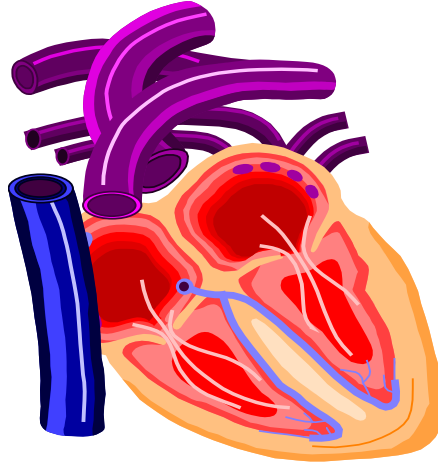


বাংলাদেশ ক্রীড়া শিক্ষা প্রতিষ্ঠান

**BANGLADESH KRIRA SHIKKHA PROTISHTHAN**  
**ZIRANI, SAVAR, DHAKA**



**Post Graduate Diploma in Exercise Physiology-2015**

## SPECIALIZATION AREA

### EXERCISE PHYSIOLOGY

#### Syllabus

#### Paper I

#### UNIT-I

- 1 Bioenergetics
  - 1.1 Energy Sources
  - 1.2 Definition of Energy
  - 1.3 Biological energy cycle
    - 1.3.1 Adenosine triphosphate
    - 1.3.2 Sources of ATP
  - 1.4 The Aerobic and Anaerobic System during rest and exercise-Anaerobic Threshold (OBLA)
  - 1.5 Recovery from Exercise
    - 1.5.1 Recovery oxygen (Oxygen debt)
    - 1.5.2 Replenishment of energy stores during recovery
    - 1.5.3 Reduction of lactic acid in blood and muscle
    - 1.5.4 Restoration of oxygen stores
    - 1.5.5 Some practical recovery guidelines
- 2 Measurement of Energy, Work and Power:
  - 2.1 Ergometry
  - 2.2 Energy, work and power
  - 2.3 Direct measurement of energy
  - 2.4 Indirect measurement of energy
  - 2.5 Caloric equivalent of oxygen: Respiratory exchange ration (RQ)
  - 2.6 Cost of Exercise
  - 2.7 Modified methods for reflecting energy cost
  - 2.8 Body size and energy cost

#### UNIT-II

Neuromuscular concepts, Cardiovascular and Endocrine systems

- 1 Neuromuscular concepts
  - 1.1 Skeletal muscle structure and function
    - 1.1.1 Structure the basis for contraction
    - 1.1.2 Sliding filament theory of muscle contraction
    - 1.1.3 Function of skeletal muscle
    - 1.1.4 Slow twitch and fast twitch muscles and their distributaries
    - 1.1.5 Structural and functional characteristics of slow and fast twitch muscles.
    - 1.1.6 Application of research in muscle fiber typing, training and adaptations
      - a) Sprinters versus distance runners
      - b) Training and fiber number
      - c) Shift in fiber types
      - d) Substrate shifts with training
      - e) Metabolic shifts with training
      - f) Impact of strength training
      - g) Fiber type and injuries
      - h) Aging process
      - i) Screening athletes by fiber typing
    - 1.1.7 Local muscular fatigue

- 1.2 Basic structure and function of nerve
- 1.3 Action potential and movement of nerve impulse
- 1.4 Neuro-muscular junction
- 1.5 Reflex action and receptors
  
- 2 Cardiovascular System
  - 2.1 Anatomy and physiology of heart
  - 2.2 Circulation of blood through heart
  - 2.3 Cardiac output, stroke volume and minute volume
  - 2.4 Heart rate, blood pressure and distribution of blood flow
  - 2.5 Cardiac output during exercise
  - 2.6 Change in heart rate, blood pressure during exercise
  - 2.7 Athlete heart
  - 2.8 Blood: its composition and function
  - 2.9 Blood groups
  
- 3 Respiratory system-Gas exchange and transport
  - 3.1 Structure and function of respiratory tract
  - 3.2 Mechanics of respiration
  - 3.3 Diffusion and partial pressure of gases
  - 3.4 Gas transport: Transport of oxygen and carbon dioxide by blood
    - 3.4.1 Dissolved oxygen
    - 3.4.2 Oxyhaemoglobin
    - 3.4.3 Carbonic acid and bicarbonate join
    - 3.4.4 Carbonic acid and bicarbonate join
    - 3.4.5 Carbon dioxide dissociation curve

