedure at 6 w.p.m.
3. Ability to read and send 15×5 character morse blocks of mixed letters and numbers at 6 w.p.m.
4. To identify the parts of a flashing messages
5. The procedure by flashing for two ships exchanging identities when names are unknown
6. Practical use of the "Erase Sign", "Repeat Signal", "Waiting Signal or Period Signal etc
7. The meaning of the groups "YU" "YZ" "YV".

Sound Signals: General understanding of single letter meaning when made by these method i.e. by siren, whistle

Code Flags:

1. Recognize and describe all international code flags and understand their single letter meanings
2. Use of substitute flags, answer pendant

3. Procedure when:
Calling using international code flags, Flag signal can be seen but not understood, Using "Affirmative" "Negative" "Interogative", A flag signal is completed
4. Demonstration of how to spell when using flags
5. Ceremonials - How to pay mark of respect to warships by merchant ships and other vessels.

Signals for Distress and Emergency:

1. Abandon, Accident, Doctor, Injured/sick
2. Communications, Search-assistance
3. Distress, Position of distress, Sinking, Rescue
4. Damages-repairs, Underwater operations, Fire, Explosion, Leakage, Towing
5. Aids to Navigation, dangers to Navigation, Navigating and Steering instructions

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| Paper Code | 114707 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | General Zoology Paper-I | | | |

Non-chordata:

1. Broad classification of non-chordate phyla up to orders with special reference to local forms, their affinities and economic importance
2. **Type study:**
 - 2.1 Arthropoda- Prawn
 - 2.2 Mollusca- Sepia
 - 2.3 Echinodermata- Sea star
3. **Special study:** Coral reefs and reef formation

Cordata:

1. Broad classification up to orders with special reference to local forms, their affinities and economic importance.
2. **Type study:**
 - 2.1 Chondrichthyes- Dog fish
 - 2.2 Osteichthyes- Jew fish
 - 2.3 Reptilia- Sea turtle
 - 2.4 Mammalia- Dolphin
3. **Special study:**
 - 3.1 Scales and fins in fishes.
 - 3.2 Sea Snakes of Bangladesh
 - 3.3 Sea Birds of Bangladesh
 - 3.4 Aquatic adaptation in mammals

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|---------------------|-----------------------|-------------------|-------------------|----------------------------|
| Paper Code | 114709 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Botany Paper-I | | | |

A. Microbiology

Marks: 40

1. Introduction, contribution of eminent scientists in the field Microbiology.
2. Introduction, characteristics and reproduction of Prions, Viroids, Rickettsia and Mycoplasma.
3. Viruses: Definition, biological nature, physical and chemical structure, multiplication, transmission and economic importance.
4. Bacteria: Introduction, classification, structure, multiplication and economic importance.

B. Phycology

Marks: 20

1. Habit and habitats, classification, general structures, reproduction and economic importance of Algae.
2. Salient feature of Cyanophyceae, Chlorophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae.
3. Life histories of *Anabaena*, *Oedogonium*, *Vaucheria*, *Sargassum* and *Polysiphonia*.

C. Mycology

Marks: 20

1. Introduction, general characteristics, classification, structure and economic importance of Fungi.
2. Life histories of *Synchytrium*, *Pythium*, *Saccharomyces*, *Penicillium*, *Puccinia*, *Agaricus* and *Fusarium*.
3. Lichens: Habit and habitats, classification, structure and importance.

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| Paper Code | 114711 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Biochemistry Paper-I | | | |

Physical Chemistry:

1. **Structure of atoms:** Fundamental particles. Rutherford's and Bohr's Atom Model, Concept of Quantum Numbers, Pauli exclusion principle, Hund's rule, electronic structure of atoms
2. **Elementary treatment of chemical bonds:** Ionic Bond, Covalent Bond, Coordination Bonds, Hydrogen Bond and metallic bond, polarity of covalent molecules
3. **The Behaviour of gases:** Gas laws, kinetic theory of gases, Avogadro's law, Graham's law, Dalton's law of partial pressure, behaviour of real gases, Vander Waal's modifications
4. **Thermodynamics:** 1st Law of thermodynamics, enthalpy, heat capacity, isothermal adiabatic expansion of ideal gas, thermochemistry, 2nd law of thermodynamics
5. **Chemical equilibrium:** Laws of mass action, partition coefficient, equilibrium constant, determination of equilibrium constant
6. **Acids, bases and buffers:** Concepts of acids, bases, P^H and buffer solution, mechanism of buffer action, dissociation of water, weak acid and buffer solution
7. **Salinity & metallic salts:** NaCl, KCl, $MgCl_2$ etc
8. **Chemical kinetics:** First and second order reactions and their simple treatment determination of order of reaction, Simple Theories of Reaction Rate, Catalysis (Elementary Treatment)

B. Organic Chemistry:

1. **Aliphatic:** Nomenclature, preparation, characteristic reactions and biological occurrence of each class Saturated and unsaturated hydrocarbons, Monohydric alcohol's, glycerol's, Aldehydes and ketones, Monocarboxylic and dicarboxylic acids and amines
2. **Aromatic:** Nomenclature, preparation, characteristic reactions and biological occurrence of aromatic hydrocarbons, phenols, amines, diazonium salts, aldehydes and ketones
3. **Heterocyclic compounds:** Furan, pyrrole, thiophene and pyridine, their preparation and properties

2nd Year

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|----------------------|-----------------------------|-------------|----------------------|
| Course Code : 131001 | Marks : 100 | Credits : 4 | Class Hours : 60hrs. |
| Course Title : | বাংলা জাতীয় ভাষা (আবশ্যিক) | | |

ক : সাহিত্য

নম্বর-৭৫

১) নির্বাচিত কবিতা

নম্বর-২৫

- ক) মাইকেল মধুসূদন দত্ত : আত্ম-বিলাপ
খ) রবীন্দ্রনাথ ঠাকুর : ঐকতান
গ) কাজী নজরুল ইসলাম : চৈতী হাওয়া
ঘ) জীবনানন্দ দাশ : বনলতা সেন
ঙ) ফররুখ আহমদ : ডাহুক
চ) শামসুর রাহমান : বার বার ফিরে আসে
ছ) আল মাহমুদ : সোনালী কাবিন: ৫

২) নির্বাচিত প্রবন্ধ

নম্বর-২৫

- ক) বঙ্কিমচন্দ্র চট্টোপাধ্যায় : বাঙ্গালা ভাষা
খ) হরপ্রসাদ শাস্ত্রী : তৈল
গ) রবীন্দ্রনাথ ঠাকুর : সভ্যতার সংকট
ঘ) প্রমথ চৌধুরী : যৌবনে দাও রাজটিকা
ঙ) কাজী আবদুল ওদুদ : বাংলার জাগরণ
চ) কাজী নজরুল ইসলাম : রাজবন্দীর জবানবন্দী
ছ) মোতাহের হোসেন চৌধুরী : সংস্কৃতি-কথা

৩) নির্বাচিত গল্প

নম্বর-২৫

- ক) রবীন্দ্রনাথ ঠাকুর : একরাত্রি
খ) বিভূতিভূষণ বন্দ্যোপাধ্যায় : পুঁই মাচা
গ) আবুল মনসুর আহমদ : ছুর কেবলা
ঘ) মানিক বন্দ্যোপাধ্যায় : প্রাগৈতিহাসিক
ঙ) সৈয়দ ওয়ালীউল্লাহ : নয়নচারা
চ) শামসুদ্দীন আবুল কালাম : পথ জানা নাই
ছ) হাসান আজিজুল হক : আত্মজা ও একটি করবী গাছ

খ : ভাষা শিক্ষা

নম্বর-২৫

- ১। পত্র রচনা : ব্যক্তিগতপত্র, দাফতরিকপত্র, ব্যবসায়-সংক্রান্তপত্র, আবেদনপত্র ও মানপত্র
২। গদ্যরীতি : সাধু, চলিত ও আঞ্চলিক
৩। প্রমিত বাংলা বানানের নিয়ম (বাংলা একাডেমি, ঢাকা)
৪। অনুবাদ : ইংরেজি থেকে বাংলা
৫। সারসংক্ষেপ।

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|---------------------|--|-------------------|-------------------|----------------------------|
| Course Code | 121103 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Course Title | English (Compulsory Alternative) | | | |

Group –A: Poetry (Norton Anthology of English Literature Vol. I and II)

Piece to be read:

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|-----------------------|--|
| 1. John Milton | : ‘When I consider How My Light Is Spent’ |
| 2. Thomas Gray | : ‘Elegy Written in a Country Churchyard’ |
| 3. William Blake | : ‘The Chimney Sweeper’(Songs of Experience) |
| 4. William Wordsworth | : ‘I Wander Lonely as a Cloud’ |
| 5. P.B. Shelly | : ‘Mutability’ |
| 6. John Keats | : ‘Ode to Autumn’ |
| 7. Tennyson | : ‘Ulysses’ |
| 8. A.E. Housman | : ‘When I was One and Twenty’ |
| 9. Emily Dickinson | : ‘Because I Could not Stop for Death’ |
| 10. Robert Frost | : ‘Stopping by Woods on a Snowy Evening’ |

Group –B: Drama

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| 1. William Shakespeare | : <i>Twelfth Night/ As You Like It</i> |
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Group –C: Novel

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| 1. Earnest Hemmingway | : <i>The Old Man and the Sea</i> |
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| Paper Code | 124701 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Oceanography | | | |

PHYSICAL OCEANOGRAPHY

1. History of Oceanography
2. Physical properties of sea water
 - 2.1 Pressure and depth, units, accuracy and precision
 - 2.2 Density, potential density and neutral density, TS diagram
3. Concept & Distribution of temperature, salinity, conductivity, pressure etc. in ocean
4. Sound and light in sea water: Propagation, attenuation, extinction, color of sea
5. Ocean Wave
 - 5.1 Wave parameters
 - 5.2 Classification of waves
6. Ocean circulation
 - 6.1 Wind driven surface circulation: Coriolis force, Ekman's spiral, major ocean currents
 - 6.2 Vertical circulation: Upwelling and sinking

7. Astronomical Tides
 - 7.1 Causes of tide: centrifugal force and gravitational attraction, tidal potential
 - 7.2 Types of tide

CHEMICAL OCEANOGRAPHY

1. Major, minor and trace elements in sea water and their biological roles
2. Composition of sea water
 - 2.1 Constancy of composition
 - 2.2 Factors influencing composition of sea water
 - 2.3 Preparation of artificial sea water
3. Chemistry of air-sea interface
4. Nutrients in the sea
 - 4.1 Nitrogen and
 - 4.2 Phosphorous cycle
5. Dissolved gasses in sea water
6. The oxidation-reduction potential of seawater. (pH, Eh, etc.)
7. Resources of hydrocarbon in the Bay of Bengal and its commercial utilization for Bangladesh.

FISHERIES OCEANOGRAPHY

1. Effects of major environmental factors on fish life history
2. Planning, strategy and operation for Commercial Fishing
3. Climate change, Green house gases and its effects in the Bay of Bengal
4. Ocean colour & phytoplankton pigment
5. Application of remote sensing in marine fisheries
6. Resource conservation & management effort
7. Sea Surface Temperature

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|---------------------|-------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 124703 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | General Ship Knowledge | | | |

SHIP CONSTRUCTION

1. Lloyds Dimention
2. Sections used in ship building
3. Connections
4. Riveting
5. Electric arc welding
6. General types of ships
7. Stresses and strains in ship
8. Keels
9. Cellular double bottom
10. Frames

11. Beams
12. Water tight bulk heads
13. Shell and deck plating

SHIP STABILITY

1. Forces and moments
2. Centroids and the center of gravity
3. Density and specific gravity
4. Laws of floatation
5. Effect of density on draft and displacement
6. Final KG
7. Angle of loll

CARGO WORK

1. Basic concepts of cargo work, common cargos, cargo plan, care of cargo
2. Lifting gear, unit loads and containers
3. Refrigerated and deck cargos
4. The deck Labour Regulations

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 124705 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Fishing Gear And Commercial Fishery | | | |

1. **Fishing Gear and Materials:** Introduction, Classification, materials used in making fishing gears, materials used in Nets & Ropes; Properties of fibres, construction-thickness-properties of net twine, fishing line & Ropes, Floats, Sinkers & Accessories properties of floats; types-classifications- uses of floats. Preservation and maintenance of net making materials, trawl nets. Otter boards and other fishing gears. Bait. Types of baits. Netting Materials, Types of net. Mesh size. Properties of net. Configurations of net, fishing gear. Manufacturing- lacing-joining-cutting-mending of nets
2. **Designing of fishing gear:** Otter boards-type, uses, Principle, designing, mathematical calculation. Designing of Trawl net, taking of trawl net-Head rope-Ground rope-fish bag-trawling wire rope- sweep line- haul- up line-dog chain-wire ropes & cables
3. **Fishing Methods & Fishing Grounds:** Definition of fishing method, elements of fishing method, methods of fish detecting-fish concentrating-attracting-hunting-Intercepting; Classification of Fishing, Method in the light of harvesting
4. **Commercial Fishing Methods:** In the world in the light of Gear Choice—Towed Gear Fishing Methods-Bottom otter trawling-stern, trawling-beam, trawling-mid-water, trawling. Preparation -operation- shooting-hauling of

otter trawling. Safety precaution during trawl fishing. Advantage and Disadvantage of stern trawling and beam trawling or side trawling. Knowledge of Encircling Gear and Static Gear Fishing Methods such as—Purse seine. Gillnets, Set nets, Traps. Long lining. Pots. Location and size of important commercial fishing grounds in the Bay 'of Bengal: Major Fishing Grounds of the world

5. **Fish Finder** - types according to fishing method, operation and uses

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|---------------------|---------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 124707 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | General Zoology Paper-II | | | |

1 Cytology:

1.1 Defination

1.2 Ultra-structures of cell; chromosomes; DNA & RNA; cell divisions; gametogenesis; morphology of sperm and ovum

2 Genetics:

2.1 Definition of genetics

2.2 Mendel's laws of heredity; incomplete dominance; interaction of genes; epistasis

2.3 Linkage and crossing over

2.4 Mutation

2.5 Sex determination

3 Evolution:

3.1 Theories of organic evolution

3.2 Evidences of evolution

3.3 Geological time-table

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|---------------------|------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 124709 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Botany Paper-II | | | |

Biodiversity and Conservation

20

1. Definition and elements of biodiversity; causes and loses of biodiversity; rare, vulnerable, threatened and endangered species of Bangladesh.
2. Definition and types of conservation, principles of conservation, advantages and disadvantages of *in situ* and *ex-situ* conservation; conservation in botanic gardens and seed banks; role and activity of IUCN, WWF and CITES.

Ecology

40

1. Definition and scope of ecology, climatic, topographic and biotic factors.

2. Salient features of hydrophytes, xerophytes and halophytes.
3. Plant succession: Causes and types, hydrosere, xerosere.
4. Structure and function of ecosystems (Sundarban forest).
5. Food chain, food web and ecological pyramids.
6. Phytogeographical regions of Bangladesh.

Environmental Science

20

1. Definition and components of the environment.
2. Pollution: Air, water and sound pollution, causes and effects of pollution on plants and animals and their remedies.
3. Green house effect: Sources and effects of green house gases, ozone layer depletions.
4. Population growth and its impact on nature.

Cytology

20

1. Introduction, definition and scope of Cytology, concept of prokaryotic and eukaryotic cells.
2. Ultra structure of eukaryotic cell; detailed structure and function of cell organelles (chloroplast, mitochondria, ribosome, endoplasmic reticulum and nucleus).
3. Physical and chemical structure of chromosome.
4. Meiotic cell division and its significance.

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|---------------------|------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 124711 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Biochemistry Paper-II | | | |

A. Bio-Molecules:

1. **Chemistry of Carbohydrates:** Definition, classification, structure, nomenclature, optical properties, general reactions, mono, oligo and polysaccharides (starch, cellulose, galactose and insulin), amino sugars, biological importance and characteristic, identification reactions of carbohydrates
2. **Chemistry of Proteins and Amino Acids:** Definition, classification and nomenclature of amino acids, structure, general reactions, biological importance, ionization states of amino acids, acid base behavior of amino acids, buffering action, isolation procedure of amino acids from their mixtures, characteristic and identification reactions, peptide and their chemical synthesis, peptides of biological interest. Classification and structure of proteins, primary and secondary structure, alpha-helix & beta-pleated sheets, isolation,

separation and purification of proteins, identification of N-terminal and C-terminal residues of proteins

3. **Chemistry of lipids:** Definition, classification, chemical composition and importances of lipids, fats and oils, fatty acids, their classification, structure and nomenclature, biological importance, general reactions, chemical constants of fats such as iodine number, rm value, saponification number, acetyl number and acid value with importance; waxes, phospholipids with special reference to biological importance
4. **Nucleic Acid:** Introduction, historical resume, definition, types, three components, phosphoric acid, pentose sugar, nitrogenous bases. nucleosides, nucleotides, Deoxyribonucleic Acid (DNA), Ribonucleic Acid (RNA)
5. **Vitamins and Minerals:** Fat soluble vitamins: A, D, E, K, biological functions, deficiency symptoms, dietary sources
 - 5.1 Water soluble vitamins: B-complex, vitamin C, biological functions, deficiency symptoms, dietary sources
 - 5.2 Minerals: Fe^{2+} , Ca^{2+} , P, Zn^{2+} , Mg^{2+} , and I_2 and their biological functions.
6. **Endocrinology:** Characteristic of hormones, classification, general mode of action, synthesis, secretion and biological functions.

B. Metabolism:

1. **Enzymes:** Definition, biochemical nature, classification, factors affecting enzyme action, enzyme kinetics, importance of enzymes in biological system
2. Digestion and Digestive Enzymes, structure and coenzyme activities of B-vitamins
3. **Metabolism:** General aspects of metabolism and method of study, bioenergetics, principles and ATP Cycle, catabolic pathways of carbohydrates, glycolysis, tricarboxylic acid cycle, electron transport chain, pentose phosphate pathway, biosynthesis of carbohydrates in plants and animals; synthesis of glucose by photosynthesis, synthesis of glucose from fat in germinating seeds by gluconeogenic pathway

Third Year

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|---------------------|-----------------------------|-------------------|-------------------|----------------------------|
| Course Code | 121101 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Course Title | English (Compulsory) | | | |

Aims and objective of this course: To develop students' English language skills, to enable them to benefit personally and professionally. The four skills- listening, speaking, reading and writing will be integrated to encourage better language use.

1. Reading and understanding 5x4=20
Students will be expected to read passages so that they might come across in their everyday life, such as newspapers, magazines, general books etc. Simple stories will also be included to give students a familiarity with different uses of the language.

[N.B. 5 Questions are to be answered. Each question will carry 4 marks. There may be division in each question]

- a) Understanding different purposes and types of readings
- b) Guessing word- meaning in context.
- c) Understanding long sentences
- d) Recognizing main idea and supporting ideas
- e) Answering comprehension questions
- f) Writing summaries

2. Writing
- a) Writing correct sentences, completing sentences and combining sentences. 05
 - b) Situational Writing: Posters, notices, slogans, memos, advertisements etc. 04
 - c) Paragraph Writing :Structure of a paragraph; to topic sentence; developing ideas; writing a conclusion; types of paragraphs (narrative, descriptive, expository, persuasive); techniques of paragraph development (such as listing, cause and effect, comparison and contrast) 08

Or,

- d) Newspaper writing: Reports. Press realize, dialogue etc
 - e) Writing resume
- Or,
- f) Writing letters : Formal and Informal letters, letters to the editor, request letter, job applications, complaint letter etc.
 - g) Essay : Generating ideas; outlining, Writing a Thesis sentence; writing the essay: writing introduction, developing ideas, writing conclusion, revising and editing. 15

3. Grammar

25

- a) Word order of sentences.
- b) Framing questions.
- c) Tenses, articles, subject –verb agreement, noun-pronoun agreement, verbs, phrasal verbs, conditionals, prepositions and prepositional phrases, infinitives, participles; gerunds.
(Knowledge of grammar will be test through contextualized, passages).
- d) Punctuation

4. Developing Vocabulary: Using the dictionary, suffixes, prefixes, synonyms, antonyms, changing word forms (from verb to noun etc.) and using them in sentences. 10

5. Translation from Bengali to English. 1x5=5

6. Speaking Skills: Speaking skill should be integrated with writing and reading in classroom activities.

The English sound system; pronunciation skills; the IPA system; problem sounds; vowels; consonant and diphthongs; lexical and syntactic stress.

(Writing dialogue and practice it orally students can develop their speaking skill. Dialogue writing can be an item in writing test.

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 134701 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Fish Processing & Engineering | | | |

- 1. Chemistry of fish body, properties & construction of fish muscle
- 2. Keys of good handling practice, handling techniques of wet & processed fish
- 3. Fish stowage
- 4. Fish & shell-fish preparation for different processing methods
- 5. Aims & objectives of fish & shell-fish processing & preservation
- 6. Different fish & shell-fish processing methods Chilling, Freezing, Salting, Drying, Smoking, Canning, Fermentation, Irradiation
- 7. Meaning and types of Fishery by products, methods of commercial production of fish meal, fish liver oil, shark fin,
- 8. Value added products development, methods of commercial production of fish surimi, fish ball
- 9. Concept and methods of fish marketing, marketing channel of raw and frozen products
- 10. Principles & functions of ice plant, canning machine, IQF plant, freezing unit, smoking & drying chamber
- 11. Principles, properties & functions of refrigerant
- 12. Transportation of live fish/crab, wet fish and finished products

13. Modern packing methods
14. Operation & management of cold store

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 134703 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Quality Control & HACCP Management | | | |

1. Basic concept on quality control, factors that affects the quality of fish & shell-fish
2. Freshness criteria of wet fish, fish quality evaluating methods
3. Concepts on quality deterioration of raw & processed products, their symptoms & control measures
4. Morphology of bacteria
5. Microbial population study, standard plate count, media preparation
6. Inspection of *Salmonella* and *Escherichia coli*
7. Control methods of micro organisms
8. Microbiology of fish spoilage & control measures
9. Food born disease
10. Meaning, history, principles, scope, objectives and importance
11. Application of HACCP in fish processing plant.
12. Importance and types of inspection, HACCP based inspection of frozen products
13. Hygienic design of fish processing plant, equipment, utensils
14. Personnel hygiene
15. Meaning and methods of sterilization and disinfectant

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 134705 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Port, Harbour & HR Management | | | |

- 1. Introduction to the Business of Ports:** Development of ports; The development of port organizations; Internal organizations within ports; Port labor; Specialist organizations which work within ports; Road, rail transport and inland waterways; The ship interface; Key issues facing the future of ports, including:
 - i) Competition, ii) Asylum Act regulations, iii) Skills shortages.
- 2. Introduction to Port Management:** Introduction to ports and port development; Owners and landlords vs. operators; Types of ports; Operating models; Ports vs. terminals; Vessels, cargoes and terminal types; Varying interests in the port vs. terminal business and the customers; Management structures, ports personnel, roles and functions; Key stakeholders in ports; Government agencies; Port users and their agents; Local community; Port and terminal operations; Port ownership and administration; Port and cargo movement; Competition and other challenges facing the industry.

- 3. Management of People in the Ports Industry:** Planning, allocating and evaluating work carried out by teams, individuals and yourself: i) Setting objectives and planning; ii) Controlling work; iii) Reviewing performance. Developing teams to improve relationships; Maintaining and enhancing performance; Recruitment and selection.
- 4. Effective Communication Skills:** Why effective communication is important; The basic skills; Reviewing your skills; Uses of communication; Keeping records; Negotiation: i) why it is important, ii) how to prepare, iii) conducting negotiations, iv) follow-up.
- 5. Customer Focus:** The importance of customer focus; Identifying who the customer is; Understanding customer needs from the customer's point of view; Meeting customer needs; The importance of added value; Customer focus as a team effort; Establishing performance standards in customer focus; Converting complaints into opportunities; Customer focus as a way of life not a process; Creating the culture of our customer rather than the customer; The importance of customer focus to the viability of the business
- 6. Finance, Accounting and Budgeting:** Financing in ports; Understanding management accounts -profit and loss account and balance sheet; Budgeting, budgetary control and forecasting; Working capital control and cash flow; Capital project appraisals (NPV, IRR); Key performance indicators; Accounting, internal control and audit
- 7. Health and Safety:** Health and Safety legislation; the health and safety policy; Health and safety roles; Senior management; Safety Manager; Middle management; Supervisors and operatives; Safety representatives; Safety inspections and audits; Risk management; Safety cultures; Accident investigation; Accident reports, records and analysis
- 8. Environmental Issues:** Activities, effects and issues; Environmental legislation; Commitment and compliance; Policy formulation; Environmental Management systems; Environmental review; Objectives, targets and indicators; Monitoring; Risk assessment and Environmental assessment; Audit and review.
- 9. Strategic Analysis:** The strategic cycle; Internal and external factors; Generic strategies; Frameworks for analysis and choice; Strategic options; Strategy implementation; Contemporary issues in ports.
- 10. Port Security and Emergency Response:** Defining a port for the purpose of guidance and regulations on security; Considering the stakeholders in port security; Key considerations with regard to security; The new International Mandatory Requirements proposed for port security; Defining the Designated Authority for port security; Assessment of vulnerability and the level of risk to a port facility; Preparing a security action plan and emergency response; Security officer and the security team; The importance of intelligence and exchanging information; Training of staff.
- 11. Human Resources Management (HRM):** HR strategy and planning; recruitment and selection; the psychological contract; human resource development / learning and development; performance management; leadership; motivation; organizational change; technology and HRM; flexibility; work-life balance and family-friendly policies; pay and

reward; partnership, employee involvement, high performance work practices; discipline and grievance procedures; dismissals and redundancies; diversity and equal opportunities; international and comparative aspects of HRM, HRM in multinationals; HRM in Asia (Bangladesh, Singapore), North America (USA, Canada) & EU (UK, Germany).

12. Case Study: i) Managing Marine Operations in Port; ii) Managing Cargo Operations in Port; iii) Managing Customs Procedure in Port; iv) Current Issues in Port Management. The case study employs learning from throughout the programme to topical and relevant industry issues that impact on management decisions in ports. It will enable you to integrate your learning from the various topics covered in the course as well as enable you to write a detailed and well-structured written business report.

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| Paper Code | 134707 | Maks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Lab work, Industrial attachment & Independent Research | | | |

A. Fish Biology:

1. Morphological Study: Fish, shell-fish & marine algae
2. Fish Anatomy: Digestive system, reproductive system & blood circulation
3. Fish Food: Natural food & artificial food, formulation of artificial food
4. Museum Specimen: Study & fish-diversity research

B. Environmental Assessment:

1. Analysis: Oceanographic data, fisheries forecasting system
2. Model Preparation: Different shore, sea bed & shell calendar
3. Collection, Processing & Analysis: Fishing data, MSY determination
4. Plankton Study: Identification, lab culture, preparation of permanent slide

C. Post Harvest Technology & Quality Control:

1. Preparation of fish & shrimp for chilling, freezing, canning, drying & smoking
2. Techniques of fish filleting
3. Production of fishery by products- fish finger, shark fin, fish glue, chitin etc
4. Sorting & grading of shrimp
5. Freshness test
6. Standard plate count & method of gram staining
7. Planning, implementation & management for HACCP in a processing plant
8. Detection of pathogenic bacteria
9. Estimation of moisture & essential minerals of fish & shrimp

INDUSTRIAL ATTACHMENT/SEA TRAINING

1. Training on fish/shrimp processing, preservation and quality assurance technique
2. Training in a shrimp/fish hatchery on hatching technology
3. Training on aquaculture technology of fish and shrimp

INDEPENDENT RESEARCH/ DISSERTATION

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 134709 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Information and Communication Technology (ICT) | | | |

1. Introduction
 - 1.1 Introduction to computer hardware, software, types, capabilities
 - 1.2 Application of computers
2. Computing
 - 2.1 System software: definition, Operating Systems and system utilities, components of OS, shell, UI, essential file and printing services
 - 2.2 Application software
 - 2.2.1 Definition, major types
 - 2.2.2 Case types: Word processing, Worksheet management, Database management, Presentation graphics, Image/photo editing, Statistical package, Internet clients (mail, web, telnet, ftp)
 - 2.2.3 Other major types: Multimedia, Games and entertainment, reference, CAD/CAM, GIS, Networking and Communication Social, ethical issues in computing: crime, virus, legal issues, privacy, concept of intellectual property and software piracy, misuse, loss and/or generation of employment, etc.
3. E-commerce
 - 3.1 Introduction to Internet programming
 - 3.2 E-Commerce Revolution
 - 3.3 E - Commerce System Models and Concepts
 - 3.4 E-Commerce Application
4. ICT
 - 4.1 The Internet: Technology, concepts and application
 - 4.2 Data Layer Development
 - 4.3 Web Application Design pattern
 - 4.4 The E-commerce Security Environment, Security Model. Network-level Security
 - 4.5 Net and Web services

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 134711 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Safety, Environmental Protection & Leadership | | | |

Introduction, Safety and Survival

1. Safety guidance, Principles of survival at sea.
2. Definitions, Survival craft and appliance.
3. SOLAS training manual, Safety symbols.

Emergency situation

1. Types of emergencies, Precautions, Fire prevention.
2. Foundering, Crew expertise and initial familiarization.
3. Muster list and emergency signals, Crew and emergency instructions.
4. Extra equipment and survival, abandoning ship-complications.

Evacuation

1. Abandoning ship-last resort, Personal preparation for abandoning ship.
2. Need to prevent panic, Crew duties to passengers.
3. Crew duties for launching survival craft.
4. Master's order to abandon the ship, Means of survival.

Survival craft and Rescue boats

1. Life boats, Life rafts, Rescue boats.

Personal Life saving appliances

1. Life buoys, Life Jackets, Immersion suits, Thermal protective aid.
2. Boarding survival craft and demonstrations.

Survival at sea

1. Dangers to survivors, Best use of survival craft facilities.

Emergency Radio equipment

1. Portable radio apparatus for survival craft, EPIRBs, SARTs. Introduction, concept & application of Fire triangle to fire and explosion. Types & source of ignition, Flammable materials commonly found on board, Need for constant vigilance, Fire hazards.
2. Organization of shipboard fire-fighting, Location of fire-fighting appliances and emergency escape routes, Fire spread in different parts of a ship.
3. Fire and smoke detection measures on ship and automatic alarm system, Classification of fire and applicable extinguishing agents.
4. Selection of fire-fighting appliances and equipment, fire hoses and nozzles, Mobile apparatus, Portable fire extinguishers, Fireman's outfit, Fire blankets, Fire alarms and first action.

5. Fire fighting, Fire fighting mediums, Fire fighting procedures, Small fires and Extensive fires.
6. Precautions for & use of fixed installations: General, CO2 and Foam system, Sprinklers, Pressure spray system.

Personal Safety, Social Responsibilities and Environmental Protection

1. Introduction, Ship familiarization, Nature of shipboard hazards, Equipment for counter the hazards, List of hazards, Hot work, Engine room watch keeping.
2. Team building, Team work, Pollution, Effect of pollution on marine environment, International measures for pollution prevention.
3. Fundamentals of communications, Methods of communication, Barriers in communication, Effective transmission skills, Effective listening skills, Effects of wrong communication.
4. Rights and obligation of crew employment conditions, Health and Hygiene on board, Explanation of Emergency, Drills and Muster, Value and need of drill and training, Internal communication.
5. Loading and unloading of cargo, Mooring and unmooring, Enclosed spaces, working aloft.
6. Galley, Pantry, Fridge room, Drugs and alcohol, Periodical demonstration for preventing environmental pollution on board and sea.

Leadership

1. Leadership.
2. Leadership VS Management.
3. Achieving Executive Balance: Nine Ways Leaders and Managers Work Together.
4. Comparison Chart of Leadership Skills and Management Skills.
5. **Theories of Leadership.**
6. **Types of Leadership**-Authentic leadership, Military Leadership and Public leadership.
7. **Leadership Styles**:-Autocratic, Democratic, Laissez Faire Leadership: Lewin, Lippitt, & Whites Leadership Studies.
8. **Marine Corps Leadership Principles.**
9. **Ethics of Leadership.**

10. **Leadership Skills. Motivation, inter-personal relationship, cross cultural relationship.**
11. **Characteristics of a Leadership.**
12. **Habits of highly Effective People.**

| | | | | |
|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 134712 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | General Zoology Paper-III (Practical) | | | |

- A. Study of museum specimens representing all major classes and orders of non-chordates and chordates
- B. Dissection:**
1. Bivalve-shell and digestive system
 2. Prawn-appendages, external characters, digestive, nervous and circularly system
 3. Reproductive system of shark or any bony fish
 4. Jew fish-scales, otolith, digestive and circulatory system
 5. Temporary mounting-scales of fish and preparation of blood smear
 6. Study of permanent slides-slides of plankters
 7. Study of bones of fish and reptiles
- C. Excursion shall be made for the study of local fauna and reports of the observation with ecological notes and illustrations made in the fields should be mentioned. Excursion report will be based on the study of any two of the following habitats:-
I) Estuary; II) Sea beach; III) Mangrove forest

Instruction of Exam time and Marks distribution (Theory Course)

- | | |
|--|-----------|
| 1. Dissection-one from non-chordate and one from chordate groups | 15+15=30 |
| 2. Temporary mounting (one) | 10 |
| 3. Spot identification (non-chordate, chordate, bones, permanent slides) | 5x2=10 |
| 4. Practical Note Book | 10 |
| 5. Study Tour Report | 20 |
| 6. Viva-voce | <u>20</u> |

Total marks = 100

| | | | | |
|---------------------|-------------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 134714 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Botany Paper-III (Practical) | | | |

1. Morphological and microscopic examination of Bacteria, Algae and Fungi included in the syllabus.
2. Anatomy of root, stem (primary and secondary) with single staining technique.
3. Study of plant population by quadrat method.
4. i) Identification: fertilizers, seeds, vegetables and fruits.
ii) Museum specimens and permanent slides

iii) Botanical names of available local plants.

iv) Economic products included in the syllabus.

v) Plants of morphological and ecological interest
5. Excursion shall be performed in order to study and collect plants from natural habitats, records of field trips should be maintained properly.
6. Practical note book should be maintained properly and regularly signed by course teacher.
7. Practical class records duly signed by course teacher and herbarium sheets as well as other collections have to be submitted on the day of practical examination.
8. Viva-voce will be held during the practical examination.

Instruction of Exam time and Marks distribution (Theory Course)

| | |
|--|-----------|
| 1. Bacteria/Algae/Fungi/Plant Pathology | 10+10=20 |
| 2. Taxonomy & Collection | 10 |
| 3. Anatomy (Secondary growth of dicot stem and root) | 10 |
| 4. Spot identification (non-chordate, chordate, bones, permanent slides) | 5x2=10 |
| 5. Practical Note Book | 10 |
| 6. Study Tour/Excursion report | 20 |
| 7. Viva-voce | <u>20</u> |
| Total marks = 100 | |

| | | | | |
|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 134716 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Biochemistry Paper-III (Practical) | | | |

Group A: Volumetric analysis:

1. a) Preparation of standard n/10 Na₂CO₃ solution
b) Determination of the strength of HCL, against standard Na₂CO₃ solution
2. a) Preparation of n/10 solution of potassium biphthalate
b) Determination of the amount of acetic acid in vinegar against standardized NaOH
3. Standardization of potassium permanganate solution against sodium oxalate as the primary standard
4. Standardization of sodium thiosulphate solution using potassium dichromate as primary standard
5. Determination of the amount of ferrous iron in Mohr's salt solution against standard potassium dichromate

Group B: Detection of organic compounds:

1. Carboxylic acids and phenols
2. Aldehydes and ketones
3. Amides, amines and nitrocompounds

Group C: Identification tests:

1. Estimation of vitamin C by Bessel's titrametric method
2. Iodine value and saponification value of fats and oils
3. Estimation of glucose by calorimetric method
4. Estimation of proteins by biurette method
5. Colour tests of proteins, amino acids and carbohydrates
6. Identification and separation of amino acids by chromatographic method
7. Preparation of buffer and determination of P^H value of acetic acid

Instruction of Exam time and Marks distribution (Theory Course)

| | |
|---------------------|-------------|
| Group A | : 30 |
| Group B | : 20 |
| Group C | : 20 |
| Practical Note-Book | : 10 |
| <u>Viva-Voce</u> | <u>: 20</u> |

Total Marks =100

NATIONAL UNIVERSITY



Syllabus

Subject: Mathematics

Three Years B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Subject: Mathematics
Syllabus for Three Year B.Sc. Pass Course
Session: 2013-2014
Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|-----------|---|-------|---------|
| First Year | | | | |
| 113701 | Paper-I | Fundamentals of Mathematics | 100 | 4 |
| 113703 | Paper-II | Coordinate Geometry and Vector Analysis | 100 | 4 |
| Second Year | | | | |
| 123701 | Paper-III | Calculus | 100 | 4 |
| 123703 | Paper-IV | Linear Algebra | 100 | 4 |
| Third Year | | | | |
| 133701 | Paper-V | Computer Programming and Numerical Analysis | 100 | 4 |
| 133703 | Paper-VI | Ordinary Differential Equations | 100 | 4 |
| 133704 | Paper-VII | Math Lab | 100 | 4 |
| | | Total = | 700 | 28 |

Detailed Syllabus

First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|-----------------------------|-------|---------|
| 113701 | Paper-I | Fundamentals of Mathematics | 100 | 4 |

Elements of logic: Mathematical statements, Logical connectives, Conditional and bi-conditional statements. Truth tables and tautologies, Quantifiers, Logical implication and equivalence, Deductive reasoning. Methods of proof (direct, indirect and Method of Induction.)

Set Theory: Sets and subsets, Set operations, Cartesian product of two sets, De Morgan's laws.

Relations and functions: Relation and Functions, Order relation, Equivalence relations. Functions. Images and inverse images of sets Injective, surjective and bijective functions. Inverse functions.

The Real Number System: Field and order properties, Natural numbers, integers and rational numbers, Absolute value and their properties. Basic inequalities.(Including inequalities of means, powers; inequalities of Cauchy, Chebyshev, Weierstrass).

The Complex Number System: Field of Complex numbers, De Moivre's theorem and its applications.

Theory of equations: Number of roots of polynomial equation. Relations between roots and coefficients, Symmetric functions of roots, Sum of the powers of roots, Synthetic division, Des Cartes rule of signs, Multiplicity of roots, Transformation of equations.

Elementary number theory: Divisibility, Fundamental theorem of arithmetic, Congruences (basic properties only)

Summation of Series: Summation of algebraic and trigonometric series, Arithmetic-geometric series.

Books Recommended:

1. Schaums Outline Series- *Theory and problems on set theory and related topics.*
2. S. Bernard & J M Child – *Higher algebra.*
3. Md. Abdur Rahman – *Basic Algebra*
4. Fazlur Rahman & Hafizur Rahman – *Fundamentals of Mathematics.*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|---|-------|---------|
| 113703 | Paper-II | Coordinate Geometry and Vector Analysis | 100 | 4 |

Two-dimensional Geometry: Transformation of coordinates, Pair of straight lines (homogeneous second degree equations, general second degree equations representing pair of straight lines, angle between pair of straight lines, bisectors of angle between pair of straight lines), General equations of second degree (reduction to standard forms, identifications, properties and tracing of conics).

Three-dimensional Geometry: Coordinates, Distance, Direction cosines and direction ratios, Planes (equation of plane, angle between two planes, distance of a point from a plane), Straight lines (equation of lines relationship between planes and lines, shortest distance) Spheres.

Vector Analysis: Vectors in plane and space. Algebra of vectors. Rectangular Components. Scalar and Vector products. Triple scalar product. Applications of vector to geometry (vector equations of straight lines and planes, areas and volumes). The gradient, divergence and curl of a vector function.

Book Recommended:

1. H. H. Askwith – *Analytic Geometry of Conic Section*
2. J. A. Hummel – *Vector Geometry*
3. Fazlur Rahman & Hafizur Rahman – *Analytic and Vector Geometry.*

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-------------|-------|---------|
| 123701 | Paper-III | Calculus | 100 | 4 |

Functions & their graphs (Polynomial and rational functions, logarithmic and exponential functions, trigonometric functions and their inverses, hyperbolic functions and their inverses, combinations of such functions). Limit and continuity: Definitions and basic theorems on limit and continuity. limit at infinity and infinite limits Computation of limits.

Differentiation: Tangent lines and rates of change. Definition of derivative. One-sided derivatives. Rules of differentiation (proofs and applications). Successive differentiation. Leibnitz theorem (proofs and application). Related rates. Linear approximations and differentials.

Applications of Differentiation: Rolle's theorem, mean value theorem. Maximum and minimum values of functions. Concavity and points of inflection. Optimization problems, Curvature.

Function of several variables: Limit and continuity. Partial derivatives Differentiability. linearization and differentials. The chain rule. Partial derivatives with constrained variables Directional variables. Lagrange multipliers, Taylor's formula.

Integration: Antiderivatives and indefinite integrals. Techniques of integration. Definite integration using antiderivatives. Definite integration using Riemann sums. Fundamental theorems of calculus (proofs and applications). Basic properties of integration. Integration reduction.

Applications of Integration: Arc length. Plane areas. Surfaces of revolution. Volumes of solids of revolution.

Graphing in polar coordinates. Tangents to polar curves. Areas in polar coordinates. Arc length in polar coordinates.

Multiple Integration: Double integrals and iterated integrals. Double integrals over nonrectangular regions. Double integrals in polar coordinates. Area by double integral. Triple integrals and iterated integrals. Volume as a triple integrals.

Improper integrals. Tests of convergence and their applications. Gamma and Beta functions.

Indeterminate forms, L' Hospital's rule.

Approximation and Series: Taylor polynomials and series. Convergence of series. Taylor's series. Taylor's theorem and remainders. Differentiation and integration of series. Validity of Taylor expansions and computations with series.

Book Recommended:

1. Howard Anton : *Calculus*
2. Mohammad and Bhattacharjee : *Text Book on Differential Calculus*
3. : *Text Book on Integral Calculus*
4. Matin and Chakrabarty : *Differential Calculus*
5. Abu Yusuf : *Differential Calculus*
: *Integral Calculus*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|----------------|-------|---------|
| 123703 | Paper-IV | Linear Algebra | 100 | 4 |

Matrices and Determinants:

Notion of matrix. Type of matrices. Algebra of matrices. Determinant function. Properties of determinants. Minors, Cofactors, expansion and evaluation of determinants. Elementary row and column operations and row reduced echelon matrices. Invertible matrices. Different types of matrices, Rank of matrices.

Vectors in R^n and C^n : Review of geometric vectors in R^2 and R^3 spaces. Vectors in R^n and C^n . Inner product. Norm and distance in R^n and C^n .

System of Linear Equations: System of linear equations (homogeneous and non-homogeneous) and their solutions. Application of matrices and determinants for solving system of linear equations. Applications of system of equations in real life problems.

Vector Space: Notion of groups and fields. Vector spaces. Subspaces. Linear combination of vectors. Linear dependence of vectors. Basis and dimension of vector spaces. Row and column space of matrix. Rank of matrices. Solution spaces of systems of linear equations.

Linear Transformation: Linear transformations. Kernel and image of linear transformation and their properties. Matrix representation of linear transformations. Change of bases.

Eigenvalues and Eigenvectors: Eigenvalues and Eigenvectors. Diagonalization. Cayley-Hamilton theorem and its application.

Book Recommended:

1. Howard Anton & Chris Rorres – *Elementary Linear Algebra with Application*
2. Seymour Lipschutz (Schaum’s Outline Series) – *Linear Algebra*
3. Md. Abdur Rahman - *Linear Algebra*
4. Fazlur Rahman & Hafizur Rahman - *Linear Algebra*

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|---|-------|---------|
| 133701 | Paper-V | Computer Programming and Numerical Analysis | 100 | 4 |

Part-I: Computer Programming

Algorithm and programs: Problem analysis and development of algorithms. Program coding, execution, design, validation and refinement.

Basic FORTRAN: Data type, operations functions, assignment statement, input-output, stop and end statement.

Control structure: Logical data type, logical if and block if, do and continue, Go to statement, While statement.

Input-output: formatted input and output, File processing.

Dimensional arrays: Arrays and subscripted variables, dimension statement, parameter and data statement, examples average group data, sorting and searching.

Multidimensional arrays: Matrix operations, Solving linear system, Functions and subroutines: Library functions and statement functions, function subprogram, subroutine, subprogram, Common statement.

Part-II: Numerical Analysis

Solutions of equations of one variable: Bisection method, Fixed point iteration, Newton-Raphson method, Error analysis for iterative method.

Interpolation and polynomial approximation: Taylor polynomials, Interpolation and Lagrange polynomial, Iterated interpolation.

Numerical differentiation & integration: Numerical differentiation with backward – difference formula, forward difference formula, Adaptive quadrature method, Trapezium method, Simpson method, Matrix algebra and system of equations. Matrix operations, Gauss-Jordan elimination method. SOR Method. (Successive over-Relaxation method).

Books Recommended:

1. Schaum's Outline Series : Fortram 77
2. V. Rajaraman : Fortram 90/95
3. S. S. Kuo : *Numerical methods & Computers*
4. Burdin & J. D. Faires : *Numerical Analysis*
5. S. S. Shastry : *Introductory Methods of Numerical Analysis*
6. হোসাইন, ভট্টাচার্য, ইলিয়াস : *সাংখ্যিক বিশ্লেষণ*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|---------------------------------|-------|---------|
| 133703 | Paper-VI | Ordinary Differential Equations | 100 | 4 |

1. **Ordinary differential equations and their solutions:** Definition and formation of differential equations. Classification of differential equations. Solutions. Implicit solutions. Singular solutions. Initial value problems. Boundary value problems. Basic existence and uniqueness theorems (statement and illustration only). Direction fields. Phase line.
2. **Solution of first order Differential equations :** Separable equations. Linear equations. Exact equations. Special integrating factors. Substitutions and transformations. Homogeneous equations. Bernoulli equation. Riccati equation. First order higher degree equation-solvable for x, y and p . Clairaut's equation.
3. **Modelling with first order differential equations:** Construction of differential equations as mathematical models (exponential growth and decay, heating and cooling, mixture of solution. Series circuit, logistic growth, chemical reaction, falling bodies). Model solutions . and interpretation of results. Orthogonal trajectories.
4. **Solution of higher order linear equations:** Linear differential operators. Basic theory of linear differential equations. Solution space of homogeneous linear equations. Fundamental solutions of homogeneous solutions. Reduction of orders, Homogeneous linear equations with constant coefficients. Non-homogeneous equation. Method of undetermined coefficients. Variation of

parameters. Euler-Cauchy differential equation.

5. **Series solutions of second order linear equations** : Taylor series solutions. Frobenius series solutions. Series solutions of Legendre, Bessel, Laguerre and Hermite equations and their solutions.

Books Recommended:

1. S.L. Ross- *Diferential Equations*.
2. Denis Gill-*Introduction to Diferential Equations*.
3. Frank Ayres, J R. *Theory and Problems of Diferential Equations*.
4. Martin Braun. *An introduction to Diferential Equations and their Applications*.
5. কুদ্দুস, আওয়াল, হাফিজ - *Ordinary differential Equation*

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-------------|-------|---------|
| 133704 | Paper-VII | Math Lab | 100 | 4 |

Problem-solving using Mathematica: Running the package. Numerical computation. Algebraic computation. Mathematical functions. Derivatives and integrals. Limits and series. Determinants and matrices. Graphics. Standard packages. Solving problems in Algebra, Geometry, Calculus, differential equations and Computing. Problems will be selected from courses studied in the first and second years.

Students are required to work on their assignments in the sessions.

Evaluation: Internal Assessment (Laboratory works): 30 marks. Final Exam (Lab) (4 hours): 70 marks.

Books Recommended:

1. Schaum's Outline Series – *Mathematica*
2. Worldfarm's Research (Student edition) – *Mathematica*

NATIONAL UNIVERSITY



Syllabus

Subject: Nautical

Three Years B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: Nautical
Session: 2013-2014

Course content and marks distribution

| FIRST YEAR | | | |
|-------------------|--|--------------|---------------|
| Paper Code | Paper Title | Marks | Credit |
| 111501 | স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস (History of the Emergence of Independent Bangladesh) | 100 | 4 |
| 114901 | Principles of Navigation | 100 | 4 |
| 114902 | Seamanship (Practical) | 100 | 4 |
| 114903 | General Ships Knowledge (Ships Construction + Fishing Vessel Technology + Engineering Knowledge) | 100 | 4 |
| 114905 | Meteorology-I | 100 | 4 |
| 114907 | Mathematics-I | 100 | 4 |
| 114909 | Physics-I | 100 | 4 |
| Total = | | 700 | 28 |

| SECOND YEAR | | | |
|--------------------|--|--------------|---------------|
| Paper Code | Paper Title | Marks | Credit |
| 131001/ 121103 | বাংলা জাতীয় ভাষা (National Language)/ English (Compulsory Alternative) | 100 | 4 |
| 124901 | Ocean & Offshore Navigation | 100 | 4 |
| 124903 | Coastal Navigation-I | 100 | 4 |
| 124905 | Cargo Operation and Ship Stability | 100 | 4 |
| 124906 | Bridge Procedure and Watch Keeping (Practical) | 100 | 4 |
| 124907 | Mathematics-II | 100 | 4 |
| 124909 | Physics-II | 100 | 4 |
| Total = | | 700 | 28 |

| THIRD YEAR | | | |
|-------------------|---|--------------|---------------|
| Paper Code | Paper Title | Marks | Credit |
| 121101 | English (Compulsory) | 100 | 4 |
| 134901 | Ship Handling (Ship Handling Simulator training) | 100 | 4 |
| 134902 | Meteorology (Practical)-II | 50 | 2 |
| 134903 | Navigational Aids | 100 | 4 |
| 134904 | Signaling (Practical) | 100 | 4 |
| 134905 | Computer Science | 100 | 4 |
| 134906 | Coastal Navigation (Practical)-II | 100 | 4 |
| 134907 | Marine Resources, Management and Maritime Law & Convention | 100 | 4 |
| 134908 | <u>Applied Science Practical: Physics (Practical)</u> | 50 | 2 |
| 134909 | Safety, Environmental Protection & Leadership | 100 | 4 |
| 134910 | <u>Maritime Science Practical: Ship-board Practical Training (Mode of Exam - Evaluation of Training Record Book + Viva Voice)</u> | 100 | 4 |
| Total = | | 1000 | 40 |

Instruction: All courses are compulsory. Student should be completed at least 80% (Eighty Percent) of the total credits set for each year and secure a GPA of at least 2.00 (Two) to be considered eligible for promotion to the next class. Any pending credit from previous year has to be completed and minimum grade of D must be achieved.

Detailed Syllabus

First Year

| | | | | |
|--------------|--|------------|------------|---------------------|
| Paper Code | 111501 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | History of the Emergence of Independent Bangladesh | | | |

স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস

ভূমিকা: স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস-পরিধি ও পরিচিতি

১। দেশ ও জনগোষ্ঠীর পরিচয়

- ক) ভূ প্রকৃতির বৈশিষ্ট্য ও প্রভাব
- খ) নৃতাত্ত্বিক গঠন
- গ) ভাষা
- ঘ) সংস্কৃতির সমন্বয়বাদিতা ও ধর্মীয় সহনশীলতা
- ঙ) অভিন্ন বাংলার পরিপ্রেক্ষিতে তৎকালীন পূর্ববঙ্গ ও বর্তমান বাংলাদেশের স্বকীয় সত্তা

২। অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের প্রয়াস ও উপমহাদেশের বিভক্তি, ১৯৪৭

- ক) ঔপনিবেশিক শাসন আমলে সাম্প্রদায়িকতার উদ্ভব ও বিস্তার
- খ) লাহোর প্রস্তাব, ১৯৪০
- গ) অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের উদ্যোগ, ১৯৪৭ ও পরিণতি
- ঘ) পাকিস্তান সৃষ্টি, ১৯৪৭

৩। পাকিস্তান: রাষ্ট্রীয় কাঠামো ও বৈষম্য

- ক) কেন্দ্রীয় ও প্রাদেশিক কাঠামো
- খ) সামরিক ও বেসামরিক আমলাতন্ত্রের প্রভাব
- গ) অর্থনৈতিক, সামাজিক ও সাংস্কৃতিক বৈষম্য

৪। ভাষা আন্দোলন ও বাঙালির আত্মপরিচয় প্রতিষ্ঠা

- ক) মুসলিম লীগের শাসন ও গণতান্ত্রিক রাজনীতির সংগ্রাম
- খ) আওয়ামী লীগের প্রতিষ্ঠা, ১৯৪৯
- গ) ভাষা আন্দোলন: পটভূমি ও ঘটনা প্রবাহ
- ঘ) হক-ভাসানী-সোহরাওয়ার্দীর যুক্তফ্রন্ট, ১৯৫৪ সালের নির্বাচন ও পরিণতি

৫। সামরিক শাসন: আইয়ুব খান ও ইয়াহিয়া খানের শাসনামল (১৯৫৮-৭১)

- ক) সামরিক শাসনের সংজ্ঞা ও বৈশিষ্ট্য
- খ) আইয়ুব খানের ক্ষমতা দখল ও শাসনের বৈশিষ্ট্য (রাজনৈতিক নিপীড়ন, মৌলিক গণতন্ত্র, ধর্মের রাজনৈতিক ব্যবহার)
- গ) আইয়ুব খানের পতন ও ইয়াহিয়া খানের শাসন, এক ইউনিট বিলুপ্তিকরণ, সার্বজনীন ভোটাধিকার, এলএফও (Legal Framework Order)

৬। জাতীয়তাবাদের বিকাশ ও স্বাধিকার আন্দোলন

- ক) সাংস্কৃতিক আগ্রাসনের বিরুদ্ধে প্রতিরোধ ও বাঙালি সংস্কৃতির উজ্জীবন
- খ) শেখ মুজিবুর রহমানের ৬-দফা আন্দোলন

- গ) ৬-দফা আন্দোলনের প্রতিক্রিয়া, গুরুত্ব ও তাৎপর্য
ঘ) আগরতলা মামলা, ১৯৬৮

৭। ১৯৬৯-এর গণঅভ্যুত্থান ও ১১-দফা আন্দোলন

- ক) পটভূমি
খ) আন্দোলনের কর্মসূচী, গুরুত্ব ও পরিণতি

৮। ১৯৭০ এর নির্বাচন, অসহযোগ আন্দোলন ও বঙ্গবন্ধুর স্বাধীনতা ঘোষণা

- ক) নির্বাচনের ফলাফল এবং তা মেনে নিতে কেন্দ্রের অস্বীকৃতি
খ) অসহযোগ আন্দোলন, বঙ্গবন্ধুর ৭ই মার্চের ভাষণ, অপারেশন সার্চলাইট
গ) বঙ্গবন্ধুর স্বাধীনতা ঘোষণা ও হ্রেফতার

৯। মুক্তিযুদ্ধ ১৯৭১

- ক) গণহত্যা, নারী নির্যাতন, শরণার্থী
খ) বাংলাদেশ সরকার গঠন ও স্বাধীনতার ঘোষণাপত্র
গ) স্বতঃস্ফূর্ত প্রাথমিক প্রতিরোধ ও সংগঠিত প্রতিরোধ (মুক্তিফৌজ, মুক্তিবাহিনী, গেরিলা ও সম্মুখ যুদ্ধ)
ঘ) মুক্তিযুদ্ধে প্রচার মাধ্যম (স্বাধীন বাংলা বেতার কেন্দ্র, বিদেশী প্রচার মাধ্যম ও জনমত গঠন)
ঙ) ছাত্র, নারী ও সাধারণ মানুষের অবদান (গণযুদ্ধ)
চ) মুক্তিযুদ্ধে বৃহৎশক্তি সমূহের ভূমিকা
ছ) দখলদার বাহিনী, শান্তিকমিটি, আলবদর, আলশামস, রাজাকার বাহিনী, রাজনৈতিক দল ও দেশীয় অন্যান্য সহযোগীদের স্বাধীনতাবিরোধী কর্মকান্ড ও বুদ্ধিজীবী হত্যা
জ) পাকিস্তানে বন্দি অবস্থায় বঙ্গবন্ধুর বিচার ও বিশৃঙ্খলিতিক্রিয়া
ঝ) প্রবাসী বাঙালি ও বিশ্বের বিভিন্ন দেশের নাগরিক সমাজের ভূমিকা
ঞ) মুক্তিযুদ্ধে ভারতের অবদান
ট) যৌথ বাহিনী গঠন ও বিজয়
ঠ) স্বাধীনতা সংগ্রামে বঙ্গবন্ধুর নেতৃত্ব

১০। বঙ্গবন্ধু শেখ মুজিবুর রহমানের শাসনকাল, ১৯৭২-১৯৭৫

- ক) স্বদেশ প্রত্যাবর্তন
খ) সংবিধান প্রণয়ন
গ) যুদ্ধ বিধ্বস্ত দেশ পুনর্গঠন
ঘ) সপরিবারে বঙ্গবন্ধু হত্যা ও আদর্শিক পটপরিবর্তন

History of the Emergence of Independent Bangladesh

Introduction: Scope and description of the emergence of Independent Bangladesh.

Writing on this topic.

1. Description of the country and its people.

- Geographical features and their influence.
- Ethnic composition.
- Language.
- Cultural syncretism and religious tolerance.
- Distinctive identity of Bangladesh in the context of undivided Bangladesh.

2. Proposal for undivided sovereign Bengal and the partition of the Sub Continent, 1947.

- a. Rise of communalism under the colonial rule, Lahore Resolution 1940.
- b. The proposal of Suhrawardi and Sarat Bose for undivided Bengal : consequences
- c. The creation of Pakistan 1947 .

3. Pakistan: Structure of the state and disparity.

- a. Central and provincial structure.
- b. Influence of Military and Civil bureaucracy.
- c. Economic , social and cultural disparity

4. Language Movement and quest for Bengali identity

- a. Misrule by Muslim League and Struggle for democratic politics .
- b. The Language Movement: context and phases .
- c. United front of Haque – Vasani – Suhrawardi: election of 1954, consequences.

5. Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971)

- a. Definition of military rules and its characteristics.
- b. Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy, Islamisation)
- c. Fall of Ayub Khan and Yahia Khan's rule (Abolition of one unit, universal suffrage, the Legal Framework Order)

6. Rise of nationalism and the Movement for self determination .

- a. Resistance against cultural aggression and resurgence of Bengali culture.
- b. Sheikh Mujibur Rahman and the six point movement
- c. Reactions: Importance and significance
- d. The Agortola Case 1968.

7. The mass- upsurge of 1969 and 11 point movement: background,programme and significance.

8. Election of 1970 and the Declaration of Independence by Bangobondhu

- a. Election result and centres refusal to comply
- b. The non co-operation movement, the 7th March , Address , Operation Searchlight
- c. Declaration of Independence by Bangobondhu and his arrest

9. The war of Liberation 1971

- a. Genocide, repression of women, refugees
- b. Formation of Bangladesh government and proclamation of Independence
- c. The spontaneous early resistance and subsequent organized resistance (Mukti Fouz, Mukti Bahini, guerillas and the frontal warfare)
- d. Publicity Campaign in the war of Liberation (Shadhin Bangla Betar Kendra, the Campaigns abroad and formation of public opinion)
- e. Contribution of students, women and the masses (Peoples war)

- f. The role of super powers and the Muslim states in the Liberation war.
- g. The Anti-liberation activities of the occupation army, the Peace Committee, Al-Badar, Al-Shams, Rajakars, pro Pakistan political parties and Pakistani Collaborators , killing of the intellectuals.
- h. Trial of Bangabondhu and reaction of the World Community.
- i. The contribution of India in the Liberation War
- j. Formation of joint command and the Victory
- k. The overall contribution of Bangabondhu in the Independence struggle.

10. The Bangabondhu Regime 1972-1975

- a. Homecoming
- b. Making of the constitution
- c. Reconstruction of the war ravaged country
- d. The murder of Bangabondhu and his family and the ideological turn-around.

সহায়ক গ্রন্থ

১. নীহার রঞ্জন রায়, *বাঙালীর ইতিহাস*, দে' জ পাবলিশিং, কলকাতা ১৪০২ সাল।
২. সালাহ উদ্দিন আহমেদ ও অন্যান্য (সম্পাদিত), *বাংলাদেশের মুক্তি সংগ্রামের ইতিহাস ১৯৪৭-১৯৭১*, আগামী প্রকাশনী, ঢাকা ২০০২।
৩. সিরাজুল ইসলাম (সম্পাদিত), *বাংলাদেশের ইতিহাস ১৭০৪-১৯৭১*, ৩ খন্ড, এশিয়াটিক সোসাইটি অব বাংলাদেশ, ঢাকা ১৯৯২।
৪. ড. হারুন-অর-রশিদ, *বাংলাদেশ: রাজনীতি, সরকার ও শাসনতান্ত্রিক উন্নয়ন ১৭৫৭-২০০০*, নিউ এজ পাবলিকেশন্স, ঢাকা ২০০১।
৫. ড. হারুন-অর-রশিদ, *বাঙালির রাষ্ট্রচিন্তা ও স্বাধীন বাংলাদেশের অভ্যুদয়*, আগামী প্রকাশনী, ঢাকা ২০০৩।
৬. ড. হারুন-অর-রশিদ, *বঙ্গবন্ধুর অসমাপ্ত আত্মজীবনী পুনর্পাঠ*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১৩।
৭. ড. আতফুল হাই শিবলী ও ড.মোঃ মাহবুবুর রহমান, *বাংলাদেশের সাংবিধানিক ইতিহাস ১৭৭৩-১৯৭২*, সূবর্ণ প্রকাশন, ঢাকা ২০১৩।
৮. মুনতাসির মামুন ও জয়ন্ত কুমার রায়, *বাংলাদেশের সিভিল সমাজ প্রতিষ্ঠার সংগ্রাম*, অবসর, ঢাকা ২০০৬।
৯. আতিউর রহমান, *অসহযোগ আন্দোলনের দিনগুলি: মুক্তিযুদ্ধের প্রস্তুতি পর্ব*, সাহিত্য প্রকাশ, ঢাকা ১৯৯৮।
১০. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস, ১৯০৫-৪৭*, তাম্রলিপি, ঢাকা ২০১১।
১১. ড. মোঃ মাহবুবুর রহমান, *বাংলাদেশের ইতিহাস, ১৯৪৭-১৯৭১*, সময় প্রকাশন, ঢাকা ২০১২।
১২. সৈয়দ আনোয়ার হোসেন, *বাংলাদেশের স্বাধীনতা যুদ্ধে পরাজিতের ভূমিকা*, ডানা প্রকাশনী, ঢাকা ১৯৮২।
১৩. আবুল মাল আবদুল মুহিত, *বাংলাদেশ: জাতিরাজ্জের উদ্ভব*, সাহিত্য প্রকাশ, ঢাকা ২০০০।
১৪. শেখ মুজিবুর রহমান, *অসমাপ্ত আত্মজীবনী*, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১২।
১৫. সিরাজ উদ্দীন আহমেদ, *একাত্তরের মুক্তিযুদ্ধ: স্বাধীন বাংলাদেশের অভ্যুদয়*, ইসলামিক ফাউন্ডেশন, ঢাকা ২০১১।
১৬. জয়ন্ত কুমার রায়, *বাংলাদেশের রাজনৈতিক ইতিহাস*, সূবর্ণ প্রকাশন, ঢাকা ২০১০।
১৭. Harun-or-Roshid, *The Foreshadowing of Bangladesh: Bengal Muslim League and Muslim Politics, 1906-1947*, The University Press Limited, Dhaka 2012.
১৮. Rounaq Jahan, *Pakistan: Failure in National Integration*, The University Press Limited, Dhaka 1977.

১৯. Talukder Maniruzzaman, *Radical Politics and the Emergence of Bangladesh*, Mowla, Brothers, Dhaka 2003.

২০. মেসবাহ কামাল ও ঈশানী চক্রবর্তী, *নাচোলের কৃষক বিদ্রোহ, সমকালীন রাজনীতি ও ইলা মিত্র*, উত্তরণ, ঢাকা ২০০৮।

২১. মেসবাহ কামাল, *আসাদ ও উনসত্তরের গণঅভ্যুত্থান*, বিবর্তন, ঢাকা ১৯৮৬।

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|---------------------|---------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 114901 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Principles Of Navigation | | | |

1. The shape of the earth, poles, equator, meridians, parallels of latitude. Finding position's by latitude and longitude. Direction, bearing distance, units of measurement. Difference of latitude, difference of longitude, departure, mean latitude, middle latitude, Great circles, small circles on a sphere.

2. The celestial sphere; definitions of the celestial sphere, apparent motion on the celestial sphere, Declination, Azimuth, Sidereal hour angle. Position of heavenly body on celestial sphere, rising and setting of heavenly bodies.

3. Solar system, earth-moon system, planetary motion. Earth's rotation and movement in orbit, mean sun, ecliptic, aphelion and perihelion, first point of Aries. Equinoxes and solstices, sunrise, sunset, twilight.

4. Time; Greenwich and other standard time, zone time, mean time, apparent time, sidereal time, equation of time; relationship between longitude and time.

5. Local Hour Angle (LHA) of a heavenly body in time and arc. Greenwich Hour Angle (GHA) of Sun, Moon, Planets and Aries. Sidereal Hour Angle (SHA).

6. Visible Horizon, Sensible Horizon and Rational horizon. Correction of sextant altitudes, dip, refraction, horizontal parallax, parallax in altitude, semi-diameter.

7. Geographical position of a heavenly body. A circle of position and its practical application, i.e. position line, Intercept.

8. Phases of Moon and its relationship with tides. Tide calculation for secondary port.

9. Principle of position fixing by measurement of different distance from two or more fixed points.

10. Simple properties of Mercator and Gnomonic charts. Use of Latitude and Longitude scales; measurement of distance, Rhumb lines.

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|---------------------|-------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 114902 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Seamanship (Practical) | | | |

1. The meaning of common nautical terminology.
2. The names and functions of various parts of the ship; for example, decks, compartments, ballast tanks, bilges etc.
3. Knowledge of the compass card and its use.
4. Ability to report the approximate bearing of an object in degrees or points on the bow.
5. Reading, streaming and handling of patent log.
6. Marking on a hand lead line, taking a cast of the hand lead and correctly reporting the sounding obtained.
7. Lifting Gear - Strength of ropes, Blocks, Purchases, Loads on derricks, Derrick rigs, Heavy lifts, Patent derricks or Ship cranes.
8. Anchor and Cables - various parts, marking on cable and operations.
9. Ropes and wires - their types, constructions and care in uses.
10. Painting - Different types of paints, Techniques of different types of painting works, Precautions during painting.
11. Knots, bends and hitches in common use :- Reef Knot, Rolling hitch, Timber hitch, Figure of eight, Clove hitch, Wall and Crown, Bowline and bowline on the bright, Sheet bend (double and single), Sheepshank, Round turn and two half hitches, Marling spike hitch etc. To whip a rope's end using plain or palm and needle whipping. To put a seizing on a rope or wire hawser and derrick topping lift, Splicing plaited and multi-strand manila and synthetic fibre rope, eye splice, short splice and back splice, Splicing wire rope.
12. Slinging a stage: rigging a boatswain chair and pilot ladder.
13. Towing at Sea: Towing preparations, Approach to the disabled ship, Drifting attitude similar and dissimilar type of ships, Establishing contact, Ship handling while towing, Yawning of towed ship, Shortening-in-tow, Emergency action when towing, Towing ropes/hawser.

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 114903 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | General Ships Knowledge (Ship's Construction + Fishing Vessel Technology + Engineering Knowledge) | | | |

SHIP'S CONSTRUCTION

1. Classification of Ships in Types:- Container Vessel, Multipurpose Vessel, Cattle Ship ,Ro Ro Ships, LPG/LNG Carriers, Cruise Ship, Yacht Ship, Fishing Vessel, Salvage Vessel, Offshore Vessel, War Ship, etc. Special features of above types of ships.
2. Definitions & Meanings: LOA, LBP, FP, AP, Depth, Draft, Freeboard, Camber, Sheer, Rake, Rise of floor, etc.
3. Principal Parts of a Ship: Bow, Stern, Shell plating, Double Bottom Tanks, Cargo Holds, Twin Decks, Deep Tanks, Fore peak and after peak store rooms and tanks, Plate keels and duct keels of forecastle deck, Quarter Deck, Main/Weather decks, Hatch covers, Cargo Gear, anchoring and mooring equipment, etc.
4. Machinery Spaces of Engine Room: Engine Casing, subdivisions of Engine Room, Steering Gear, Pump rooms, Mast houses, Workshops, etc.
5. Superstructure: Wheel House, accommodation spaces, cabins, galley, pantry, dining saloons, recreation rooms, various stores and lockers, cold storage spaces, etc.
6. General Layout of Ships:- Fishing vessel, General Cargo Ship, Bulk Carrier, Oil Tanker and Container Ship, Simple sketches of the same.

FISHING VESSEL TECHNOLOGY

- 1.1 Definitions, Classifications of Vessels and Classification of Fishing Vessel.
- 1.2 Principal Dimension of Fishing Vessels: - Length overall (LOA), Forwarded Perpendicular (FP), After Perpendicular (AP), Length between perpendiculars (LBP), Breadth, Depth, Draught, Displacement, Light displacement and loaded displacement.
- 1.3 GRT, NRT, Water Plan Area Coefficient, Block Coefficient, Midsection Coefficient, Prismatic Coefficient, Dead weight.
- 1.4 Freeboard deck, Lower deck, Weather deck, Bulkhead deck, Super structure deck, Main deck, Upper deck.
- 1.5 General Arrangement Plan (GA plan), Capacity Plan, Rigging Plan, Anchor Arrangement Plan, Mooring Plan of Fishing Vessel, Fire and Safety Plan of Fishing Vessel.

- 1.6 Life Saving equipments of Fishing Vessel, e.g.- Life Buoys, Life Raft, SCBA, Fire Extinguishers, Fire Hoses and Fire Hydrant, Fire Main, Fire Bucket and Fire Blanket.
- 1.7 Design of Fishing Gears: - Trawl Doors, Side Gallows, Otter rigger, Booms, Cargo hooks, etc.
- 1.8 Design of Fish Holds, Fresh water tank, Double Bottom tank, Crew accommodation, Galleys, Wheel house, Engine room, Fish hold covers, tiller flat, etc.

ENGINEERING KNOWLEDGE

- 1.1.1 Engineering Units and Common Terms: Mass, Force, Weight, Work, Power, Energy, Mechanical efficiency Pressure, Volume, Temperature, Heat, Properties of steam.
- 1.1.2 Properties of Gases: Boyle's law, Charles' law, Combination, Expansion and compression, Isothermal, Adiabatic, Polytrophic.
- 1.1.3 Internal Combustion Engines: Cycles of four and two stroke Diesel Engines; Timing diagrams indicator diagrams and Valve mechanism. Brief introduction to fuel system. Scavenging and supercharging. Cooling, Lubrication.
- 1.1.4 Pumps and Auxiliaries: Pumps, Bilge and Ballast pumping arrangement. Fresh water Generator. Oily-water Separator.
- 1.1.5 Concept of Refrigeration & Refrigerants.
- 1.1.6 Steering Gears: Steering Motor, Hunting gear, Tele-motor, Rudder stock unit Hydraulic, Rotary vane, electric steering gears.
- 1.1.7 Propeller, Pitch and Slip.
- 1.1.8 Control fundamentals, Instrumentation and control terminology.

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|---------------------|----------------------|-------------------|-------------------|----------------------------|
| Paper Code | 114905 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Meteorology-I | | | |

- 1. The Atmosphere. Its Constitution and physical properties, vertical structure of the atmosphere, temperature variations over the earth's surface.
- 2. The principles of pressure measurement. The use of standard datum and Knowledge of aneroid and precision aneroid barometer and the barograph.

3. Sea and air temperature observation. The principles of hygrometer. Observation to obtain relative humidity. Care and maintenance of the above mentioned instruments.
4. The Beaufort wind scale, Method of estimating direction and force of wind at sea, wind and air movements on rotating earth, geotropic wind, gradient winds, friction and Cyclostrophic wind.
5. Knowledge of mean sea level pressure distribution. Daily and seasonal change in atmospheric pressure. Prevailing winds, Land and sea breezes, Monsoons, Katabatic winds, Anabatic winds, Fohn wind effect and local winds.
6. The Characteristics of weather associated with the principle pressure systems, e.g. anticyclones, depressions, permanent and Semi-Permanent high and low pressure areas. Relationship between pressure and distribution of winds. Air masses and their properties. Buys Ballot's Law, anti-cyclones, ridge of high pressure, Air masses. Tropical Revolving Storm.
7. Water vapour in the atmosphere, evaporation, Condensation and precipitation. Saturation, relative humidity and dew point. Knowledge of atmospheric stability and lapse rate. Formation and Classification of clouds.
8. Visibility: General remarks, formation of fog, radiation fog, advection fog, mist, haze, dust and smoke, Mixing fog, sea smoke.
9. Thunderstorms: Introduction, lightning and thunderstorm weather.
10. Synoptic charts, weather routine, selected ship, supplementary and auxiliary ships. Introduction to coding and de-coding weather messages. Sea states. Storm signal.
11. Principal Ocean Currents, their names and Characteristics, causes of Ocean currents; gradient current, seasonal changes in general circulation

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| Paper Code | 114907 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Mathematics-I (Algebra And Trigonometry) | | | |

A. ALGEBRA :

1. **Elementary set theory**
 - a. Sets and Subsets
 - b. Set operations
 - c. Cartesian product of two sets
 - d. Relations order relations
 - e. Equivalence relation
 - f. Functions injective
 - g. Subjective and objective function
 - h. Inverse function
2. **Theory of equations**
 - a. Relation between roots and Co-efficients
 - b. Sums and the powers of the roots.

- c. 'Descartes' rule of Signs.
- d. Removal of any term.
- e. System of linear equation.
- 3. **Vectors**
 - a. Vectors and Scalars
 - b. The Dot and Cross product
 - c. Vector Differentiation
 - d. Gradient, Divergence and Curl
 - e. Vector Integration
 - f. The Divergence theorem, Stockes theorem and relative integral theorems.
- 4. **Matrix**
 - a. Different kinds of Matrices.
 - b. Elementary properties.
 - c. Solution of systems of equations.
- 5. **Determinants**
 - a. Determinants up to the third order.
 - b. Elementary properties.
 - c. Solution of systems of equations.
- 6. **Summation of series**

B: TRIGONOMETRY

- a. De Moiver's theorem.
- b. Deduction from De Moiver's theorem.
- c. Trigonometrical and exponential functions of complex arguments.
- d. Gregory's Series.

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| Paper Code | 114909 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Physics-I | | | |

GROUP – A

11.1.1 PROPERTIES OF MATTER :

- a. Vectors:**
Scalars & vectors and their products, Vector Addition and resolution, Gradient, divergence and curl. Vector differentiation & Integration. The divergence theorem & Stock's theorem.
- b. Particle motion :**
Particle kinematics, motion in a plane, Projectile motion, Uniform circular motion rotational kinematics, angular acceleration, Relation between linear and angular kinematics of a particle Dynamics of rigid bodies: angular velocity, angular momentum, kinetic energy of rotation: theorem of parallel and perpendicular axes.
- c. Oscillation:**
Simple harmonic motion, pendulum, free. damped and forceful oscillations.
- d. Gravitation and gravity:**
Law of universal gravitation – Gravitational intensity and potential – Motion of planets and Satellites, - Kepler's lay of planetary motion-Velocity of escape.

- e. **Elasticity-**
Stress and strain- Hook's Law-Elastic constants Relation concerning elastic constants-Poisson's ratio-Determination of young's Modulus-Determination of Poisson's ratio or Rubber.
- f. **Surface tension-**
Surface energy, Surface tension and molecular theory of surface tension – Potential energy due to a surface tension – Pressure with a curved film- Angle of contact-Capillarity-Measurement of surface tension by Capillary method.
- g. **Viscosity-**
Viscosity and coefficient of viscosity- Flow of fluid through a narrow tube-Poiseuille's equation.

GROUP – B

11.1.3 HEAT AND THERMODYNAMICS :

- a. **THERMOMETRY-**
Temperature- Temperature scale-Resistance thermometer- Thermocouple.
- b. **Calorimetry-**
Specific heats of solids and liquids by the method of mixture-Newton's Law of cooling.
- c. **Transmission of heat-**
Thermal conductivity- Determination of thermal conductivity's of good and bad conductors- Freezing of a pond.
- d. **Thermodynamic system-**
First law of thermodynamics-Isothermal and adiabatic expansions.
- e. **The second law of thermodynamics-**
Reversible and Irreversible process-Carnot cycle-Efficiency of reversible engines.

2.2 WAVES: SOUND AND OPTICS

- a. **Wave and Sound:**
Superposition principle, wave velocity, Beat, Velocity of sound, Doppler effect.
- b. **Optics:**
Fermat's principle of stationary time, Combination of very thin lenses, Equivalent of lenses, Minimum deviation and dispersion of Prism, Nature of light.

2nd Year

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|----------------------|-----------------------------|-------------|----------------------|
| Course Code : 131001 | Marks : 100 | Credits : 4 | Class Hours : 60hrs. |
| Course Title : | বাংলা জাতীয় ভাষা (আবশ্যিক) | | |

ক : সাহিত্য

নম্বর-৭৫

১) নির্বাচিত কবিতা

নম্বর-২৫

- ক) মাইকেল মধুসূদন দত্ত : আত্ম-বিলাপ
খ) রবীন্দ্রনাথ ঠাকুর : ঐকতান
গ) কাজী নজরুল ইসলাম : চৈতী হাওয়া
ঘ) জীবনানন্দ দাশ : বনলতা সেন
ঙ) ফররুখ আহমদ : ডালুক
চ) শামসুর রাহমান : বার বার ফিরে আসে
ছ) আল মাহমুদ : সোনালী কাবিন: ৫

২) নির্বাচিত প্রবন্ধ

নম্বর-২৫

- ক) বঙ্কিমচন্দ্র চট্টোপাধ্যায় : বাঙ্গালা ভাষা
খ) হরপ্রসাদ শাস্ত্রী : তৈল
গ) রবীন্দ্রনাথ ঠাকুর : সভ্যতার সংকট
ঘ) প্রমথ চৌধুরী : যৌবনে দাও রাজটিকা
ঙ) কাজী আবদুল ওদুদ : বাংলার জাগরণ
চ) কাজী নজরুল ইসলাম : রাজবন্দীর জবানবন্দী
ছ) মোতাহের হোসেন চৌধুরী : সংস্কৃতি-কথা

৩) নির্বাচিত গল্প

নম্বর-২৫

- ক) রবীন্দ্রনাথ ঠাকুর : একরাত্রি
খ) বিভূতিভূষণ বন্দ্যোপাধ্যায় : পুঁই মাচা
গ) আবুল মনসুর আহমদ : হুয়ুর কেবলা
ঘ) মানিক বন্দ্যোপাধ্যায় : প্রাগৈতিহাসিক
ঙ) সৈয়দ ওয়ালীউল- আহ : নয়নচারা
চ) শামসুদ্দীন আবুল কালাম : পথ জানা নাই
ছ) হাসান আজিজুল হক : আত্মজা ও একটি করবী গাছ

খ : ভাষা শিক্ষা

নম্বর-২৫

- ১। পত্র রচনা : ব্যক্তিগতপত্র, দাফতরিকপত্র, ব্যবসায়-সংক্রান্তপত্র, আবেদনপত্র ও মানপত্র
২। গদ্যরীতি : সাধু, চলিত ও আঞ্চলিক
৩। প্রমিত বাংলা বানানের নিয়ম (বাংলা একাডেমি, ঢাকা)
৪। অনুবাদ : ইংরেজি থেকে বাংলা
৫। সারসংক্ষেপ।

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| Course Code | 121103 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Course Title | English (Compulsory Alternative) | | | |

Group –A: Poetry (Norton Anthology of English Literature Vol. I and II)

Piece to be read:

- | | |
|-----------------------|--|
| 1. John Milton | : ‘When I consider How My Light Is Spent’ |
| 2. Thomas Gray | : ‘Elegy Written in a Country Churchyard’ |
| 3. William Blake | : ‘The Chimney Sweeper’(Songs of Experience) |
| 4. William Wordsworth | : ‘I Wander Lonely as a Cloud’ |
| 5. P.B. Shelly | : ‘Mutability’ |
| 6. John Keats | : ‘Ode to Autumn’ |
| 7. Tennyson | : ‘Ulysses’ |
| 8. A.E. Housman | : ‘When I was One and Twenty’ |
| 9. Emily Dickinson | : ‘Because I Could not Stop for Death’ |
| 10. Robert Frost | : ‘Stopping by Woods on a Snowy Evening’ |

Group –B: Drama

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|------------------------|--|
| 1. William Shakespeare | : <i>Twelfth Night/ As You Like It</i> |
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Group –C: Novel

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|-----------------------|----------------------------------|
| 1. Earnest Hemmingway | : <i>The Old Man and the Sea</i> |
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| Paper Code | 124901 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Ocean And Offshore Navigation | | | |

Calculation of Courses and Distances

1. Calculation of Distance between two positions on the on the same parallel of latitude.
2. The difference of longitude for a given distance to run along a parallel of latitude.
3. To derive the final position after sailing along a parallel of latitude.
4. Use of the Plane sailing formula.
5. Calculation of course and distance between two positions using plane sailing formula.

6. Calculating DR position or an estimated position using the plain sailing formula given the Compass Course and Compass Error, Log distance, estimated speed, tidal and current information and leeway.
7. The use of Mercator sailing formula.
8. Calculation of true course and distance between two positions using Mercator Sailing.
9. To find the final position, when the initial position and course and distance steamed given using Mercator sailing.

Nautical Almanac

- 1.1 To understand the information contained in general in the Nautical Almanac and in detail in the daily pages.
- 1.2 The use of tables of corrections and incremental correction in the Nautical Almanac.
- 1.3 To find the LHA of Sun, planets and Aries by given date, GMT and longitude of the observer.
- 1.4 To derive the LHA of a Star from LHA Aries and SHA of Star using Nautical Almanac.
- 1.5 To find the LMT and GMT of Sun rise and Sun set, using observer's latitude and longitude and the Nautical Almanac. Total Hour of Darkness calculation.
- 1.6 The use of information in the Nautical Almanac to obtain the LMT of the Meridian Passage of the Sun to the nearest minute and interpolation for the observer longitude when necessary.
- 1.7 Star identification/findings.

Sextant Corrections

- 1.1.1 To obtain from the Nautical Almanac, Dip of the sea horizon, refraction, Sun's semi-diameter and application of these corrections to obtain the true altitude of a heavenly body.
- 1.1.2 To obtain the True Zenith distance from the true altitude of a heavenly body.

Latitude by Meridian Altitude

- 1.1.1.1 Application of the true Zenith distance of the heavenly body, when it is on the observer's meridian to the declination of the body of obtains the observer's latitude.
- 1.1.1.2 To find the observer's latitude from the true altitude of Polaris.

1.1.1.3 To obtain from the Nautical Almanac the corrections related to the altitude of Polaris and application of these corrections.

1.1.1.4 To find the true azimuth of Polaris from the Tables and direction of position line.

Astro-Position Line

1.1.1.1.1 The solution of PZX triangle to find the calculated zenith distance of the heavenly body when it is out of meridian, using co-latitude, polar distance and LHA.

1.1.1.1.2 Application of the calculated zenith distance to the true zenith distance of the heavenly body to find the intercept of the body and the intercept terminal point (ITP) through which to draw the position line (Marcq St. Hillarie method).

1.1.1.1.3 To derive the true azimuth of the body from tables and then determine the direction of the position line.

Errors of Compasses- Azimuths

1.1.1.1.1.1 To obtain the error of the magnetic compass or gyro compass by comparing the compass bearing of the body to the azimuth of the body obtained at the time of observation.

1.1.1.1.1.2 To calculate the azimuth of the body from tables, using GMT of observation, information from Nautical Almanac, LHA of the body and observer's DR positions.

1.1.1.1.1.3 To obtain from tables using observer's DR position and information from the Nautical Almanac, the true bearing of the heavenly body on rising or setting.

1.1.1.1.1.4 Application of variation to the error of magnetic compass to find the deviation for the direction of the ship's head.

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|---------------------|-----------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 124903 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Coastal Navigation-I | | | |

1. Mercator's Chart and Gnomonic or Great Circle Sailing Charts, Plain charts, Scales, Graduation, Scale or Natural Scale, Nautical Mile, Knot, Instruction, Measuring Distance, etc.
2. The Log - Plotting and Taking of Positions - Positions on Plans - Conventional Signs and Abbreviations – Soundings - Metric Charts.
3. Tidal Streams – Currents - Dangers - Types of Charts and Publications.

4. Coastal Aids to Navigation – Lighthouses - Light Vessels -Buoys - Radio and Radar Stations - Fog Signals.
5. Directions - Bearings and Courses; True, Magnetic and Compass - Pylorus - Gyro Compass.
6. The Compass Rose - Taking off and laying down Courses and Bearing - Courses to Steer - Course to steer to counteract a Current - Leeway.
7. Position on a chart by simultaneous cross bearing, by bearing and range.
8. Position Lines and Fixes - Running Fix – Leeway - Types of Running Fix - Cocked hat - Dead Reckoning Position and Estimated Position.
9. Elementary Knowledge of passage planning and execution; Landfalls in thick and clear weather; The selection of suitable anchorage, approaching anchorage and entering narrow channel waters; The use of clearing marks and horizontal and vertical angles.
10. Position from Astronomical and Terrestrial Position Lines - Crossed Position Lines - Transferring Position lines - The use of a single Position line.
11. The Correction of Courses - Gyro Compass - Magnetic Compass - Variation, Deviation Error - Bearing - The Deviation Card - Leeway.
12. Radio Bearings - Errors and Adjustments of Radio Bearings - use of Radio Bearings - Long Distance Radio Bearings.
13. Knowledge of IALA system of Buoyage.
14. To find the time and height of high and low water.

To find height of tide at any given time by using Tidal Diagram

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 124905 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Cargo Operation And Ship Stability | | | |

Cargo Operation

1. **GENERAL:** Stress and strain. Elastic limit, Yield point, breaking strength, Proof Load, Factor of safety, Safe working load. Annealing and normalising of cargo gear.
2. **CARGO GEAR:** Blocks: Parts of a block, different types of block, non-toppling and snatch blocks. External binding. Internal binding. Strapped. Markings on a block. Size of a block and sheave, size of rope to be used in a block. Relationship between diameter of sheave and diameter of rope.

3. Tackles: Names of parts of a tackle, using a tackle to advantages or disadvantage. Mechanical advantage, velocity ratio or 'power gained', efficiency of a tackle; relationship between pull on the hauling part and load. Types of tackles/purchases used on ships.
4. Shackles: Various types. Markings on shackles.
5. Cargo hooks: Various types. Markings on cargo hooks.
6. Ropes: Care of ropes and wires used for cargo gear.
7. Derrick rigs: The Union purchase. Setting up of a union purchase. Importance of preventer guys. Maximum load to be used for angle between runners. Swinging derrick with powered guys. Putting Winches in double gear. The Yo-Yo gear working of ship's cranes. Hoisting, lowering and securing a derrick.
8. Slings: Types of slings used for lifting cargo of different types. Accident prevention when working cargo.
9. Overhauling blocks: Its maintenance. Reeving a three-fold purchase.
10. Hatch-covers: Types of hatches. Opening and closing of McGregor and Hydraulic hatch covers. Closing arrangements. Battening down a hatch.

Stability

- 1.1 The meaning of terms: Block coefficient, Displacement, Deadweight.
- 1.2 Use of displacement and tones per centimetre (TPC) immersion scales to determine weight of cargo or ballast from draughts or freeboard. Load line marks Density, Relative density, Principle of Archimedes, Floatation, and Effect of density of water on draught and freeboard, Fresh water allowance (FWA), the marine hydrometer and its uses.
- 1.3 Buoyancy, Reserve buoyancy, understanding the fundamental actions to be taken in the event of partial loss of intact buoyancy.
- 1.4 General understanding with definitions of:
 - 1.4.1 Centre of gravity, stable, unstable and neutral equilibrium.
 - 1.4.2 Metacentric height.
 - 1.4.3 Righting lever.
 - 1.4.4 Righting moment.
- 1.5 The use of stability and hydrostatic data supplied to ships. The effect of adding and removing weights, the danger of slack tanks.
- 1.6 List, Loll, Trim and their corrections.

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 124906 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Bridge Procedure And Watch Keeping (Practical) | | | |

Bridge Procedure

1. Guidelines for watch keeping at sea and in port.
2. Basic principles and use of radar.
3. Introduction and use of Radio Communication Equipment on board ship for distress and safety - Selection of suitable frequencies.
4. Radio Regulations relating to Maritime Services including maritime frequency allocation.
5. Satellite Communication and Alerting systems - Equipment on board and ashore. Methods adopted.
6. Global Maritime Distress and Safety System - Principles and actual applications.
7. World Wide Navigational Warning System - India's role as a Co-ordinator for area.
8. Meteorological Broadcast - Routine weather messages and storm warnings.
9. Search and Rescue Communications.

Watch Keeping

- 1.1 International Regulations for preventing collisions at sea. Application. Exceptions for local rules or harbours, etc. Exceptions for special class of ships. Responsibility for the consequence of neglect of rules.
- 1.2 Definitions of term 'Vessel,' power driven vessel', sailing vessel', 'fishing vessel', 'seaplanes', 'vessel not under command', vessel restricted in ability to manoeuvre, 'constrained by draft', 'Underway', 'restricted visibility'. Steering and Sailing rules. Conduct of vessels in any condition of visibility, Maintenance of Proper looks out.
- 1.3 Maintenance of safe speed. Factors to be considered for determining safe speed. Determination of risk of collision with another vessel.
- 1.4 Use of radar in determining risk of collision.
- 1.5 Use of visual bearings.

- 1.6 Types of actions to be taken to avoid collision or close quarter situation. Conduct of vessels in narrow channels and when approaching blind bends.
- 1.7 Conduct of vessel in traffic separation schemes of International Maritime Organization.
- 1.8 Conduct of vessels in sight of one another.
- 1.9 Responsibility to keep out of way, when two sailing vessels are on collision course.
- 1.10 Responsibility to keep out of way, when one vessel is overtaking another vessel of any type.
- 1.11 Action to be taken by a vessel, when meeting another vessel head on. Responsibility to keep out of way, when two vessels are crossing each other.
- 1.12 Action to avoid collision. Duty of the vessel, which has the right of way.
- 1.13 Right of way between a normal power driven vessel not under command, a vessel restricted in her ability to manoeuvre, a vessel engaged in fishing, a sailing vessel and a vessel constrained by her draft.
- 1.14 Conduct of Vessels in restricted visibility.
- 1.15 Applicability. Determination of risk of collision when another vessel is detected by radar alone.
- 1.16 Action to be taken when for signal of another vessel is heard but vessel is not seen though it any have been detected by radar.
- 1.17 More detailed knowledge of 'International Regulations for Preventing Collision at Sea.
- 1.18 Precautions while using floating navigational aids such as buoys, light vessels, etc.

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 124907 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Mathematics-II (Calculus And Co-Ordinate Geometry) | | | |

A. CALCULUS

- 1. **Differential Calculus**
 - a. Differentiation (Including successive differentiation)
 - b. Mean value theorem, Taylor's theorem.
 - c. Maxima and minima
 - d. Tangents and Normals.
- 2. **Integral Calculus (Including Differential equations)**
 - a. Indefinite Integrals.

- b. Definite Integrals.
 - c. Beta and Gamma function
 - d. Area of plane curves.
 - e. Differential equation; Equations of first order and first degree. Linear equation with constant coefficients.
- B. CO-ORDINATE GEOMETRY (TWO DIMENSIONAL)**
- a. Pair of straight lines.
 - b. General equation of second degree.
- C. CO-ORDINATE GEOMETRY (THREE DIMENSIONAL)**
- a. Co-ordinate in three dimension, distance, direction, Cosines and direction ratios, Planes (Equation of a plane, angle between two planes, Distance of a point from a plane), Straight lines (Equation of a line, Relationship between plane and lines, shortest distance).

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| Paper Code | 124909 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Physics-II | | | |

GROUP – A

11.1.5 ELECTRICITY AND MAGNETISM:

- a. Electrostatics-**
Coulomb's Law-Intensity and potential- Gauss's Law – Field due to a dipole- Capacitance- Conductor – Insulators and Dielectrics.
- b. Magnetic effect of current-**
Magnetic field accompanying a current – Laplace's Law- Fields due to a straight current-Intensity at the center of a circular current-Intensity at a point on the axis of a circular current – Field at a point on the axils of a solenoidal current.
- c. Electromagnetic Induction-**
Faraday's Law of induction- Lanz's Law-Self and mutual inductance varying current-LR and CR circuits.
- d. Alternating current-**
Calculation of e.m.f and current at any instant in a rotating coil- Average e.m.f- A.C circuit containing resistance inductance or capacitance-Resonance circuit- Power in A.C.

GROUP – B

11.1.6 ELECTRONICS:

- a. Thermoionic Emission and Valve-**
Vacuum tubes- Their parameters and characteristics- Cathode Ray tube (CRT) Electrostatic type and Electromagnetic type.
- b. Semiconductor and Transistor-**
Chemical bonds in semiconductor-Band gap- Intrinsic and extrinsic semiconductors-P type and N type semiconductors- Principles of the P-N junction – Theory of operation of Transistor characteristics.
- c. Electronic Circuits-**
Principles with circuit diagram of rectifier feed back, amplifier and oscillator.
- d. Principles of Radio communication-**

Modulation and De-modulation-Sidebands –A.M Transistor-Block study of a A.M radio

Transmitter- A.M radio receiver-Block study radio receiver – Superheterodyne principle-Block study of a superheterodyne radio receiver.

11.1.7 INTRODUCTION TO COMPUTER SCIENCE:

Concept of computer and its device-

- a. Type of computers- Microcomputer and its configuration-Terminology. Computer generation characteristics.
- b. Computer memory ROM, RAM, PROM –Disk operation system (DOS) Graphical user interface (Windows).
- c. Data base management system (DBMS), Management information system. EDP, MIS, DSS.
- d. System Analysis and Design – Data Flow Diagram (DFD)- Symbols, Flow chart symbols.
- e. Table (statistical)-Spread sheet; Data query-Database; Graphics and Printing- Graphics; Analyzing – Basic Computer of programming.

Third Year

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|---------------------|-----------------------------|-------------------|-------------------|----------------------------|
| Course Code | 121101 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Course Title | English (Compulsory) | | | |

Aims and objective of this course: To develop students' English language skills, to enable them to benefit personally and professionally. The four skills- listening, speaking, reading and writing will be integrated to encourage better language use.

1. Reading and understanding 5x4=20
Students will be expected to read passages so that they might come across in their everyday life, such as newspapers, magazines, general books etc. Simple stories will also be included to give students a familiarity with different uses of the language.

[N.B. 5 Questions are to be answered. Each question will carry 4 marks. There may be division in each question]

- a) Understanding different purposes and types of readings
 - b) Guessing word- meaning in context.
 - c) Understanding long sentences
 - d) Recognizing main idea and supporting ideas
 - e) Answering comprehension questions
 - f) Writing summaries
2. Writing
- a) Writing correct sentences, completing sentences and combining sentences. 05
 - b) Situational Writing: Posters, notices, slogans, memos, advertisements etc. 04
 - c) Paragraph Writing :Structure of a paragraph; to topic sentence; developing ideas; writing a conclusion; types of paragraphs (narrative, descriptive, expository, persuasive); techniques of paragraph development (such as listing, cause and effect, comparison and contrast) 08
- Or,
- d) Newspaper writing: Reports. Press realize, dialogue etc
 - e) Writing resume
- Or,
- f) Writing letters : Formal and Informal letters, letters to the editor, request letter, job applications, complaint letter etc.
 - g) Essay : Generating ideas; outlining, Writing a Thesis sentence; writing the essay:writing introduction, developing ideas, writing conclusion, revising and editing. 15

3. Grammar

25

- a) Word order of sentences.
- b) Framing questions.
- c) Tenses, articles, subject –verb agreement, noun-pronoun agreement, verbs, phrasal verbs, conditionals, prepositions and prepositional phrases, infinitives, participles; gerunds. (Knowledge of grammar will be test through contextualized, passages).
- d) Punctuation

4. Developing Vocabulary: Using the dictionary, suffixes, prefixes, synonyms, antonyms, changing word forms (from verb to noun etc.) and using them in sentences. 10

5. Translation from Bengali to English. 1x5=5

6. Speaking Skills: Speaking skill should be integrated with writing and reading in classroom activities.

The English sound system; pronunciation skills; the IPA system; problem sounds; vowels; consonant and diphthongs; lexical and syntactic stress.

(Writing dialogue and practice it orally students can develop their speaking skill. Dialogue writing can be an item in writing test.)

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 134901 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Ship Handling (Ship Handling Simulator Training) | | | |

- 1. Berthing, Un-berthing and Anchor work under various conditions of wind and tide.
- 2. Open Moor, Fouling Hawse, Moored closed to a Danger, Running or Flying Moor, Clearing a Foul hawse etc.
- 3. Principles of Ship handling: Engines, Propellers, Wake current, Rudder, The Turning Circle, Effects of Loading, Trim, List, Shallow water effect, cannel effect, Sternway, Twin-screws, Wind, Current, Bends, etc.
- 4. Practical ship handling, management and handling of vessel. Preparations before *proceeding* to at sea.
- 5. Manoeuvring the vessel with special regard to the factors that could adversely affect the vessel's safety.
- 6. Precautions in Manoeuvring for launching rescue boats of survival crafts in heavy/bad weather.
- 7. Methods of taking on board survivors from rescue boats or survival crafts.
- 8. Practical measures to be taken, when navigating in ice or conditions of ice accretion on board the vessel.

9. Manoeuvring in traffic separation schemes.
10. The importance of navigating at reduced speed to avoid damage caused by own vessel's bow or stern wave.
11. Transferring cargo to other vessels at sea.

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|---------------------|-----------------------------------|------------------|-------------------|----------------------------|
| Paper Code | 134902 | Marks: 50 | Credits: 2 | Class Hours: 30hrs. |
| Paper Title: | Meteorology (Practical)-II | | | |

1. Use of Meteorological Instruments and know the method of calibrate of various types of meteorological instruments and device, such as;

- a) Anemometer
- b) Barometer
- c) Hygrometer
- d) Thermometer
- e) Wind Shock

2. Identification of various types of Clouds, Precipitations

3. Calculation of true direction and true speed of wind by using anemometer and wind calculation chart.

4. To find the dew point and relative humidity of a certain area by hygrometer.

6. To apply the Buys Ballot's Law

7. Understand coding and decoding weather message, Sea States.

8. To know the various day and night signal of storm displayed by Bangladesh meteorological department, sea port authority.

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|---------------------|--------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 134903 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Navigational Aids | | | |

MAGNETIC COMPASS

1. Knowledge of how the magnetic compass is enable to point constantly in fixed direction. Construction of dry card and liquid magnetic compass.
2. Magnetic variation and the sources by which the information may be obtained. The importance of correcting for secular change in magnetic variation.
3. Magnetic deviation due to Ferro-magnetic materials in ship's structure and awareness due to change of heading.
4. The deviation card and its use. Compass error from a knowledge of magnetic variation and a deviation card. Transmitting procedure of magnetic compass and heading information relayed to other instruments.

Gyro Compass

- 1.1 Knowledge of how the master gyro is enable to point in a fixed direction.
- 1.2 Heading information's relayed to other instruments, i.e. radar, radio direction finder. Off course alarms.
- 1.3 The gyro compass errors: - Latitude (damping) error, Speed and course error, Variable errors.
- 1.4 Care and maintenance of Gyro compass.
- 1.5 Limitation of Gyro compass.

Radar

- 1.1.1 Block diagram of a Radar. The echo principle and its application to radar pulses. Method by which a radar installation gathers information's and presents it on a visual display. Pulse duration and pulse-recurrence frequency. The components on a simple block diagram of a radar installation.
- 1.1.2 Path followed by a single radar pulse from transmitter to target and returning echo through the receiver to its appearance on the C.R.T. Method by which the C.R.T. is able to display and echo at the correct range and bearing.
- 1.1.3 The suppression of sea echoes and anti-clutter rain/snow controls. Errors and correction procedures, Index error etc. The selection of appropriate range scale and pulse length.
- 1.1.4 Safety precautions necessary, when in the vicinity of open equipment and the radiation hazards near antenna and open wave guides.
- 1.1.5 The ship's Head up, North up, relative motion and true motion presentation.
- 1.1.6 Horizontal and vertical beam width, lobe structure in vertical and horizontal plane.
- 1.1.7 Radar echoes and the factor affecting the interpretation of the display, i.e. blind and shadow sector.
- 1.1.8 Multiple echoes, indirect echoes, side echoes, second trace echoes and identification of the probable true echo.
- 1.1.9 Effects of atmospheric condition on radiation of radar. The appearance of Racoons and Remarks on the radar screen.
- 1.1.10 Radar Plotting in PPI to find course, speed, CPA, TCPA of another vessel.
- 1.1.11 Errors and Limitations of RADAR.
- 1.1.12 Care and Maintenance of RADAR.
- 1.1.13 Familiarization of Automatic Radar Plotting Aids (ARPA).

AIS

- 1.1.1.1 Working Principles of AIS.
- 1.1.1.2 Block Diagram of AIS.

- 1.1.1.3 Classes of AIS.
- 1.1.1.4 Usages of AIS.
- 1.1.1.5 Manual Input data of AIS.
- 1.1.1.6 AIS as Collision avoidance.
- 1.1.1.7 Limitation of AIS.
- 1.1.1.8 Merit and Demerits of AIS.
- 1.1.1.9 Care and Maintenance of AIS.
- 1.1.1.1.1 Theoretical consideration of modern navigation system like GPS, DGPS, ECDIS etc.

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|---------------------|------------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 134904 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Signaling (Practical) | | | |

Morse Code

1. Identification of the Morse symbols for the alphabet and Numerals send and receive flashing at 6 w.p.m.
2. Ability to read and send plain language messages in Morse using correct procedure at 6 w.p.w.
3. Ability to read and send 15X5 character Morse blocks of mixed letters and numbers at 6 w.p.w.
4. To identify the parts of a flashing messages.
5. The procedure by flashing for two ships exchanging identities when names are unknown.
6. Practical use of the "Erase Sign", "Repeat Signal", "Waiting Signal or Period Signal etc.
7. The meaning of the groups "YU" "YZ" "YV".

Sound Signals

General understanding of single letter meaning when made by these method i.e. by siren, whistle.

Code Flags

1. Recognize and describe all international code flags and understand their single letter meanings.
2. Use of substitute flags, answer pendant.
3. Procedure when: Calling using international code flags, Flag signal can be seen but not understood, Using "Affirmative" "Negative" "Interrogative", A flag signal is completed.

4. Demonstration of how to spell, when using flags.
5. Ceremonials - How to pay mark of respect to warships by merchant ships and other vessels.

Signals for Distress and Emergency

1. Abandon, Accident, Doctor, Injured/sick.
2. Communications, Search-assistance.
3. Distress, Position of Distress, Sinking, Rescue.
4. Damages repairs, under water operations, Fire, Explosion, and Leakage.
5. Towing.
6. Aids to Navigation, Dangers to Navigation, Navigating and Steering instructions.

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|---------------------|-------------------------|-------------------|-------------------|----------------------------|
| Paper Code | 134905 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Computer Science | | | |

Computer Fundamentals:

Historical development of computers: an evolution. Classification of Computers on different norms such as generations, technology, etc. Different functional parts of a computer and their functions. Computer peripherals: Monitor, Printer, Key Board, Floppy disk drive, Floppy, Hard disk, Mouse. Computer arithmetic: Binary, Octal, Decimal & Hexadecimal number systems and mutual conversion: addition, 1's & 2's complementation in binary only. Units of memory measurement: Bits, Bytes, KB, MB, GB, and TB. Units of run-time measurement: sec, ms, s, ns, ps, fs, as. Different computer environments: Batch processing, Time-sharing, Interactive & Network, their functional details and differences. Computer connectivity: LAN, MAN, WAN, Internet. Internet activity in India and various facilities available on Internet, Satellite based Communication.

C Language 1:

Computer languages, their classification and compilation. C-Character set. Data Types. Constants and variables. Operators: Arithmetic, Increment & Decrement, Modulo division, Relational, Logical, Conditional and Comma. Expressions and. Assignment statements. Control statements: if, nested if, switch, while loop, for loop, do while loop. Arrays: single and two dimensional only.

C Language 2:

Functions: User-defined, Standard library functions of various types. Pointers: &, operators. Pointer expression: pointer assignment, pointer arithmetic, pointer comparison, Structures. File handling in C: opening a file, write into a file, reading from a file, closing a file

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 134906 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Coastal Navigation (Practical)-II | | | |

1. Navigational charts and publications

- a) A thorough knowledge of navigational charts, light lists and sailing directions and their correction using Notices to Mariners and navigational warnings by radio and NAVTEX and ship's routing information.
- b) Use of parallel rulers, dividers GD plotter, Station Pointer.
- c) The ability to lay off suitable courses and prepare charts and information for a coastal passage, and to calculate an ETA.
- d) The correction of courses for compass error. Knowledge of the separate effects of variation and deviation on compass headings.
- e) The ability to adjust course, amend the allowance for tidal stream, set, and/or leeway and amend ETA.
- f) Positions fixed using position lines obtained visually or by radar as bearings or ranges from shore land-marks, lighthouses, beacons and buoys.
- g) Position lines and fixes by Electronic Navigational Instruments.
- h) Information obtained from log, propeller revolutions, soundings, winds, tides, currents and estimated speed.
- i) Parallel indexing by radar.
- j) Transit bearings and single bearings used as clearing and leading lines.
- k) Horizontal and vertical angles.
- l) Transferred position lines, single position lines.
- m) A thorough knowledge of navigational procedures in connection with traffic separation schemes and other routing schemes, coastal ship reporting schemes and VTS.
- n) Landfalls and approaching harbours and anchorages. The use of visual indications, radar and appropriate instruments in making landfall and during an approach.

2. Visual aids to navigation

- a) Lighthouses and beacons, light characteristics
- b) Use of transits, leading lines and clearing lines
- c) IALA system of buoyage for Region A
- d) Use of sailing directions
- e) Pilotage plans and harbor entry

3. Passage Planning

- a) Preparation of navigational plan for short coastal passages
- b) Meteorological considerations in planning short coastal passages
- c) Use of routine chart.
- d) Use of waypoints on passage
- e) Importance of confirmation of position by an independent source
- f) Keeping a navigational record

4. Tides and tidal streams

- a) Use of Admiralty Tide Table (ATT) while making a passage from one position to another.
- b) Use of Admiralty method of determining tidal height at standard port and awareness of Corrections for secondary ports,
- c) Use of tidal diamonds and tidal stream atlases for chart work

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 134907 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Marine Resources, Management and Maritime Law & Convention | | | |

- 1. Concept of Law and Contract Act: Concept of Law-Civil, Criminal Law, Statute Law, Admiralty court, Corner's court, Juries, Public Law, Private Law, Public and Private International Law; Understanding of Plaintiffs, Respondent, Summons, Affidavits, Arbitration.

2. Bangladesh Contract Act with reference to following: Agreement, Offer and Acceptance, consideration, consent, capacity to contract, valid void and voidable contracts, quasi contract, breach of contract, remedies for breach, discharge of contract, agency bailment, FOB & CIF contract, Invoice and consular Invoice, Letter of Credit, Bill of Lading, Bills of exchange, Way bill, Charter Parties.
3. Scope of Maritime Law: Sources, Subjects and objects. Continental Shelf, Exclusive Economic Zone, Sea Bed, Admiralty Jurisdiction, innocent passage, International aspects of Registration Ship building contracts and mortgage. Nationality of ships, flags of convenience and flag Discrimination.
4. Knowledge about classification, Recognized classification societies, character symbols of classification.
5. Knowledge about Tonnage, Weight Tonnage class, Measurement Tonnage class, Tonnage Mark.
6. Maritime Lien, Possessory Lien, Freight, General Average.
7. Marine Insurance and Marine Losses; Total Loss and Partial Loss, Constructive total Loss, Particular average loss, General Average Loss, General Average Sacrifice, General Average Expenditure.
8. Knowledge on Marine Fisheries Ordinance 1983, Marine Fisheries Rules of Bangladesh.
9. Knowledge on Fish & Fish Products (Inspection & Quality) control ordinance of Bangladesh with special reference to HACCP (Hazard Analysis Control Critical Point) for quality control on board the fishing vessel.
10. Bangladesh Merchant Shipping Ordinance 1983 in general with special reference to;
 - I. Definitions
 - II. Registration of Ships
 - III. Shipping Master
 - IV. Fishing Vessel
 - V. Function of POMMD
 - VI. Seamen & Apprentices
 - VII. Limitation and Liability
 - VIII. Investigation and Inquiries, etc.
11. Primary knowledge on the role of UN organizations like IMO, ILO, FAO over fishing vessel operation and Maritime business.
12. Simple knowledge on ILO conventions related to Fishing Vessel and Fisherman (ILO Work in Fishing Convention 2007), and Torremolinos Protocol, 1993, SOLAS, STCW-95 (as amended in 2010), STCW-F-95, MARPOL 73/78.

13. Maritime Declaration of health and requirements of international health regulation.
14. Knowledge about Food law, safety of food, Composition of food, Understanding about Codex, Standard documents of Codex, Specialist Committees of Codex Commission.
15. Knowledge on the chapters on Fishing and Fisheries as covered in the UN convention on the Law of the Sea (UNCLOS), 1982 with special reference to Territorial water, Exclusive Economic Zone, Continental Shelf, Coastal state, landlocked state.

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|---------------------|---|------------------|-------------------|-----------------------------|
| Paper Code | 134908 | Marks: 50 | Credits: 2 | Class Hours: 30 hrs. |
| Paper Title: | Applied Science Practical: Physics (Practical) | | | |

PRACTICAL EXPERIMENT:

1. Determination of 'g' by compound pendulum; kater's pendulum.
2. Determination of young's rigidity moduli by Searle's dynamic method.
3. Rigidity modulus by static method.
4. Surface tension of water by capillary tube method.
5. Surface tension and angle of contact of mercury by Quinke's method.
6. To determine to moment of inertia of a Fly-wheel about its axis of rotation.
7. To determine the specific heat by the method of cooling.
8. To determine the thermal conductivity of a bad conductor by Lee's method.
9. To find the frequency of tuning fork by Meld's experiment.
10. Comparison of e.m.f's of two cells.
11. Verification of the law's of combination of resistances.
12. Calibration of a meter bridge wire.
13. Determination of galvanometer resistance by half deflection method.
14. Determination of figure of merit of a galvanometer.
15. Determine E.C.E. of copper/silver.
16. Determination of wave length of light by Newton's rings.
17. Specific rotation of sugar solution by polarimeter.
18. Study the variation of reactance due to L and C with frequency.
19. Plotting the characteristics curve for a diode valve/Semiconductor diode.
20. Construction of receiver and construction of transmitter.
21. Transistor characteristics curve.

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|---------------------|--|-------------------|-------------------|----------------------------|
| Paper Code | 134909 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Safety, Environment Protection And Leadership | | | |

Introduction, Safety and Survival

1. Safety guidance, Principles of survival at sea.
2. Definitions, Survival craft and appliance.
3. SOLAS training manual, Safety symbols.

Emergency situation

1. Types of emergencies, Precautions, Fire prevention.
2. Foundering, Crew expertise and initial familiarization.
3. Muster list and emergency signals, Crew and emergency instructions.
4. Extra equipment and survival, abandoning ship-complications.

Evacuation

1. Abandoning ship-last resort, Personal preparation for abandoning ship.
2. Need to prevent panic, Crew duties to passengers.
3. Crew duties for launching survival craft.
4. Master's order to abandon the ship, Means of survival.

Survival craft and Rescue boats

1. Life boats, Life rafts, Rescue boats.

Personal Life saving appliances

1. Life buoys, Life Jackets, Immersion suits, Thermal protective aid.
2. Boarding survival craft and demonstrations.

Survival at sea

1. Dangers to survivors, Best use of survival craft facilities.

Emergency Radio equipment

1. Portable radio apparatus for survival craft, EPIRBs, SARTs. Introduction, concept & application of Fire triangle to fire and explosion. Types & source of ignition, Flammable materials commonly found on board, Need for constant vigilance, Fire hazards.
2. Organization of shipboard fire-fighting, Location of fire-fighting appliances and emergency escape routes, Fire spread in different parts of a ship.
3. Fire and smoke detection measures on ship and automatic alarm system, Classification of fire and applicable extinguishing agents.
4. Selection of fire-fighting appliances and equipment, fire hoses and nozzles, Mobile apparatus, Portable fire extinguishers, Fireman's outfit, Fire blankets, Fire alarms and first action.
5. Fire fighting, Fire fighting mediums, Fire fighting procedures, Small fires and Extensive fires.
6. Precautions for & use of fixed installations: General, CO2 and Foam system, Sprinklers, Pressure spray system.

Personal Safety, Social Responsibilities and Environmental Protection

1. Introduction, Ship familiarization, Nature of shipboard hazards, Equipment for counter the hazards, List of hazards, Hot work, Engine room watch keeping.
2. Team building, Team work, Pollution, Effect of pollution on marine environment, International measures for pollution prevention.
3. Fundamentals of communications, Methods of communication, Barriers in communication, Effective transmission skills, Effective listening skills, Effects of wrong communication.
4. Rights and obligation of crew employment conditions, Health and Hygiene on board, Explanation of Emergency, Drills and Muster, Value and need of drill and training, Internal communication.
5. Loading and unloading of cargo, Mooring and unmooring, Enclosed spaces, working aloft.
6. Galley, Pantry, Fridge room, Drugs and alcohol, Periodical demonstration for preventing environmental pollution on board and sea.

Leadership

1. Leadership.
2. Leadership VS Management.
3. Achieving Executive Balance: Nine Ways Leaders and Managers Work Together.
4. Comparison Chart of Leadership Skills and Management Skills.
5. **Theories of Leadership.**
6. **Types of Leadership**-Authentic leadership, Military Leadership and Public leadership.
7. Leadership Styles:-Autocratic, Democratic, Laissez Faire Leadership: Lewin, Lippitt, & Whites Leadership Studies.
8. Marine Corps Leadership Principles.
9. Ethics of Leadership.
10. Leadership Skills. Motivation, inter-personal relationship, cross cultural relationship.
11. Characteristics of a Leadership.
12. Habits of highly Effective People.

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|---------------------|---|-------------------|-------------------|----------------------------|
| Paper Code | 134910 | Marks: 100 | Credits: 4 | Class Hours: 60hrs. |
| Paper Title: | Maritime Science Practical: {Ship-Board Practical Training (Mode Of Exam - Evaluation Of Training Record Book + Viva Voice)} | | | |

NATIONAL UNIVERSITY



Syllabus Subject: Physics

Three Year B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
 Syllabus for Three Year B.Sc. Pass Course
 Subject: Physics
 Session: 2013-2014
 Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|-----------|--|-------|---------|
| First Year | | | | |
| 112701 | Paper-I | Mathematical Methods, Waves and Optics | 100 | 4 |
| 112703 | Paper-II | Mechanics, Properties of Matter and Relativity | 100 | 4 |
| Second Year | | | | |
| 122701 | Paper-III | Thermodynamics and Statistical Mechanics | 100 | 4 |
| 122703 | Paper-IV | Electromagnetism and Basic Electronics | 100 | 4 |
| Third Year | | | | |
| 132701 | Paper-V | Atomic Physics and Quantum Mechanics | 100 | 4 |
| 132703 | Paper-VI | Nuclear Physics and Solid State Physics | 100 | 4 |
| 132704 | Paper-VII | Physics Practical | 100 | 4 |
| | | Total = | 700 | 28 |

Detail Syllabus

First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|--|-------|---------|
| 112701 | Paper-I | Mathematical Methods, Waves and Optics | 100 | 4 |

A. MATHEMATICAL METHODS

1. Vector Analysis

Transformation properties of vectors; Differentiation and integration of vectors; Line integral, volume integral and surface integral involving vector fields; Gradient, divergence and curl of a vector field; Gauss' divergence theorem, Stokes' theorem, Green's theorem - application to simple problems; Orthogonal curvilinear co-ordinate systems, unit vectors in such systems, illustration by plane, spherical and cylindrical co-ordinate systems only.

2. Matrices

Hermitian adjoint and inverse of a matrix; Hermitian, orthogonal, and unitary matrices; Eigenvalue and eigenvector (for both degenerate and non-degenerate cases); Similarity transformation; digitalization of real symmetric matrices.

3. Ordinary Differential Equations

Solution of second order linear differential equations with constant coefficients and variable coefficients by Frobenius' method (singularity analysis not required); Solution of Legendre and Hermite equations about $x=0$; Legendre and Hermite polynomials - orthonormality properties.

4. Partial Differential Equations

Solution by the method of separation of variables; Laplace's equation and its solution in Cartesian, spherical polar (axially symmetric problems), and cylindrical polar ('infinite cylinder' problems) coordinate systems.

5. Fourier Series

Fourier expansion – statement of Dirichlet's condition, analysis of simple waveforms with Fourier series. Introduction to Fourier transforms; the Dirac-delta function and its Fourier transform; other simple examples. Vibration of stretched strings- plucked and struck cases.

B. WAVES AND OPTICS

1. Linear Harmonic Oscillator (LHO)

LHO. Free and forced vibrations. Damping. Resonance. Sharpness of resonance. Acoustic, optical, and electrical resonances: LCR circuit as an example of the resonance condition. A pair of linearly coupled harmonic oscillators --- eigenfrequencies and normal modes.

2. Waves

Plane progressive wave in 1-d and 3-d. Plane wave and spherical wave solutions. Dispersion: phase velocity and group velocity.

3. Fermat's principle

Fermat's principle and its application on plane and curved surfaces.

4. Cardinal points of an optical system

Two thin lenses separated by a distance, equivalent lens, different types of magnification, Helmholtz and Lagrange's equations, paraxial approximation, introduction to matrix methods in paraxial optics – simple application.

5. Wave theory of light

Huygen's principle; deduction of law of reflection and refraction.

6. Interference of Light

Condition of sustained interference by analytical treatment, Division amplitude and division of wave front, methods for production of interference fringes by biprism and determination of wavelength, measurement of thickness of thin films, colour of a thin film in reflected and

transmitted light, Haidinger's fringe, Theory of Newton's rings. Determination of wavelength and refractive index using Newton Ring apparatus .

7. Interferrometer

Michelson's interferometer and its theory relating to the formation of circular fringe's, Determination of wavelength of a source and small difference of wave lengths in D lines by Michelson's interferometer, standardization of a meter by Michelson's interferometer.

8. Diffraction of light

Fresnel and Fraunhofer class of diffraction, Fresnel's half period zones, zone plate its similarity with convex lens. Diffraction at straight edge, circular aperture.

9. Elements of fiber optics

Construction of optical fibers, image formation, numerical aperture, structure--step index, graded index, uses.

Books &References:

Mathematical Physics

1. Introduction to Mathematical Physics - C. Harper (Prentice-Hall of India).
2. Mathematical Methods - M. C. Potter and J. Goldberg (Prentice-Hall of India).
3. Vector Analysis - M. R. Spiegel, (Schaum's Outline Series) (Tata McGraw-Hill).
4. Tatwiyā Padārtha Bidyā Bhumikā – S. Sengupta, Asok Ghosh and D. P. Roychoudhuri (W.B. State Book Board (WBSBB)).
5. Mathematical Physics – P.K. Chattopadhyay (Wiley Eastern)

Waves and Optics

1. Waves and Oscillations - Rathin N. Chaudhury (New Age Publ.).
2. Waves- J R Crawford (Tata McGraw Hill)
3. Fundamentals of Optics - F. A. Jenkins and H. E. White (Mc Graw Hill, Kogakusha).
4. Geometrical and Physical Optics - B. S. Longhurst (Orient Longmans).
5. Optics – A. K. Ghatak (Tata Mc Graw Hill).
6. Optics – Hecht and Zajac (Addison-Wesley)

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--|--------------|----------------|
| 112703 | Paper-II | Mechanics, Properties of Matter and Relativity | 100 | 4 |

A. MECHANICS

1. Mechanics of a Single Particle

Velocity and acceleration of a particle in (i) plane polar coordinates - radial and cross-radial components (ii) spherical polar and (iii) cylindrical polar co-ordinate system; Time and path

integral of force; work and energy; Conservative force and concept of potential; Dissipative forces; Conservation of linear and angular momentum.

2. Mechanics of a System of Particles

Centre of mass, centre of mass frame, centre of moving systems, Collision: elastic and inelastic collision, coefficient of restitution. Expression of velocities of two bodies after elastic and inelastic collision in laboratory frame. Elastic collision in centre of mass frame. Relationship between angle of scatterings in laboratory frame and centre of mass frame. Motion of a rigid body about a fixed axis. Angular momentum and expression of angular momentum of a system of rotating bodies. Relationship of angular momentum of a system of bodies with angular momentum in centre of mass frame. Principle of conservation of angular momentum.

3. Rotational Motion

Moment of inertia, radius of gyration; Energy and angular momentum of rotating systems of particles; Parallel and perpendicular axes theorems of moment of inertia; Calculation of moment of inertia for simple symmetric systems; Ellipsoid of inertia and inertia tensor; Setting up of principal axes in simple symmetric cases. Rotating frames of reference - Coriolis and centrifugal forces, simple examples. Force free motion of rigid bodies - free spherical top and free symmetric top.

B. PROPERTIES OF MATTER

1. Gravitation

Gravitational potential and intensity, calculation of gravitational potential and intensity due to thin spherical shell, thick spherical shell, sphere, circular disc etc. Compound pendulum, measurement of 'g' by bar and Kater's pendulum.

2. Elasticity

Hooke's law, work done in strain, elongation strain, volume strain, shearing strain, Young's modulus, Bulk modulus and rigidity modulus and their inter-relationship, Poisson's ratio, torsion in a cylinder, twisting couple, variation of strain along its length. Bending of beams and cantilevers in different cases: loaded at free end, loaded uniformly, bending moments.

3. Viscosity

Equation of continuity, Energy of a liquid in flow, Bernoulli's theorem, critical velocity, Reynold's number, Poiseuille's equation, motion in a viscous medium: Stoke's law, streamline and turbulent flow.

4. Surface tension

Surface tension as a molecular phenomenon, surface tension and surface energy. Excess pressure on curved liquid surface (spherical bubble and drop). Theory and experimental determination of surface tension of liquid by ripple method.

C. RELATIVITY

1. Introduction

Galilean transformation and invariance of Newton's laws of motion, non-invariance of Maxwell's equations. Michelson-Morley experiment and explanation of the null result.

2. Special Theory of Relativity

Concept of inertial frame. Postulates of special theory; simultaneity; Lorentz transformation along one of the axes – length contraction, time dilatation and velocity addition theorem, Fizeau's experiment. Four vectors. Relativistic dynamics : variation of mass with velocity; energy momentum relationship.

3. Vectors and Tensors

Covariant and contravariant vectors. Contraction. Covariant, contravariant, and mixed tensors of rank-2, transformation properties. The metric tensor (flat space-time only). Raising and lowering of indices with metric tensors. (Consistent use of any one convention --- $\text{diag}(-1,1,1,1)$ or $\text{diag}(1,-1,-1,-1)$.) Example of common four-vectors: position, momentum, derivative, current density, four-velocity.

Books & References:

Mechanics & Properties of Matter

1. Theoretical Mechanics - M. R. Spiegel, (Schaum's Outline Series) (McGraw-Hill).
2. Mechanics - K. R. Symon (Addison-Wesley).
3. Introduction to Classical Mechanics - R. G. Takwale and P. S. Puranik (Tata McGraw-Hill).
4. Classical Mechanics – N. C. Rana and P. S. Joag (Tata McGraw-Hill).
5. Physics-I - D. Halliday and R. Resnick (Wiley India Pvt Ltd).
6. Padarther Dharma - D. P. Ray Chaudhuri (West Bengal State Book Board).
7. The Feynman Lectures on Physics – Vol I (Addison-Wesley).
8. An Introduction to Mechanics – D. Keppner and R.J. Kolenkow (Tata McGraw-Hill).
9. Mechanics – H. S. Hans and S. P. Puri (Tata McGraw-Hill).
10. Classical Mechanics – J. Goldstein (Narosa Publ. House).
11. Classical Mechanics – A. K. Roychaudhuri (O. U. P., Calcutta).

Relativity

1. Concepts of Modern Physics, Arthur Beiser, (Tata McGraw-Hill)
2. Modern Physics, K. S. Krane, (Wiley India Pvt Ltd)
3. Modern Physics, Murugesan & Sivaprasath, (S. Chand & Company Ltd)
4. Introduction to Mechanics, Mahendra K. Verma, (Universities Press)

References:

1. Introduction to Special Relativity, R. Resnick, (Wiley India Pvt Ltd)
2. Elements of Properties of Matter, D. S. Mathur, (S. Chand & Company)
3. General Theory of Relativity, P. A. M. Dirac, (Prentice-Hall of India)

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|--|-------|---------|
| 122701 | Paper-III | Thermodynamics and Statistical Mechanics | 100 | 4 |

A. THERMODYNAMICS**1. Kinetic Theory of Gasses**

Basic assumptions of kinetic theory, Ideal gas approximation, deduction of perfect gas laws. Maxwell's distribution law (both in terms of velocity and energy), root mean square and most probable speeds. Finite size of molecules : Collision probability, Distribution of free paths and mean free path from Maxwell's distribution. Degrees of freedom, equipartition of energy (detailed derivation not required).

2. Real Gases

Nature of intermolecular interaction : isotherms of real gases. Van der-Waals equation of state, Other equations of state (mention only), critical constants of a gas, law of corresponding states; Virial Coefficients, Boyle temperature.

3. Heat transfer

Thermal conductivity, diffusivity, Fourier equation for heat conduction –its solution (steady state) for rectilinear and radial (spherical and cylindrical) flow of heat, Determination of thermal conductivity of solids by Searle's method, Forbe's method and Lee's disc method(for bad conductors).

4. Radiation

Nature of radiant heat, emissive and absorptive power, prevost's theory of heat exchange, Kirchhoff's law (simple deduction), Black body radiation, Stefan-Boltzmann law, Planck's formula for black body radiation (elementary idea).

5. Basic Concepts of Thermodynamics

Microscopic and macroscopic points of view : thermodynamic variables of a system, State function, exact and inexact differentials.

6. First Law of Thermodynamics

Thermal equilibrium, Zeroth law and the concept of temperature. Thermodynamic equilibrium, internal energy, external work, quasi-static process, first law of thermodynamics and

applications including magnetic systems, specific heats and their ratio, isothermal and adiabatic changes in perfect and real gases.

7. Second Law of Thermodynamics

Reversible and irreversible processes, indicator diagram. Carnot's cycles-efficiency, Carnot's theorem. Kelvin's scale of temperature, relation to perfect gas scale, second law of thermodynamics – different formulations and their equivalence, Clausius inequality, entropy, change of entropy in simple reversible and irreversible processes, entropy and disorder; equilibrium and entropy principle, principle of degradation of energy.

8. Thermodynamic Functions

Enthalpy, Helmholtz and Gibbs' free energies; Legendre transformations, Maxwell's relations and simple deductions using these relations; thermodynamic equilibrium and free energies.

9. Change of State

Equilibrium between phases, triple point : Gibbs' phase rule (statement only) and simple applications. First and higher order phase transitions, Ehrenfest criterion. Clausius-Clapeyron's equation. Joule-Thomson effect.

B. STATISTICAL MECHANICS

1. Phase space

Concept of Microstates and macro states, Basic postulates - equal priori probability and ergodic hypothesis, Liouville theorem and conservation of density in phase space, Statistical ensemble - Micro-canonical, Canonical and Grand canonical ensemble and their partition functions, Relation of statistical mechanics with thermodynamics - Expressions of different thermodynamical quantities (e.g. Free energy, pressure, average energy, entropy, Specific heat) in terms of partition function;

2. Classical statistics

Maxwell-Boltzmann distribution function, Calculation of thermodynamical quantities for ideal gas, Maxwell-Boltzmann velocity distribution law, (Average, most probable velocity and root mean square speed and their relation; Principle of equipartition of energy.)

3. Quantum statistics

Concept of indistinguishability, Entropy of mixing and Gibbs' paradox, Resolution of Gibbs' paradox introducing indistinguishability; Bose-Einstein distribution function and its behaviour with temperature, Basic idea of phenomenon Bose-Einstein condensation (Qualitative description), Calculation of various thermodynamical quantities of photon gas (black body radiation); Fermi-Dirac distribution function and its behaviour with temperature, Basic idea of Fermi surface and Fermi energy, Calculation of various thermodynamical quantities of free electron gas; Classical limits and distinguishing features of classical and quantum statistics.

Books &References:

Heat &Thermodynamics

1. Heat and thermodynamics - Zemansky and Ditman (Mc Graw Hill, Kugakusha).
2. Kinetic theory of gases - Loeb (Radha Publ. House).
3. Thermodynamics – F. Fermi (Dover)
4. Tapgatividya – Asoke Ghosh (W.B.S.B.B).
5. A Treatise on Heat - Saha and Sribastava (The Indian Press Ltd).
6. Gaser Anabik Tattwa- Pratip Kumar Chaudhuri (W. B. S. B. B).
7. Thermal Physics – S. Garg, R. M. Bansal, C. K. Ghosh (Tata Mc Graw Hill).
8. Heat and Thermodynamics – H. P. Roy and A. B. Gupta (New Central Book Agency).

Statistical Mechanics

1. Statistical Physics, F. Mandl (ELBS).
2. Fundamentals of Statistical and Thermal Physics, F. Reif, (Mc Graw Hill).

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--|--------------|----------------|
| 122703 | Paper-IV | Electromagnetism and Basic Electronics | 100 | 4 |

A. ELECTROMAGNETISM

1. Electrostatics

Quantisation of charge and Millikan's oil-drop experiment, Coulomb's law, intensity and potential --- example of point charge, Gauss' theorem --- simple applications, potential and field due to an electric dipole, mechanical force on the surface of a charged conductor. Dielectric medium, polarization, electric displacement.

2. Capacitor

Parallel-plates and cylindrical, energy stored in parallel plate capacitor.

3. Steady Current

Network analysis --- Kirchoff's laws, Thevnin and Norton's theorem, Wheatstone bridge, potentiometer.

4. Thermoelectricity

Seebeck, Peltier, and Thomson effects, laws of thermoelectricity, thermoelectric curve --- neutral and inversion temperature, thermoelectric power.

5. Magnetic effect of current

Biot and Savart's law, Ampere's circuital law (statement only), magnetic field due to a straight conductor, circular coil, solenoid, endless solenoid, Magnetic field due to a small current loop --
- concept of magnetic dipole, Ampere's equivalence theorem.

6. Lorentz force

Force on a moving charge in simultaneous electric and magnetic fields, force on a current carrying conductor in a magnetic field.

7. Magnetic materials

Intensity of magnetization, relation between **B**, **H**, and **M** --- illustration in the case of bar magnet, magnetic susceptibility --- dia, para and ferromagnetic materials, statement of Curie's law. Hysteresis in a ferromagnetic material, hysteresis loss.

8. Electromagnetic induction

Self and mutual inductances in simple cases, energy stored in inductance.

9. Varying currents

Growth and decay of currents in L-R circuit; charging and discharging of capacitor in C-R circuit.

10. Alternating current

Mean and r.m.s. values of current and emf with sinusoidal wave form; LR, CR and series LCR circuits, reactance, impedance, phase-angle, power dissipation in AC circuit --- power factor, vector diagram, resonance in a series LCR circuit, Q-factor, principle of ideal transformer.

B. BASIC ELECTRONICS

1. Thermo-ionic emission

classical deduction of Richardson's equation, characteristic curve of a vacuum diode, space charge, temperature and space charge limited current, Child Langmuir law, Triode and its characteristics curves, parameters from these curves. Triode as an amplifier, graphical analysis with load line. Semiconductors : junction diode, zener diode & their applications.

2. Basic concepts of Transistor

PNP & NPN transistors operation, characteristics curves of a transistor in common emitter and common base mode - current amplification factor, input & output resistance. Transistor as an amplifier (simple Mathematical treatment) in CE mode, d.c and a.c load line, graphical analysis of the amplifier.

3. Feed back in amplifiers

conditions of oscillation, Barkhausen criteria ; Working principle & description of Tuned collector and Hartley oscillators mentioning frequency of oscillation.

4. Logic gates

Logic gates: OR, AND, NOT, NAND, NOR, XOR, their circuit realization & truth tables. Boolean algebra, de Morgan's theorem, flip-flop circuit.

Books &References:

Electricity & Magnetism

1. Introduction to Electrodynamics – D. J. Griffith, (Prentice Hall, India Pvt. Ltd).
2. Berkeley Series Vol II (Electricity and Magnetism) E.M. Purcell (Tata McGraw-Hill).
3. The Feynman Lectures on Physics – Vol. II (Addison – Wesley).
4. Electricity and Magnetism - J. H. Fewkes and J. Yarwood (Oxford Univ. Press, Calcutta).
5. Physics-II - D. Halliday and R.Risnick (Wiley India Pvt Ltd).
6. Classical Electrodynamics – J.D> Jackson (Wiley India)

Electronics

1. Integrated Electronics – J. Millman and C. C. Halkias (Mc Graw Hill).
2. Electronic Fundamentals and Applications – D. Chattopadhyay and P. C. Rakshit (New Age International)
3. Electronics Fundamentals and Applications – J. D. Ryder (PHI Pvt. Ltd).
4. Electronic Device and Circuit Theory – R. Boylestad and L. Nashelsky (Prentice – Hall).
5. Integrated Electronics – J. Millman and C. C. Halkias (Mc Graw Hill).
6. Digital Logic and Computer Design – M. Moris Mano, (PHI (Pvt.) Ltd.).
7. Electronics – R.K. Kar (**Books and Allied (P) Ltd.**).
8. Digital Electronics – D. Ray Chaudhuri (Platinum Publishers)

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|--------------------------------------|-------|---------|
| 132701 | Paper-V | Atomic Physics and Quantum Mechanics | 100 | 4 |

1. Atomic Spectrum:

Good quantum numbers, and selection rules. Stern-Gerlach experiment and spin as an intrinsic quantum number. Incompatibility of spin with classical ideas. Bohr-Sommerfeld model. Fine structure. Study of fine structure by Michelson interferometer.

2. Vector model of atom:

Magnetic moment of the electron, Lande g factor. Vector model – space quantization. Zeeman effect. Explanation from vector atom model.

3. Bohr's hydrogen atom

Theory of hydrogen atom, expression of radii of electrons, expression of energies and hydrogen atom spectrum. Effect of nuclear motion on atomic spectra, reduced mass, modified Rydberg constant and wave number, Evidences in favour of Bohr' s theory, correspondence principle, fine structure of special lines and Sommerfield's relativistic atom model.

4. Uncertainty principle

Uncertainty principle - Its deduction and application to simple problems, viz, Non-existence of electron within nucleus, Ground state energy of Hydrogen atom, Radius of Bohr orbit.

5. Molecular spectroscopy

Diatomic molecules – rotational and vibrational energy levels. Basic ideas about molecular spectra. Raman effect and its application to molecular spectroscopy (qualitative discussion only).

B. QUANTUM MECHANICS

1. Old quantum theory

Planck's formula of black-body radiation. Photoelectric effect. Quantization of energy levels.

2. Basic quantum mechanics

de Broglie hypothesis. Electron double-slit experiment. Compton effect, Davisson-Germer experiment, Heisenberg's uncertainty principle (statement) with illustrations. Concept of wave function as describing the dynamical state of a single particle. Group and phase velocities, classical velocity of a particle and the group velocity of the wave representing the particle. Principle of superposition. Schrödinger equation. Probabilistic interpretation; equation of continuity, probability current density. Boundary conditions on the wave function.

3. Basic postulates of quantum mechanics

Dynamical variables as linear hermitian operators and eigenvalue equations, Momentum, energy and angular momentum operators. Measurement of observables, expectation values. Commutation relations between operators. Compatible observables and simultaneous measurements, Ehrenfest theorem.

Books &References:

Atomic Physics

1. Mani H.S. and Mehta G.K. : Introduction to Modern Physics
2. Beiser A. : Perspectives of Modern Physics
3. White A.E. : Introduction to Atomic Physics
4. Barrow H., : Introduction to Molecular Physics
5. Feynmann R.P. Et al : The Feynmann Lectures in Physics, B.I. Publication
6. Hertzberg G. : Atomic Spectra and Atomic Structure
7. Hertzberg G. : Molecular spectra and Molecular Structure
8. Herchiaf : Fluorescence and phosphorescence Olon,

Quantum Mechanics

1. Quantum Mechanics – J. L. Powell and B. Crasemonn, (Oxford, Delhi).
2. Quantum Mechanics – F. Schwabl (Narosa).

3. Quantum Mechanics – A. K. Ghatak and S. Lokenathan (Macmillan, Delhi).
4. Introductory Quantum Mechanics - S. N. Ghoshal (Calcutta Book House).
5. A Textbook of Quantum Mechanics – P. M. Mathews and K. Venkatesan (Tata Mc Graw Hill).
6. Modern Quantum Mechanics – Sakurai (Persian Education)

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|---|-------|---------|
| 132703 | Paper-VI | Nuclear Physics and Solid State Physics | 100 | 4 |

A. NUCLEAR PHYSICS

1. Bulk properties of nuclei

Nuclear mass, charge, size, binding energy, spin and magnetic moment. Isobars, isotopes and isotones; mass spectrometer (Bainbridge).

2. Nuclear structure

Nature of forces between nucleons, nuclear stability and nuclear binding, the liquid drop model (descriptive) and the Bethe-Weizsacker mass formula, application to stability considerations, extremesingle particle shell model (qualitative discussion with emphasis on phenomenology with examples).

3. Unstable nuclei

- (a) Alpha decay : alpha particle spectra – velocity and energy of alpha particles. Geiger-Nuttal law.
- (b) Beta decay : nature of beta ray spectra, the neutrino, energy levels and decay schemes, positron emission and electron capture, selection rules, beta absorption and range of beta particles, Kurie plot.
- (c) Gamma decay : gamma ray spectra and nuclear energy levels, isomeric states. Gamma absorption in matter, photoelectric process, Compton scattering, pair production (qualitative).

4. Nuclear fission and fusion

Discovery and characteristics, fission products and energy release, spontaneous and induced fission, transuranic elements. Chain reaction and basic principle of nuclear reactors. Nuclear fusion: energetics in terms of liquid drop model.

B. SOLID STATE PHYSICS

1. Crystal Geometry

Amorphous and crystalline materials, glassy forms periodic lattice, basis, translation vectors, primitive and non-primitive Crystal Axis, Unit Cell, Primitive and Conventional Bravais lattice,

Miller indices, symmetry, point groups and space groups. Body centered and face centered lattices, interplanar spacing. Indices of lattice planes.

2. Crystallography

Bragg's law, diffraction of X –ray, measurement of lattice parameter for cubic lattices. Theory of Laue Spots.

3. Bonding in Solids

Types of bonding in solids, covalent, Ionic bindings, energy of bonding, transition between covalent and ionic bonding, metallic bonding, Vander waal's bonding, hydrogen bond.

4. Lattice Vibrations

Linear monatomic chains, Acoustical and optical phonons, Qualitative description of the phonon spectrum, Brillouin Zones, Einstein and Debye theories of specific heat of solid T^3 Law. Qualitative description of free electron theory and its inadequacies with reference to Hall effect and specific heat of electrons in metals.

Books &References:

Nuclear Physics

1. Littlefield T.A. and Thorley N. : Atomic and Nuclear Physics E.L.B.S.
2. Enge H.A. : Introduction to Nuclear Physics, Addison-Wesley
3. Meyroff : Element of Nuclear Physics
4. Kaplan : Nuclear Physics
5. Cohen : Concepts of Nuclear Physics
6. Segre : Nuclei and particles. BIn'Cham : Nuclear Physics 31

Solid State Physics

1. Introduction to Solid State Physics, C. Kittel (Wiley Eastern).
2. Elementary Solid State Physics – M. Ali Omar (Pearson Education)
4. Solid State Physics – A. J. Dekker (Mc. Millan)
4. Solid State Physics – S. O. Pillai (New Age International)
5. Elements of Solid State Physics – J. P. Srivastava (Prentice Hall)
6. An Introduction to Solid State Physics and Application – R.J. Elliot and A.F. Gibson (McMillan)
7. Solid State Physics – D.W. Snoke (Person Education)

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------|--------------|----------------|
| 132704 | Paper-VII | Physics Practical | 100 | 4 |

LABORATORY CLASSES: At least 30 Experiments are to be performed during 3 years.

(Two Experiments, one from each group are to be performed in six (6) hours during final examination)

Distribution of Marks

| Distribution of Marks | | | Distribution of Marks on each Experiment | | |
|-----------------------|--|----------------|--|-----------------------------|-----------|
| i) | Two Experiments (One from each group) | 2×35=70 | i) | Theory | 5 |
| ii) | Laboratory Note Book | 15 | ii) | Procedure & Data Collection | 15 |
| iii) | Viva-voce on Experiment | 15 | iii) | Calculations & Results | 10 |
| | | | iv) | Discussions | 5 |
| | Total | 100 | | Total | 35 |

Laboratory Teaching Classes

One laboratory class (of 3 periods duration) per week should be devoted to teach the following topics during the three years course. These lectures should be taken in laboratory and should be of interactive type so that students also participate in the learning process. As the course on physics practical will be taught in early months of first year, students will get sufficient time to use apparatus in practical classes.

Laboratory Teaching

1. Demonstration lectures on use of Vernier, Micrometer, Spherometer, Barometer, common balance ,etc.; graph plotting -2 Lab-class.
2. (i) Basic ideas of Probability & Statistics
(ii) Error analysis, significant figures, limits of accuracy of an Experiment-associated choice of equipments. -3 Lab-class
3. Measuring instruments (e.g. Galvanometer, Multimeter & CRO) to be used in the laboratory – 2 Lab-class.

GROUP –A

1. Determination of the value of acceleration due to gravity by using bar Pendulum.
2. Determination of moment of inertia of a metallic cylinder/rectangular bar about an axis passing through its centre of gravity.
3. To determine the modulus of rigidity of the form of a cylindrical rod by statical method.
4. Determination of young's modulus of the material of the given wire by Searle's method.
5. To determine the focal length of two given convex lenses and their combination in contact by displacement method.

6. Determination of refractive index of the given liquid with the help of plane mirror, convex lens & spherometer.
7. To determine the focal length of two given convex lenses and their combination in contact by displacement method.
8. Determination of the refractive index of the material of a prism by drawing the i - δ curve using spectrometer.
9. To calibrate a polarimeter and hence to determine the concentration of sugar solution.
10. Determination of the surface tension of water by capillary rise method.
11. Determination of the co-efficient of viscosity of water by flow through a capillary tube
12. Determination of the frequency of a tuning fork with the help of a sonometer (Either by using the relevant formula or by using the n - l curve).
13. To determine refractive index of water using travelling microscope.
14. To determine the boiling point of a given liquid by platinum resistance thermometer.
15. Determination of thermal conductivity of the given rod by Searle's apparatus.
16. Determination of thermal conductivity of a bad conductor of heat by Lee's and Chorlton's method.
17. Determination of specific heat of the given liquid by the method of cooling.
18. To determine the boiling point of a given liquid by platinum resistance thermometer.
19. To determine the melting point of a solid with the help of a thermocouple.
20. To determine the wavelength of monochromatic source by Fresnel's biprism.
21. Determination of the width of a single slit by the Spectrometer with diffraction method.
22. To determine the wave length of monochromatic light by Newton's ring experiment.

GROUP –B

1. To determine the ballistic constant of a ballistic galvanometer.
2. Determination of specific resistance of the material of a given wire by meterbridge.
3. Verification of the laws of series and parallel resistance by a Post Office box.
4. Determination of E.C.E. of copper by using an ammeter and a copper voltameter.
5. Determination of EMF of a cell by potentiometer.
6. Comparison of the magnetic moments of two given bar magnets by deflection magnetometer.
7. Determination of the value of the given low resistance by drop of potential method with the help of metre-bridge.

8. Determination of internal resistance of a cell with the help of potentiometer.
9. Conversion of the given galvanometer into an ammeter & its calibration using copper voltameter.
10. Determination of resistance of a galvanometer by half-deflection method.
11. Determination of the reduction factor of a tangent galvanometer with copper voltameter and hence to determine the value of H, the horizontal component of earth's magnetic field.
12. Convert a given galvanometer into voltmeter and calibrate it.
13. To draw the forward characteristic curves of a semiconductor diode and hence calculate the dc resistance (r_{dc}).
14. To draw the dynamic characteristic curve of a triode for three different loads and to calculate the voltage gain for the load and to compare it with the theoretically calculated value.
15. To draw input, out put and mutual characteristics curve of a transistor in CE mode and hence to calculate its h-parameters.
16. To measure the resistance, reactance and self inductance of a choked coil in an L-R circuit using an A.C. Voltmeter.
17. To determine the ripple factor of a full wave rectifier with a shunt capacitor filter using a D.C. voltmeter and to study the variation of ripple factor with load.
18. To study a full wave rectifier with a shunt capacitor as filter circuit and hence to determine the values of ripple factor using CRO at the different loads.
19. To study the frequency response curve of a series LCR circuit and determine the resonance frequency.
20. Determination of J (mechanical equivalent of heat) by Joule's electrical calorimeter.
21. To study the variation of mutual inductance of a given pair of co-axial coils by using a ballistic galvanometer.
22. To measure the self inductance of two coils by Anderson bridge .To find the total inductance of the above two coils connected in series and hence estimate the coefficient of coupling between the coils.

Books &References:

1. *BSc Practical Physics*, C. L. Arora, (S. Chand)
2. *An Advanced Course in Practical Physics*, D. Chattopadhyay and P. C. Rakshit, (New Central Book Agency)
3. *A Text Book of Advanced Practical Physics*, S. Ghosh, (New Central Book Agency)
4. ব্যবহারিক পদার্থবিজ্ঞান- অরুণ বসাক ও ছদরুদ্দিন আহমেদ চৌধুরী
5. ব্যবহারিক পদার্থবিজ্ঞান (১ম ও ২য় খণ্ড) - মফিজুল মান্নান

NATIONAL UNIVERSITY



Syllabus

Subject: Psychology

Three Years B.Sc. Pass Course

Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: Psychology
Session: 2013-2014

Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|-----------|--|-------|---------|
| First Year | | | | |
| 113401 | Paper-I | General Psychology | 100 | 4 |
| 113403 | Paper-II | Experimental Psychology | 100 | 4 |
| Second Year | | | | |
| 123401 | Paper-III | Developmental Psychology | 100 | 4 |
| 123403 | Paper-IV | Social Psychology | 100 | 4 |
| Third Year | | | | |
| 133401 | Paper-V | Industrial Psychology | 100 | 4 |
| 133403 | Paper-VI | Measurement & Statistics in Psychology | 100 | 4 |
| 133404 | Paper-VII | Practical | 100 | 4 |
| | | Total = | 700 | 28 |

Detailed Syllabus

First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|--------------------|-------|---------|
| 113401 | Paper-I | General Psychology | 100 | 4 |

- 1. Introduction:** Definition and nature of Psychology; Psychology as a science; Fields of Psychology: Experimental, Physiological, Clinical, Counseling, Industrial, Engineering, Educational, Social and Developmental Psychology; Methods of Psychology: Experimental, observational. Clinical, Case histories, Survey method.
- 2. Sensation and Perception:** The nature of sensation and perception; Selectivity in perception: Selective attention; Determinants of stimulus selection; Form perception: Figure and ground, contour, perceptual organization, Perceptual constancy: Size and Brightness constancy; Depth perception: Monocular and Binocular cues to depth perception; perception of movement; Illusion and hallucination.
- 3. Learning:** Definition and nature of learning; Factors of learning; Classical conditioning, Operant conditioning, Cognitive learning: Cognitive mapping, Latent learning, Insightful learning; Principles of reinforcement: Primary and secondary reinforcement, Schedule of reinforcement.
- 4. Memory and forgetting:** Defining Memory and forgetting; Information processing approach-Sensory memory, short-term memory and long term memory; Ways of measuring memory;
- 5. Motivation:** Defining Motivation; Motivational cycle; Characteristics of motivated behavior;
- 6. Personality:** Definition of personality; Nature and determinants of personality: Observation, Rating Inventories and Projective tests.

7. **Intelligence:** Definition of intelligence; Concept of I.Q.; Measurement of intelligence; Verbal and non-verbal tests, Individual and group tests;

References:

1. আফসার উদ্দীন (২০০২). সাধারণ মনোবিজ্ঞান। রাজশাহী : রাজশাহী বিশ্ববিদ্যালয় প্রকাশনা বোর্ড।
2. Crider, A.B., Goethals, G.R. Robert D. Kavanaugh.R.D. Solomon, P.R. Psychology, Scott Foresman (1993), Psychology (4th ed.) New York; Harper Collins College publishers.
3. Feldman, R.S. (2002), Understanding Psychology (6th ed.) New York; Mc Graw Hill; Hisher education.
4. Hilgrad, E.R., Alkimson, R., and Alkinson. (R.C.) Introduction to Psychology. New York; Harcourf Brace, Latested.
5. Huffman K. (2004) Psychology in Action (7th ed.) U.S.A.; John Wiley and Sons Inc.
6. যোগেন্দ্র কুমার মন্ডল (২০০৮)ঃ সাধারণ মনোবিজ্ঞান; হাসান বুক হাউজ, ঢাকা।
7. Morgan, C.T. and King, R.A Wisz, J.R. and Shoopier C. (1966) Introduction to Psychology. New York: Mc Graw Hill.
8. Munn. N.L. (1969). Introduction to Psychology; D Boston, Houghton Mifflin Co.
9. Newman, P.R. and Newman, B.M. (1983) Principles of Psychology; Illionis Homewood: The Dorsey Press, Latested.
10. Zimbardo, P.G (1979), Psychology and life: Scott, Foresman and Co. Latested.
11. কাজী সাইফুদ্দীন (২০১০), সাধারণ মনোবিজ্ঞান, আলিয়া পাবলিকেশন, ঢাকা।
12. নীহার রঞ্জন সরকার, মনোবিজ্ঞান ও জীবন।
13. এম. আর. আলী, মনোবিজ্ঞান।

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------------|-------|---------|
| 113403 | Paper-II | Experimental Psychology | 100 | 4 |

1. **Introduction:** Definition and scope of experimental psychology, stimuli and responses, Forms of behavior studied in experimental psychology.
2. **Variables:** Definition; Types of variables; control of variables; experimental variable and controlled variable. Relationship between variables.
3. **Experimentation:** Experimental method, characteristics of experimental method, Experimental method vs Scientific method. Types of experiment, Experimental group and control group.
4. **The Problem:** Selecting the problem, necessity of defining a problem, technique involved in defining a problem.
5. **Hypothesis:** Definition and Types of hypothesis, sources of hypothesis, function of hypothesis, Characteristics of a good hypothesis.
6. **Designing and conducting experiment:** Essential characteristics of good experimental design, Types of experimental design: Simple Randomized Design, Two Matched Groups Design, More than Two Randomized Groups Design, Repeated Measurement Design, Within Group Design, Factorial Design, Steps in experimentation.
7. **Writing Report of Experiments- steps.**

References:

1. মীর ফখরুজ্জামান. পরীক্ষন মনোবিজ্ঞান
2. নীহার রঞ্জন সরকার, মনোবৈজ্ঞানিক পরিমাপন ও পরিসংখ্যান
3. McGuigan, F. T. - Experimental Psychology, Prentice Hall Inc.
4. Postman, L & Egan, J.P. - Experimental Psychology: An Introduction, Harper & Row.NY.
5. Woodworth & Schlosberg – Experimental Psychology.
6. কাজী সাইফুদ্দীন (২০০৭), পরীক্ষন মনোবিজ্ঞান ও গবেষণা পদ্ধতি, আবীর প্রকাশনি, ঢাকা।
7. নীহার রঞ্জন সরকার, পরীক্ষন মনোবিজ্ঞান।

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|--------------------------|-------|---------|
| 123401 | Paper-III | Developmental Psychology | 100 | 4 |

- 1. Introduction:** Definition of Developmental Psychology, Meaning of developmental change, Types and rate of change, Division of life cycle, Principles of development.
- 2. Methods for the study of development:** Observational method Experimental method, Longitudinal & cross-sectional method, Case Study, Interview, Questionnaires.
- 3. Prenatal development:** How life begins, three stages of prenatal development, Factors influencing prenatal development, Maternal factors & environmental factors.
- 4. Birth and Neonate:** The birth process, Types of birth, Birth complications, Adjustment of Neonate, characteristics of a Neonate, Physiological functioning.
- 5. Infancy:** Characteristics, Physical development, Developmental tasks, Reflex actions.
- 6. Babyhood:** Characteristics, Physical development, Motor development, Language development, Social development.
- 7. Childhood:** Characteristics, Physical development, Language development, Emotional development, Social development, Childhood play and its importance.
- 1. Adolescence:** Physical changes during adolescence, Stages of puberty, Primary sex characteristics, Secondary sex characteristics, mental tasks of adolescence.

Book recommended:

1. Alison, e, s; Susan F. and Joanne, C.(1958): Child Development: A Topical Approach; John wiley.
2. Ambron, J. R. and Brodzinsky, D. (1979): Life span Human Development; Holt, Rinehart and Winston.
3. সুলতানা বানু, (১৯৯২): বিকাশ মনোবিজ্ঞান (১ম খন্ড); বাংলা একাডেমি, ঢাকা।
4. মোঃ আমিনুল হক, (২০০৪): বিকাশ মনোবিজ্ঞান; হাসান বুক হাউস, ঢাকা।
5. Hurlock, E. B. (1978): Child Development; N.Y.; Mc Groaw Hill Book Co.
6. Hurlock, E. B. (1987): Development Psychology; N.Y.; Mc Groaw Hill Book Co.
7. সুলতানা জামান এবং সুলতানা বানু, (১৯৯৮): মানব বিকাশে মনোবিজ্ঞান; লেখকদ্বয় কর্তৃক প্রকাশিত, ঢাকা।
8. Sarafino, E.Armstrong, J.W.(1980) : Child and Adolescent Development; London; Scott. Foresman and company.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------|-------|---------|
| 123403 | Paper-IV | Social Psychology | 100 | 4 |

- 1. Introduction:** Defining Social Psychology; Subject matter of Social Psychology; Social Psychology and its relation to Psychology, Sociology and Anthropology; Research

- Methods used in Social Psychology.
2. **Socialization:** Socialization as a learning process; Agents of Socialization; Cultural Influences on Socialization.
 3. **Attitude:** Defining Attitude; Formation of Attitude; Change of Attitude.
 4. **Human Communication:** Process of Human Communication; Verbal and Nonverbal Communication.
 5. **Leadership:** Definition of Leadership; Characteristics of a Good Leader; Types of Leader.
 6. **Collective Behavior:** Public Opinion; Crowding; Rumour; Propagation; Prejudice
 7. **Social Group:** Defining Group; Types of Group; Group and Public Perception.

Reference:

1. হামিদ আখতার বেগম, আধুনিক সমাজ মনোবিজ্ঞান: রাফায়েল শাহারিয়ার প্রকাশনা, ঢাকা।
2. জহিরুল হক, সমাজ মনোবিজ্ঞান; আলোর প্রকাশনি, ঢাকা।
3. মীর কখরুজ্জামান, সমাজ মনোবিজ্ঞান; ঢাকা বইবিতান, ঢাকা।
4. Krech, D. Crutchfield R.S. and Ballachey Z. L., Individual in Society; Mc. Graw Hill Co. Ltd.
5. Lindgren, H.C. An Introduction to Social Psychology. Wiley and Sonsl.
6. Myers D.G. Social Psychology. Mc. Graw Hill, Inc.
7. Second P.F. and Backman, C.W. Social Psychology. Mc. Graw Hill.

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|-----------------------|-------|---------|
| 133401 | Paper-V | Industrial Psychology | 100 | 4 |

1. Introduction:

- 1.1. Definition of Industrial Psychology
- 1.2. Scope of Industrial Psychology
- 1.3. Industrial Psychology as an applied Science
- 1.4. History of Industrial Psychology

2. Job Analysis:

- 2.1. Definition of Job Analysis
- 2.2. Purposes of Job Analysis
- 2.3. Methods of Job Analysis

3. Personnel Selection Procedures:

- 3.1. Psychological tests
- 3.2. Biographical Information
- 3.3. Interviews
- 3.4. References

4. Personnel Training:

- 4.1. Assessment of training needs
- 4.2. Training Methods
- 4.3. Evaluation of training programs

5. Accident and Safety:

- 5.1. Definition of Accident
- 5.2. Causes of Accident: Situational and Personal factors

5.3. Prevention of accident

5.4. Safety Provisions

6. Job Satisfaction:

6.1. Nature of Job Satisfaction

6.2. Determinants of Job Satisfaction

6.3. Assessment of Job Satisfaction

Books Recommended:

1. Anastasia, A.(1979) Fields of Applied Psychology. New York; Mc Graw Hill.
2. Blum. M.L. and Naylor, J.C. (1968) Industrial Psychology CSB Publication, New Delhi, India.
3. Ghiseli E.N. & Browa C.W. Personal and Industrial Psychology. Mc Grow Hill New York.
4. রওশন জাহান, (১৯৯০) শিল্পে মনোবিজ্ঞান: কর্মবিজ্ঞান; ঢাকা বিশ্ববিদ্যালয়।
৫. আব্দুল খালেক, (২০০৫) শিল্প মনোবিজ্ঞান, (৪র্থ সংস্করণ), হাসান বুক হাউস, ঢাকা।
6. Sual, F.E. and Knight, P.a. (1995) Industrial/Organization Psychology. Brooks /Cale Publication Company. California U.S.A.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 133403 | Paper-VI | Measurement & Statistics in Psychology | 100 | 4 |

1. Introduction:

1.1. Measurement in the Physical Science

1.2. Measurement in the Social and Psychological Science

1.3. Properties of number

1.4. Levels of measurement

1.5. Basic postulates in measurement

2. Psychological Test:

2.1. Definition of Psychological Test

2.2. Current uses of Psychological Tests

2.3. Types of Psychological Test

2.4. Characteristics of a Psychological Test

3. Steps in Constructing a Psychological Test:

3.1. Designing & Writing items

3.2. Designing & Scoring Responses

3.3. Collecting Data

3.4. Analyzing Items

3.5. Assessing Reliability

3.6. Assessing Validity

3.7. Establishing Norm

4. Statistics:

What is Statistics? Classification of Statistics, Nature and Scope, uses of Statistics in Psychology, The idea of quantification.

5. Frequency Distribution:

5.1. Grouping of Data

5.2. Choosing Class intervals

5.3. Apparent and true limits of class intervals

5.4. Frequency and cumulative frequency distribution.

5.5. Graphical representation of data

6. Measures of Central Tendency:

- 6.1. Computing mean, median and mode
- 6.2. When to apply mean, median, mode
- 6.3. Mathematical Properties of the mean

7. Measures of Variability/dispersion:

- 7.1. Need to measure variability
- 7.2. The range, interquartile range, Semi-interquartile range, Mean deviation, Standard deviation, Variance.

Suggested Readings:

1. नीहार रञ्जन सरकार (२०१०), परिसंख्यान ओ परिमापन ।
2. Kline, T. J.B. (2005), Psychological Testing. New Delhi: Vistaar Publications.
3. Anastasi, A., Urbine, S.(1997), Psychological Testing and Assessment. New York; Mc Grow Hill Co.
4. Ferguson, G. S. Statistical Analysis in Psychology and Education, Longmans Green & Co. Ltd; London.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|----------------------------------|-------|---------|
| 133404 | Paper-VII | Practical (4-Experiment +2-Test) | 100 | 4 |

Any Six:

1. To investigate the phenomenon of bilateral transfer of training.
2. To investigate the phenomenon of Muller-Lyer illusion.
3. To Study the effect of division of attention.
4. To investigate the associative reaction time under free VS controlled situation.
5. To study the immediate memory span for auditory stimuli.
6. To compare incidental and intentional learning.
7. To study the effect of retro-active inhibition on paired-associate learning.
8. To measure retention as a function of time.
9. To measure intelligence by administering Alexander Pass Along Test.
10. To Study the basic concept of the child by Boehm Test of Basic Concept (BTBC)
11. To measure intelligence by Koh's Block Design Test

Marks distribution:

(A) Experiment (One day)

| | |
|----------------------|-----------|
| Laboratory note book | 10 |
| Experiment/Test | |
| Conduction | 15 |
| Report | 15 |
| Viva-voce | 10 |
| Total = | 50 |

(B) Test (One day)

| | |
|----------------|-----------|
| Lab. Note | 10 |
| Conduction | 15 |
| Report | 15 |
| Viva | 10 |
| Total = | 50 |

NATIONAL UNIVERSITY



Syllabus

Subject: Soil Science

Three Year B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Subject: Soil Science
Syllabus for Three Year B.Sc. Pass Course
Session: 2013-2014
Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|-----------|--|-------|---------|
| First Year | | | | |
| 113301 | Paper-I | Pedology and Soil Physics | 100 | 4 |
| 113303 | Paper-II | Soil Microbiology and Plant Biochemistry | 100 | 4 |
| Second Year | | | | |
| 123301 | Paper-III | Soil Chemistry and Soil Pollution | 100 | 4 |
| 123303 | Paper-IV | Soil Fertility and Fertilizers | 100 | 4 |
| Third Year | | | | |
| 133301 | Paper-V | Soil Management and Soil Conservation | 100 | 4 |
| 133303 | Paper-VI | Soil Survey and Crops of Bangladesh | 100 | 4 |
| 133304 | Paper-VII | Practical | 100 | 4 |
| | | Total = | 700 | 28 |

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Detailed Syllabus

First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|---------------------------|-------|---------|
| 113301 | Paper-I | Pedology and Soil Physics | 100 | 4 |

Soil science as an independent discipline, historical development of soil science, branches of soil science and their relationship with other branches of science; Concept of soil.

Soil forming materials - Rocks, Minerals- Primary and secondary; Weathering- physical and biogeochemical; Soil profile- horizons, layers, pedon and polypedons; Master horizons in soil.

Zonality concept of soils, Study of the orders and suborders of Soil Taxonomy with special reference to Bangladesh.

Definition of soil physics, soil physical properties; soil - a three phase disperse system, description of the three phases; Mass-Volume relations of soil constituents. Soil texture- definition, primary particles, Particle size analysis and expression of results. Assumptions and limitations of Stoke's law. Determination of textural class of a soil. Soil density.

Soil structure- definition, classification and agricultural significance.

Soil consistence- Atterberg's constants and their practical significance.

Soil water- classification and determination. Soil moisture constants.
 Composition of soil air, gas transport through soil, renewal of soil air and importance of soil air.
 Soil temperature and Soil colour.

Books Recommended:

1. The Nature and properties of soils- Brady and Weil, 13th ed.
2. Introductory Soil science- Dilip Kumar Das- 6th ed.
3. আধুনিক মৃত্তিকা বিজ্ঞান- দেলোয়ার হোসেন হাওলাদার ও মোঃ হুমায়ুন কবির ২০১৪।

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 113303 | Paper-II | Soil Microbiology and Plant Biochemistry | 100 | 4 |

Soil Organisms- Flora and fauna. Soil as a habitat for flora and fauna, significance of organisms in soil environment. Position of microorganism in the living world.
 Soil flora- Actinomycetes, Bacteria, Algae and Fungi- their structure, and simple classification.
 Growth and reproduction of bacteria. Environmental requirements of microorganisms. Biological nitrogen fixation (BNF) and their importance in agriculture, Elementary idea about nitrogen cycle.

Carbohydrate- definition, classification & synthesis in plants.

Respiration- aerobic and anaerobic respiration with its importance.

Enzyme- definition, classification and enzyme activity in soil. Factors affecting enzyme activity in soil.

Nucleic acids- Composition, Classification and functions.

Books recommended:

1. অনুজীব বিজ্ঞান- মোঃ রফিকুল ইসলাম
2. Fundamentals of Biochemistry- Dr. J.L Jain, S.Jain & N.Jain.

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-----------------------------------|-------|---------|
| 123301 | Paper-III | Soil Chemistry and Soil Pollution | 100 | 4 |

Concept and scope of soil chemistry. **Soil organic matter-** composition, characteristics and functions in soil. **Humus-** origin and importance. **Clay minerals-** structure, classification and importance. **Ion exchange properties of soil** - origin of ion exchange Properties, CEC of soil, importance of ion exchange in agriculture. Concept of soil pH and soil solution, importance of pH on soil properties and plant growth.

Plant nutrient- soil as a medium for plant growth, nutritional requirements of plants.

Essential plant nutrients - Criteria of essentiality, classification, source, function & deficiency symptoms of nutrient (specially N. P. K. S & Zn). Basic concepts of mechanisms of nutrient uptake in plants.

Soil pollution- concept and types of soil pollution.

Uses and impact of pesticides - fungicides on soil and water ecosystem. Adverse effects of heavy metals on plant growth. Control of soil pollution.

Books Recommended:

1. The Nature and properties of soils - Brady and weil-2012
2. আধুনিক মৃত্তিকা বিজ্ঞান- দেলোয়ার হোসেন হাওলাদার ও মোঃ হুমায়ুন কবির ২০১৪
3. Environmental soil science-Tan
4. Introductory soil science- Dilip Kumar Das-6th ed 2010

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--------------------------------|-------|---------|
| 123303 | Paper-IV | Soil Fertility and Fertilizers | 100 | 4 |

Concepts of soil fertility & soil productivity. Factors affecting plant growth and development. Maintenance of soil fertility. Nutrient interactions- antagonistic- synergistic activity.

Preparation and application of Compost Green manure and Farm yard manure.

Fertility status of the soils of Bangladesh.

Fertilizer materials- source and manufacture of major fertilizer materials. Time and methods of fertilizer application. Single, compound and mixed fertilizer. Nutrient contents and chemical formulae of major chemical fertilizer's. Fate of added nutrient in soil, residual effects of fertilizers, fertilizer law, balanced fertilization. Fertilizer grade & fertilizer ratio.

Books Recommended:

1. Soil Fertility and Fertilizer- Tisdale & Nelson-2009
2. Soils and Soil Fertility- L.M Thompson & F.R. Troch
3. Soil Fertility Management for Sustainable Agriculture- R. Prasad.
4. আধুনিক মৃত্তিকা বিজ্ঞান- দেলোয়ার হোসেন হাওলাদার ও মোঃ হুমায়ুন কবির ২০১৪

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|---------------------------------------|-------|---------|
| 133301 | Paper-V | Soil Management and Soil Conservation | 100 | 4 |

Objectives and Principles of Soil Management – Preparation and application of Compost, Green manure and Farm Yerd manure, Main components of Soil management – Tillage, irrigation, quality of water in irrigation, application of organic matter, fertilizer and pesticide.

Formation, properties and management of Problematic Soils – Saline Soils, Acid sulphate soils, Waterlogged soils, Organic soils and Hilly soils.

Soil as a basic and irreplaceable resource, Population versus resource base of the world.

Soil degradation: types and processes of soil degradation, factors affecting soil degradation.

Soil erosion – classification and harmful effects of soil erosion. Factors affecting water and wind erosion. Principles of soil conservation practices in the field.

Sustainable Land Use – definition and sustainable land use system.

Books Recommended:

1. Soil Conservation and Sustainable Land Use – T.H. Khan.
2. Problem Soils of Bangladesh - BARI
3. Manual of Soil and Water Conservation Practices – Gurumel Singh.
4. আধুনিক মৃত্তিকা বিজ্ঞান- দেলোয়ার হোসেন হাওলাদার ও মোঃ হুমায়ুন কবির - ২০১৪

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------------------------------|-------|---------|
| 133303 | Paper-VI | Soil Survey and Crops of Bangladesh | 100 | 4 |

Soil survey- Definition and importance of soil survey. Agricultural and non-agricultural uses of soil survey. Types of soil survey- Techniques of Exploratory, Reconnaissance and Detailed soil survey. Soil survey work plan & soil survey report. Base materials used in soil survey. Cropping pattern, crop rotation and cropping intensity. Classification of crops.

Agronomy of different crops of Bangladesh: Origin, improved varieties, Climate, Soil requirements, Cultural practices. Fertilization, harvesting and storing Rice, Wheat, Jute, cotton, Potato and Pulse.

Books recommended:

1. Soils: their survey and taxonomic classification of soil- SRDI-2013
2. কৃষি প্রযুক্তি হাতবই- BARI-2012
3. আধুনিক মৃত্তিকা বিজ্ঞান- দেলোয়ার হোসেন হাওলাদার ও মোঃ হুমায়ুন কবির-২০১৪

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-------------|-------|---------|
| 133304 | Paper-VII | Practical | 100 | 4 |

1. Precautions to be taken in the laboratory.
2. Collection, preparation and storage of soil sample.
3. Determination soil moisture by gravimetric method.
4. Determination of soil Bulk density and Particle density.
5. Preparation of standard solution of $K_2Cr_2O_7$, Oxalic acid, NaOH and $FeSO_4$.
6. Determination of organic carbon present in soil by wet oxidation method.
7. Determination of soil pH and Free carbonates.
8. Determination Glucose of a supplied sample.
9. Determination of total and Available nitrogen in soil.
10. Preparation of culture media for Microorganisms.
11. Gram staining and spore staining.

Books Recommended:

A Hand book on Analysis of SOIL, PLANT and WATER - S. M. Imamul Huq and Md Didar ul Alam.

NATIONAL UNIVERSITY



Syllabus

Department of Statistics

Three Year B.Sc. Pass Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: Statistics
Session: 2013-2014
Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|-----------|---|-------|---------|
| First Year | | | | |
| 113601 | Paper-I | Descriptive Statistics | 100 | 4 |
| 113603 | Paper-II | Probability and Probability Distributions | 100 | 4 |
| Second Year | | | | |
| 123601 | Paper-III | Methods of Statistics | 100 | 4 |
| 123603 | Paper-IV | Numerical Mathematics & Linear Algebra | 100 | 4 |
| Third Year | | | | |
| 133601 | Paper-V | Applied Statistics-I | 100 | 4 |
| 133603 | Paper-VI | Applied Statistics-II | 100 | 4 |
| 133604 | Paper-VII | Practical | 100 | 4 |
| | | Total = | 700 | 28 |

Detailed Syllabus
First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|------------------------|-------|---------|
| 113601 | Paper-I | Descriptive Statistics | 100 | 4 |

Descriptive Statistics: History of statistics, its definitions, nature and characteristics, Methods of statistics, Scope, applications and Limitations of statistics. Sources of statistical data, Primary and secondary data. Variables, Attributes, Classification, Tabulation, Different types of tables, Frequency distribution. Graphical presentation of data, Detailed study of different types of graphs and charts with their relative merits and demerits.

Measures of central tendency, Measures of dispersion, Moments, Skewness & Kurtosis and their properties. Bivariate data. Scatter diagram, Simple correlation, Rank correlation, Correlation ratio, Simple regression analysis, Principles of least squares, Lines of best fit, Standard error of estimators of regression coefficients & their properties. Multiple correlation, Partial correlation, Multiple regression, Estimation of multiple regression coefficients.

Books Recommended:

- 1 Islam, M.Nurul : An Introduction to Statistics and Probability, 4th Edition, Mullick & Brothers, Dhaka New Market
- 2 Mostafa, M.G : Methods of Statistics
- 3 Simpson G.& Kaafka, F. : Basic Statistics

- 4 Yule and Kendall, M.G. : An Introduction to the Theory of Statistics
 5 Jalil A. & Ferdous, R : Basic Statistics: Methods Applications

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|---|-------|---------|
| 113603 | Paper-II | Probability and Probability Distributions | 100 | 4 |

Probability: Elements of set theory. Experiment, Random Experiment Sample Space, Events, Union and Intersection of Events, Different types of events. Meaning of probability, Scope of probability, Different approaches of defining probability. Elementary theorems of probability, Additive & multiplication rule, permutation & combination. Conditional probability, Theorems on conditional probability, Theorem of total probability, Bayes' theorem and its uses and importance in statistics.

Random variable and its Probability Distributions: Discrete and continuous random variables, Probability density function, Distribution function, Function of random variable and its distribution, Joint distribution, marginal and conditional distributions, Independence of random variables, Mathematical expectation, Expectations of sum and products of random variables, Conditional expectation and conditional variance. Moments and moment generating functions, Characteristic function, Cumulants and cumulant generating functions, Relation between moments and cumulants.

Probability Distributions: Details study of Binomial, Negative Binomial, Geometric, Hypergeometric, Uniform, Normal, Exponential, Beta, Gamma, Lognormal, Cauchy, Pareto distributions and their properties.

Books Recommended:

- 1 Islam, M.Nurul : An Introduction to Statistics and Probability, 4th Edition, Mullick & Brothers, Dhaka New Market
 2 Roy, M.K. : Fundamentals of Probability & Probability Distribution
 3 Mosteller, Rourket : Probability with Statistical Applications.
 Thomas
 4 Hoq, M. S. : Probability : An Introduction
 5 Ross : A First Course in Probability, Collier –McMillan, N.Y.
 6 Feller, W. : Introduction to the Probability Theory and its Applications

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|-----------------------|-------|---------|
| 123601 | Paper-III | Methods of Statistics | 100 | 4 |

Sampling Distributions

Distribution of sample mean and variance and their independence, Detailed study of χ^2 , t and F distributions, Standard errors of statistics and their large sample approximations. Fisher's Z transformation, Distribution of sample correlation coefficient when population correlation coefficient is zero.

Estimation

Concept of Estimation and problem of estimation, Estimator and Estimate. Properties of a good estimator: Unbiasedness, Consistency, Efficiency, Sufficiency, Minimum Variance, Best asymptotically normal, Consistent asymptotically normal. UMVUE, Rao-Black Well Theorem, Cramer-Rao Inequality, MVB estimator, Use of Cramer-Rao inequality in finding UMVUE.

Point Estimation: ML method of estimation, Method of moments, method of Least Square, Method of minimum chi-square, Bayesian Method of Estimation.

Interval Estimation: Concept of interval estimation, Confidence interval, Confidence limit, Confidence bound, Confidence coefficients, Methods for finding confidence interval, Confidence interval for mean, variance, difference of means, ratio of variance.

Test of Hypothesis

Concept: Test of hypothesis, Logic behind tests of hypothesis, Neyman-Pearson's approach of testing hypothesis.

Preliminaries of tests: Hypothesis, simple and composite hypotheses, Null and alternative hypotheses, Concept of test of significance, procedures of testing a hypothesis, Test errors, Level of significance, One-tailed and two-tailed tests, P-value. Concept of test Statistics: Normal, T^2 , t and F statistics. Testing the significance of a single mean, Single variance, Single proportion, Difference of two means and proportions, Ratio of two variances and their confidence intervals. Paired t-test. Testing the homogeneity of several population means, Variance and proportions. Test of goodness of fit.

Books Recommended:

- 1 Mood, Graybill & Boes : Introduction to the Theory of Statistics 3rd ed. McGraw- Hill
- 2 Ashraf Ali : Methods of Statistics, Vol. II
- 3 Rao, C.R. : Linear Statistical Inference & its Applications, Wiley.
- 4 Islam, M, N. : An Introduction to Statistics and Probability, 4th Edition, Mullick & Brothers, Dhaka New Market
- 4 Mostafa, M.G. : Methods of Statistics
- 5 Hogg R.Y. and Craig, A.T : Introduction to mathematical statistics. McMillan- Collierm, N.Y.

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 123603 | Paper-IV | Numerical Mathematics & Linear Algebra | 100 | 4 |

Numerical Mathematics: Differences of a polynomial, Finite difference operator, Factorial notation. Newton's and backward interpolation formula. Central difference formula. Gauss, Stirling's and Lagrange's interpolation formulas. Interpolation with unequal interval of the argument. Numerical differentiation. Numerical integration by different formulae. Numerical solution of equations by various methods.

Linear Algebra: Vector space, Subspace, Linear independence, Basis & Dimension, Inner product, Length, Orthogonal Length, Orthogonal basis, Orthogonalisation process, Matrices & their properties, Matrix operations and their uses in Statistics. Inverse of matrices and their properties. Orthogonal, Idempotent, Patterned matrices and their properties and uses in Statistics.

Books Recommended:

- 1 Scarborough : Numerical Mathematical Analysis
- 2 Freeman, H : Finite differences for Actuarial Students
- 3 Mallick S.A. & M. E. : Numerical Mathematics, Mullick & Brothers, Dhaka New Huq Market
- 3 Searle, S.R. : Matrix Algebra useful for Statistics
- 4 Rao, C.R. & Mitra : Generalized Inverses and its Applications
- 4 Mostafa, M.G. : Methods of Statistics
- 5 Rahman, A : College Degree Algebra

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|----------------------|-------|---------|
| 133601 | Paper-V | Applied Statistics-I | 100 | 4 |

Index number

Concept of index number, Problems in the construction of index number, Construction of simple and weighted indices, cost of living index number.

Time Series Analysis

Different components of time series data. Measurement of secular trend, seasonal, cyclical and irregular components by different methods. Test of randomness of a time series data. Effect of moving average on cyclical and irregular components.

Demography

Definition, nature and scope of demography. Sources of demographic data: Vital registration, Survey and Census. Rates, ratios, and proportions. Age-Sex composition, Errors in age-sex data, detecting errors in age data. Population pyramid. Concept of population change, Population growth, Measurement of population growth with special reference to Bangladesh.

Concept of fertility, Reproduction. Measures of fertility and reproduction, Cohort fertility. Concepts of mortality and morbidity, Measures of mortality, Trends of mortality, of morbidity.

Definition, use and functions of life tables, different types of life table, construction of life tables. Actuarial life table, its construction and application

Industrial and Official statistics

Nature and scope of industrial & official statistics, Concept & importance of quality control. Quality control measures. Statistical quality control techniques, its uses and usefulness. Product

control and process control. Assignable and Non-assignable causes of variation. Control charts. Construction of control charts. Acceptance sampling. Sources and limitations of official statistics, Education Statistics, Different types of scores, I.Q. Construction of tests.

Books Recommended:

| | | | |
|----|--|---|--|
| 1 | Chatfield | : | The Analysis of Time Series: An Introduction |
| 2 | Box and Jenkins | : | Time Series Analysis |
| 3 | Shryock, H.S. Siegel, J.S. et al. | : | The Methods and Materials of Demography |
| 4 | Barclay, G.W. | : | Techniques of Population Analysis |
| 5 | Chiang, C.L. | : | The Life Table and its Application |
| 6 | Speigelman | : | Introduction to Demography |
| 7 | Pollard, S.H. Farhat, Y.& Pollard, G.N | : | Demographic Technique |
| 8 | Biswas, S. | : | Stochastic Process in Demography and Application, Wiley Eastern Ltd. |
| 9 | Duncan, A.J. | : | Quality Control and Industrial statistics |
| 10 | Gupta and Kapoor | : | Applied Statistics |
| 11 | Grant, E.L | : | Statistical Quality Control |

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-----------------------|-------|---------|
| 133603 | Paper-VI | Applied Statistics-II | 100 | 4 |

Analysis of Variance

Concepts, Definitions & Assumptions. One way, Two way & Three way classifications, Experimental Design & Sample Design, Principles of design. Basic designs: CRD, RBD, LSD, their relative efficiency, Analysis with missing values, ANOVA in Different designs. Basic concepts of factorial experiments, 2^2 , 2^3 , Analysis, interpretation and uses of above mentioned factorial experiments.

Sample Survey

Basic concept to sample survey, relative advantages, disadvantages and suitability of complete and sample enumeration. Uses of sample survey. Role of sampling theory. Requirements of a good sample design. Population, Sampling units, Sampling frame and related problems. Basic principles of sample survey. Various steps involved in a sample survey. Pilot survey. Random or probability sampling and Non-random or purposive sampling. Mixed sampling.

Different types of errors associated with sampling such as sampling errors & Non sampling errors and complete enumeration. Various methods of data collection. Questionnaire and schedule. Preparation of questionnaire. Different types of random sampling. Details study of Simple random sampling, Stratified random sampling and Systematic sampling.

Books Recommended:

- 1 Montgomery, D.C. : Design and Analysis of Experiments (2nd ed.), Wiley
- 2 Kempthorne : Design and Analysis of Experiments, Wiley
- 3 Scheffe, H. : Analysis of Variance, Wiley
- 4 S.A Mallick : Parikhaner Design
- 5 Cochran, W.G. : Sampling Techniques
- 6 Hansen, Hurwitz and Madow : Sampling Techniques

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------|--------------|----------------|
| 133604 | Paper-VII | Practical | 100 | 4 |

Condensation and tabulation of data, Frequency distribution, Graphical representation of data, Measures of location and dispersion. Measures moments, Skewness and kurtosis. Simple correlation co – efficient and fitting of regression lines. Rank correlation & Correlation ratio.

Drawing of commonly used curves: Binomial, Poisson & Normal. Exercises of fittings of Different probability distributions with standard Errors. Common tests of significance of Mean, Variance, Proportion, Correlation coefficient and Regression coefficient. Fitting of theoretical distributions and testing of goodness of fit. Tests of large samples, contingency table test, Exact test, Approximate test. Tests of homogeneity.

Analysis of CRD, RBD & LSD. Missing plot estimation with analysis. Drawing of SRS, Estimation of parameters (mean & Variance).

Computing different types of index number. Cost of living index number. Determination of trend and seasonal variation by different methods from time series data. Measurement of fertility and mortality, Calculation of rates and ratios, Construction of life table.

Uses of interpolation formulae for equal and unequal interval. Use of Solution of equation. Numerical integrations.

NATIONAL UNIVERSITY



Syllabus Department of Zoology

Three Year B.Sc. (Pass) Course
Effective from the Session: 2013–2014

National University
Syllabus for Three Year B.Sc. Pass Course
Subject: Zoology
Session: 2013-2014
Course content and marks distribution

| Paper Code | Paper | Paper Title | Marks | Credits |
|--------------------|-----------|--|-------|---------|
| First Year | | | | |
| 113101 | Paper-I | Nonchordate | 100 | 4 |
| 113103 | Paper-II | Chordata | 100 | 4 |
| Second Year | | | | |
| 123101 | Paper-III | Cytology & Histology, Ecology and Molecular biology. | 100 | 4 |
| 123103 | Paper-IV | Embryology, Physiology, Animal adaptation, Evolution, Palaeontology and Zoogeography | 100 | 4 |
| Third Year | | | | |
| 133101 | Paper-V | Ethology and Animal Genetics | 100 | 4 |
| 133103 | Paper-VI | Economic Zoology and Systematics | 100 | 4 |
| 133104 | Paper-VII | Practical | 100 | 4 |
| | | Total = | 700 | 28 |

Detailed Syllabus

First Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|-------------|-------|---------|
| 113101 | Paper-I | Nonchordate | 100 | 4 |

- Broad classification of the following phyla up to orders with general and diagnostic characteristics of each taxonomic category with examples, particular reference to Bangladesh:

Sarcomastigophora, Apicomplexa, Ciliophora, Porifera, Coelenterata, Platyhelminthes, Nematoda, Mollusca, Annelida, Onychophora, Arthropoda, Echinodermata and Hemichordata.

- Type study of the followings with their systematic position, habitats, external morphology, organ systems, such as digestion, movement, circulation, respiration, excretion, nervous, reproduction; food and feeding habits, mode of life and development
 - Phylum Sarcomastigophora: Euglena, Entamoeba

- b. Phylum Apicomplexa: *Plasmodium*
- c. Phylum Ciliophora: *Paramecium*
- d. Phylum Porifera: *Scypha*,
- e. Phylum Coelenterata; *Obelia*
- f. Phylum Ctenophora: *Hormiphora*
- g. Phylum Platyhelminthes: *Fasciola*, *Taenia*
- h. Phylum Nematoda: *Ascaris*
- i. Phylum Rotifera: Any rotifer
- j. Phylum Mollusca; *Pila*
- k. Phylum Annelida: *Neanthes*
- l. Phylum Onychophora: *Peripatus*
- m. Phylum Arthropoda; Prawn
- n. Phylum Phoronida: *Phoronis*
- o. Phylum Echinodermata; *Asteropecten*
- p. Phylum Hemichordata: *Balanoglossus*

3. Special study of the following:

- a. Protozoa: nuclear apparatus and nutrition
- b. Porifera: canal systems
- c. Coelenterata: polymorphism, Coral reef and reef formation
- d. Platyhelminthes: parasitic adaptations
- e. Annelida: segmental organs
- f. Arthropoda: crustacean larvae
- g. Echinodermata: larval forms

Books Recommended:

- 1. C. P. Hickman and L. S. Roberts. 199: Animal Diversity. Wm. C. Brown
- 2. J. W. Nybakken and J. McClintock. 1996: The Diversity of Invertebrates: Gulf of Mexico Version. Wm. C. Brown

3. L. S. Dillon. 1976: Animal variety; An Evolutionary Account. Wm. C. Brown Company Publisher Dubuque, Iowa
4. E. E. Ruppert and R. D. Barnes. 1994: Invertebrate Zoology (6" edition). Saunders College Publishing- Harcourt Brace College Publishers, New York, London
5. A. J. Marshal, W. D. William: Text Book of Zoology- Invertebrates. (Edited the edition of Text Book of Zoology, Vol. I, T. J. Parker and W. A. Haswell)
6. M. Sleigh. 1989: Protozoa and other Protists. Chapman and Hall Inc., New York

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|-------------|-------|---------|
| 113103 | Paper-II | Chordata | 100 | 4 |

1. Broad classification of the followings up to orders with general and diagnostic characteristics of each taxonomic category with examples, particular reference to Bangladesh-
 Urochordata, Cephalochordata, Cyclostomata, Chondrichthyes,
 Osteichthyes, Amphibia, Reptilia, Aves and Mammalia
2. Type study of the followings with their systematic position, habitats, external morphology, anatomy including skeletal, digestive, circulatory, respiratory, excretory, nervous, reproductive and endocrine systems; food and feeding habits, mode of life and development
 - a. Urochordata: *Ascidia*
 - b. Cephalochordata: *Branchiostoma*
 - c. Cyclostomata: *Petromyzon*
 - d. Chondrichthyes: *Scoliodon*
 - e. Osteichthyes: *Labeo*
 - f. Amphibia: *Bufo/Rana*
 - g. Reptilia: *Hemidactylus*
 - h. Aves: *Columba*
 - i. Mammalia: *Cavia*
3. **Special study of the following:**
 - i. Poisonous and non poisonous snakes; snake venom and biting mechanism
 - ii. Mesozoic reptiles

- iii. Migration of birds
- iv. Flying mammals and marsupials
- v. Aquatic adaptations of mammals
- vi. Integument and its derivatives: fish fins and scales; feathers, beak, bills and claw of birds; nails, hooves and horns of mammals; dentition, teeth and their development, types of dentition, dental formula of mammals
- vii. Skeletal system: axial and appendicular skeletons of vertebrates
- viii. Digestive system: modification of the alimentary canal in different chordates
- ix. Circulatory system: modification of aortic arches and heart in reptiles, birds and mammals
- X. Urinogenital system: excretory system; pro-, meso-, and metanephridic kidneys; reproductive system.

Books Recommended:

1. M. Hildebrand. 1994: Analysis of Vertebrate Structure. John Wiley & Sons. Inc., New York
2. G. C. Kent and L. Miller. 1997: Comparative Anatomy of the Vertebrates. McGraw Hill
3. J. Young, 1981: Life of Vertebrates. OUP, USA
4. F. H. Pough, J. B. Heiser and W. N. McFarland. 1997: Vertebrate Life. Prentice Hall
5. K. V. Kardong. 1997: Vertebrates: Comparative Anatomy, Function, Evolution. Wm. C. Brown
6. R. M. Alexander. 1977: The Chordates. Vikas Publishing House Pvt. Ltd., New Delhi
7. R. Pearson and J. N. Ball. 1981: Lecture Notes on Vertebrate Zoology. Blackwell Science.
8. T. J. Parker and W. A. Haswell: A Text Book of Zoology. Vol. II. Macmillan & Co., London
9. C. K. Weichert: Anatomy of the Chordates

Second Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|-----------|--|-------|---------|
| 123101 | Paper-III | Cytology & Histology, Ecology and Molecular biology. | 100 | 4 |

Cytology & Histology

1. Definition of cytology and histology
2. History of cytology
3. Ultra-structures of cell; cell divisions; morphology of sperm and ovum
4. Tissue: types and functions

Books Recommended:

1. G. B. Wilson and J. H. Morrison: Cytology. Affiliated East-West Press Pvt. Ltd., New Delhi
2. J. R. Baker. 1966: Cytological Technique. John Wiley & Sons

Ecology:

1. Definition, structure, component and function of ecosystem; Energy and its flow in Ecosystem; Biogeochemical cycles: carbon, nitrogen and carbon dioxide; Aquatic Ecosystem of a pond
2. Definition of population; population growth forms: J and S- shaped growth forms
Concept of carrying capacity
3. Major biomes of the world
4. Environmental pollution: air, water, soil and noise- their sources, effects and remedial measures
5. Conservation of natural resources; concept and classification of resources; renewable and non-renewable resources and their management
6. Consequences of the loss of natural resources
7. Concept of biodiversity.

Books Recommended:

1. R. L. Smith. 1998: Elements of Ecology. Longman
2. M. Begon, J. L. Harper and C. R. Townsend. 1996: Ecology: Individuals, Populations and Communities. Blackwell Science

3. C. J. Krebs. 1993: Ecology- The Experimental Analysis of Distribution and Abundance. Harper Collins, New York
4. E. A. Laws. 2000: Aquatic Pollution: An Introductory Text. Wiley
5. A. Dobson. 1996: Conservation and Biodiversity. Scientific American
6. J. Turk, J. Wittes, R. Wittes and A. Turk: Ecosystems Energy, Population. W.B. Saunders Company, Philadelphia, London
7. B. Groombridge and M.D. Jenkins. 1996: Assessing Biodiversity Status and Sustainability. WCWC
8. K. J. Gaston and J. I. Spicer. 1998: Biodiversity: An Introduction. Blackwell Science
9. M. Jeffries. 1997: Biodiversity and Conservation. Routledge
10. E. P. Odum: Fundamentals of Ecology. W. B. Saunders Com. London

Molecular biology:

1. Gene: nature, chemical composition and functions
2. Chemistry and function of nucleic acids; DNA and RNA
3. Replication of DNA; Transcription of RNA
4. Types of RNA
5. Genetic engineering; concept and techniques; gene cloning
6. Biotechnology: concept, techniques and its scope in Bangladesh

Books Recommended:

1. A. Bruce, D. Brey and J.D. Watson. 1994: Molecular Biology of the Cell. (3rd Ed.) Garland Publ. Inc.
2. J. D. Watson et al. Modern Biology of the Gene. Benjamin Inc., California, London
3. S. M. Kingsman and A. J. Kingsman Genetic Engineering
4. A. Wiseman. Principles of Biotechnology
5. S. B. Primrose Modern Biotechnology
6. S. B. Primrose Principles of Gene Manipulation
7. J. Bullock and B. Kristensen Basic Biotechnology
8. D. M. Glover Principles of Gene Cloning

9. J. M. Walker and E. B. Gingold Molecular Biology and Biotechnology
10. E. De Robertis and E. M. De Robertis, Jr. 1981: Essentials of Cell and Molecular Biology. Saunders College Publishing, New York

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|--|-------|---------|
| 123103 | Paper-IV | Embryology, Physiology, Animal adaptation, Evolution, Palaeontology and Zoogeography | 100 | 4 |

Palaeontology and Zoogeography.

Embryology:

1. Gametogenesis- spermatogenesis and oogenesis in mammals
2. Types of eggs in animals
3. Fertilization and types of cleavage
4. Extra embryonic membranes in amniotes
5. Placentation in mammals
6. Development of Neanthes and Callus
7. Embryonic circulation and nutrition

Books Recommended:

1. S. F. Gilbert and A. M. Raunio (Editors). 1997: Embryology: Constructing the Organism. Sinauer
2. B. I. Balinsky: An Introduction of Embryology
3. B. H. Wilier and J. M. Oppenheimer. 1968: Foundations of Experimental Embryology. Prentice- Hall of India Pvt. Ltd., New Delhi

Physiology

1. Homeostasis: definition, role or various systems of body in homeostasis
2. Food and nutrition; definition and types; digestion and absorption of different types of food
3. Vitamins: sources, properties and deficiency symptoms
4. Metabolism: definition; carbohydrates, lipid and protein metabolism

5. Circulation: cardiac cycle; blood- components and functions; mechanism of coronary and pulmonary circulations
6. Respiration: mechanism of breathing, pulmonary ventilation, external and internal respiration
7. Excretion: excretory system, structure and functions of kidney, mechanism of formation of urea, ultra filtration and reabsorption, osmoregulation, regulation of blood pH, composition of urine
8. Hormones: types and functions

Books Recommended:

1. C. C. Chatterjee: Human Physiology. Vols. I & II
2. W. H. Davson: A Text Book of General Physiology
3. G. L. Presser and P. A. Brown: Comparative Animal Physiology

Animal adaptation:

1. Introduction and definition.
2. Adaptive diversity in nonchordates particular reference to their habitats and feeding habits
3. Adaptive radiation and the distribution of organisms

Books Recommended:

1. M. R. Rose and G. V. Lauder. 1996: Adaptation. Academic Press
2. R. N. Brandon. 1995: Adaptation and Environment. Princeton UP, USA

Evolution:

1. Theories of evolution: Lamarck, Darwin, Wallace and synthetic
2. Evidences of organic evolution: biogeography, comparative anatomy, physiology, embryology, Palaeontology and genetics
3. Convergent, divergent and parallel evolution

Books Recommended :

1. S. Stearus and R. Hoekstra. 2000: Evolution: An Introduction. OUP, USA
2. G. Bell. 1996: Selection: The Mechanism of Evolution. Chapman & Hall
3. J. B. S. Haldane. 1990: The Causes of Evolution. Princeton UP, USA
4. R. Lewin. 1997: Human Evolution. Blackwell Science
5. T. J. Givnish and K. J. Sytsma. 1997: Molecular Evolution and Adaptive

Radiation. CUP

6. R. Leakey. 1998: The Evolution of Man: An Illustrated History of Human Origins. Ebury Press

Palaeontology:

1. Process of fossilization, types of fossils, significance of fossils, fossil dating methods
2. Geological time table
3. Palaeontological history of horse and man

Books Recommended:

1. A. M. Davis: An Introduction to Palaeontology
2. H. H. Swinerton: Outlines of Palaeontology
3. Tyage A. P. and G. S. Rao: Introduction to Palaeontology
4. C. E. Brett and G. C. Baird (Editors). 1997: Palaeontological Events: Stratigraphic, Ecological and Evolutionary Implications. Columbia UP, USA
5. H. H. Converse. 1999: Handbook of Paleo-Preparation Techniques. Florida UP, USA

Zoogeography:

1. History of the distribution of the land and water bodies of the world,
Gondwana land and continental drift theories
2. Zoogeographical regions and sub-regions of the world-their boundaries, physical characteristics, climatic conditions, vegetation and fauna with particular reference to Bangladesh
3. Pleistocene glaciation and its influence on the distribution of animals
4. Insular fauna

Books Recommended:

1. P. J. Darlington. 1998: Zoogeography: The Geographical Distribution of Animals. Krieger, USA.

Third Year

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|---------|------------------------------|-------|---------|
| 133101 | Paper-V | Ethology and Animal Genetics | 100 | 4 |

Ethology:

1. Orientation: taxes, kineses
2. Instinct behaviour
3. Learning behaviour
4. Communication behaviour: sounds, pheromones, etc.
5. Parental care of Amphibia
6. Migration of fishes
7. Social behaviour of honey bee
8. Breeding behaviour of three-spine stickle back and sea gull

Animal Genetics:

1. Introduction
2. Mendel's principles of segregation and of independent assortment
3. Modification of Mendelian ratio
4. Test cross and back cross
5. Linkage and crossing over
6. Mutation and chromosomal aberrations
7. Sex linked, sex limited and sex influenced inheritance
8. Sex determination

Books Recommended:

1. E.W. Sinnott, L.C. Dunn and Dobzhansky: Principles of Genetics. McGraw Hill
Book Co. New York
2. A. S. Islam: Fundamentals of Genetics. Vikas Publishing House Pvt. Ltd

3. R. F. Weaver and P. W. Hedrick. 1995: Basic Genetics. Wm. C. Brown
Publisher, Dubuque, Iowa
4. T. A. Brown. 1997: Genetics: A Molecular Approach. Chapman and Hall

| Paper Code | Paper | Paper Title | Marks | Credits |
|------------|----------|----------------------------------|-------|---------|
| 133103 | Paper-VI | Economic Zoology and Systematics | 100 | 4 |

Economic Zoology:

1. Apiculture: life cycle of a honey producing bee species; types of hive; honey processing
2. Sericulture: varieties of silkworm and their host plants; techniques of silkworm rearing; silkworm diseases and pests, and their control
3. Lac culture: systematic position and distribution of lac insects; life cycle of a lac insect species; collection and processing of lac
4. Integrated Pest Management (IPM): concept; components of IPM
5. Carp culture: carp culture including induced breeding of carps in ponds
6. Prawn and shrimp culture: types, techniques and management
7. Poultry farming: varieties of fowls and ducks; techniques of poultry farming; diseases of poultry and their control; economic importance of poultry
8. Economic importance of Molluscs
9. Economic importance of amphibians and reptiles in Agriculture, Fisheries and Forestry
10. Animal husbandry: concepts, farming of domestic animals- cattle and goats, diseases of domestic animals and their control, economic importance of farm animals.

Books Recommended:

1. Dennis S. Hill. 1997: The economic importance of insects (1st edition). Chapman and Hall, London
2. D. Dent: Integrated Pest Management. Chapman & Hall, London
3. R. Wall and D. Shearer. 1997: Veterinary Entomology. Chapman and Hall
4. M. Huet. 1986: Text Book of Fish culture-Breeding and Cultivation of Fish (2nd Edition) Fishing News Books

5. V. G. Jhingran and R. S. V. Pullin. 1985: A Hatchery Manual for the Common Chinese and Indian Major Carps ADB/ICLARM
6. P. R. Boyle: Molluscs and man. Edward Arnold, London

Systematics:

1. Definition of taxonomy, systematics, classification and nomenclature
2. Taxonomic hierarchy
3. Species concept
4. Taxonomic keys- types and significance
5. International Code for Zoological Nomenclature (ICZN), rules of nomenclature
6. Type methods
7. Law of priority

Books Recommended:

1. G. G. Simpson. 1990: Principles of Animal Taxonomy. Columbia UP, USA
2. E. Mayr and P. D. Ashlock. 1997: Principles of Systematic Zoology. McGraw Hill
3. V. C. Kapoor. 1988: Theory and Practice of Animal Taxonomy. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi
4. W. D. L. Ride et al. (Editors) 1999: International Code of Zoological Nomenclature (ICZN)

| Paper Code | Paper | Paper Title | Marks | Credits |
|-------------------|--------------|--------------------|--------------|----------------|
| 133104 | Paper-VII | Practical | 100 | 4 |

I. Nonchordates:

1. Study of museum specimens; representative of non-chordate phyla (minimum 50 specimens to be studied)
2. Study of permanent slides: whole mount, body parts, and various cells (at least 20 slides to be studied)
 - a. Whole animals- representatives of Protozoa and Arthropoda; mouth parts of Arthropoda

- b. Parasites- Nematode and Platyhelminthes
- c. Different larval forms of invertebrates
- 3. External morphology and dissection of various organ systems of earthworm, cockroach, prawn and *Pila*:
 - a. Digestive system of earthworm, cockroach, prawn and *Pila*
 - b. Circulatory system of earthworm and prawn
 - c. Nervous system of earthworm, cockroach, prawn and *Pila*
 - d. Reproductive system of earthworm and cockroach
- 4. Temporary mounting:
 - a. Brain, ovary and nephridium of earthworm
 - b. Salivary gland of cockroach
 - c. Statocyst of prawn
 - d. Mouth parts of mosquito

II. Chordates:

- 1. Study of museum specimens: representatives of all types of chordates particular reference to Bangladesh (minimum 50 specimens to be studied)
- 2. Dissection: dissection of the following specimens-
 - i. Lata fish- digestive system; afferent and efferent blood vessels
 - ii. Frog/toad- digestive system and circulatory systems
 - iii. Lizard- digestive and circulatory systems
- 3. Histological slides of vertebrates
- 4. Temporary mounting- scales and weberian ossicle of fishes; hyoid apparatus of toad; preparation of blood smear
- 5. Study of bones: Comparative study of the skeletons of amphibian, reptile, bird and mammal

III. Fresh water studies: identification of micro fauna in fresh water samples

- IV. Field visit to observe local invertebrate and vertebrate fauna and their habitats, and prepare a report on the visit. Students will also collect specimens and submit these along with the report in the final practical examination to be held in the 3rd year.

Distribution of marks for final examination:

1. Dissection:
 - a.) Nonchordate: (dissection 7 + display 2 + drawing & labeling 3) = 12 marks
 - b.) Chordate: (dissection 7 + display 2 + drawing & labeling 3) = 12 marks
2. Temporary mount: (any one from either nonchordates or chordates)
(Staining, mounting and displaying) = 6 marks
5. Spotting of museum specimens; invertebrates, vertebrates, whole mount slide, histological slide and bones

Items and numbers:

- a) Invertebrate museum specimens: 7 specimens x 2 = 14 marks
- b) Vertebrate museum specimens: (Chondrichthyes-1, Osteichthyes-1, Amphibia-1, Reptilia-1, Aves-1, & Mammalia-1): 6 specimens x 2 = 12 marks
- c) Slide whole mount- 1x2 = 2 marks
- d) Histological slide-1x2 = 2 marks
- e) bones- 3x2 = 6 marks
4. Fresh water studies: (3 micro species to be shown- Identification 1 mark, classification 0.5 mark, and characters 0.5 mark)-
3 specimens x 2 marks for each = 6 marks
5. Collection of specimens (4 invertebrates and 2 vertebrates) and report writing- (collection 4 + report writing 4) = 8 marks
6. Class records = 10 marks
7. Viva-voce = 10 marks