## SPECIALIZATION AREA

### EXERCISE PHYSIOLOGY

#### Syllabus

#### Paper II

### UNIT-III

- 1 Physiological effect on physical training
  - 1.1 Bio-chemical changes
  - 1.2 Aerobic changes
  - 1.3 Anaerobic changes
  - 1.4 Relative changes in Fast and Slow twitch fibers
- 2 Cardio-respiratory changes at rest
  - 2.1 Cardio-respiratory changes at rest
  - 2.2 Change during sub maximal exercise
  - 2.3 Change during maximal exercise
  - 2.4 Respiratory change
- Body composition change
  - 2.5 Changes in cholesterol and triglyceride levels
  - 2.6 Change in blood pressure
  - 2.7 Change in heat acclimatization
  - 2.8 Change in connective tissues
3. Factors influencing training effects
  - 3.1 Intensity of training
  - 3.2 Frequency and duration of training
  - 3.3 Specificity of training effects
  - 3.4 Physiology of specificity of training and exercise
  - 3.5 Genetic limitations
- 4 Mode of Exercise:
  - 4.1 Maintenance of training effects
    - 4.1.1 Detraining
    - 4.1.2 Retraining
- 5 Environmental and training in female
  - 5.1 Body size and body composition
  - 5.2 Performance-Matched physiological characteristics
    - 5.2.1 ATP-CP System
    - 5.2.2 A Lactaid component
    - 5.2.3 Anaerobic power test
    - 5.2.4 Lactic acid system
    - 5.2.5 Oxygen system
- 6 Strength:
  - 6.1 Strength differences
    - 6.1.1 Absolute difference
    - 6.1.2 Strength relative to body size
    - 6.1.3 Strength and muscle size
- 7 Effects of weight training
  - 7.1.1 Training frequency, duration and intensity
  - 7.1.2 Physiological changes following training
    - Changes in maximal work capacity
    - Changes and sub maximal exercise capacity
    - Bio-chemical changes
    - Aerobic changes

- Anaerobic changes
  - Body composition changes
  - Changes with detraining
- 8 Gynecological consideration:

#### **UNIT-IV**

##### 1 Environmental Considerations:

Performance at Altitudes  
 Altitude acclimatization  
 Physiology of acclimatization  
 Athletic performance at altitude  
 High altitude training  
 Recent research on high altitude training

##### 2 Heat balance: Exercise in Heat and cold

Heat balance-introduction  
 Heat exchange  
 Convection  
 Conduction  
 Radiation  
 Evaporation  
 Heat production-Gaining of heat  
 Mechanism of heat exchange  
 Temperature regulation (in short)  
 Exercise in heat and heat disorders  
 Heat disorders in athletes and in different games  
 Prevention of heat disorders salt and water replacement  
 Athletic drink  
 Clothing and environment  
 Exercise in cold  
 Training in cold

#### **UNIT-V**

##### 1 Nutrition, exercise and performance

Different nutrients and sources  
 Carbohydrate  
 Fat  
 Protein  
 Vitamin and minerals  
 Food requirements  
 Diet before activity, during activity and after activity  
 Selection of foods  
 Diet and performance: Recent studies

##### 2 Exercise, body composition and weight control

Body composition  
 Somatotype  
 Body fat: concepts and assessments  
 Body weight control  
 Obesity  
 Energy balance and weight control

##### 3 Exercise and training effects on body composition

Exercise pattern  
 Training programme  
 Sports specific programme  
 Children and fatness

Aging and fatness

4      Exercise and Acid-base balance

Acid and Bases

pH

Regulation of pH

Acid base balance following heavy exercise

### **Reference Books**

Guyton, Arthur C. Text Book of Medical Physiology. (Philadelphia: W. B. Saunders Company)

Morehouse L. E. and Miller A. T. Physiology of Exercise. (Saint Louis: The C. V. Mosby Company).

Karpovich, P. V. and Sinning. Wayne E. Physiology of Muscular Activity (Philadelphia. W. B. Saunders Company).

Bourne, Geoffery H. The Structure and Function of Muscles (London: Academic Press).

Astrand P. O. and Rodahl Karre Text Book of Work Physiology. (Tokyo: Mc Graw Hill Kogakusha, Ltd).

Mathew, D. K. and Fox E. L. Physiological Basis of Physical Education and Athletics (Philadelphia: W. B. Saunders Company).

## **SPECIALIZATION AREA**

### **EXERCISE PHYSIOLOGY (Practical Syllabus)**

1. Measurement of heart rate by palpation (manual), E.C. G. and Telemetric methods
2. Measurement of heart rate using telemetric method while participation in different activity programmes and its interpretation
3. Relationship of training intensity and heart rate
4. Determination of recovery patterns in sports persons using heart rate
5. Assessment of fitness using physical fitness index
6. Measurement of blood pressure
7. Measurement of vital capacity
8. Determination of maximum aerobic capacity ( $VO_2$  max)
9. Use of Bicycle Ergometer and Treadmill in training and evaluation
10. Assessment of body composition
11. Determination of anaerobic threshold and threshold heart rate
12. Estimation of hemoglobin.

## **SUBSIDIARY AREA**

### **SCIENTIFIC PRINCIPLES OF SPORTS TRAINING**

#### **Syllabus**

#### **Paper-I**

#### **UNIT-I**

1. Sports Training
  - 1.1 Definitions of conditioning sports training and coaching
  - 1.2 Aim, tasks and characteristics of sports training
  - 1.3 Principles of sports training
  
2. Training Load
  - 2.1. Definition of training load
  - 2.1. Important features of training load
  - 2.1. Principles of training load
  - 2.4 Adaptation process and conditions of adaptation
  - 2.5 Overload, its causes and symptoms. Tackling of over load.

#### **UNIT-II**

##### Training for Motor Components – 1 (Conditional Abilities)

1. Strength
  - 1.1 Definition and forms of strength
  - 1.2 Factors determining strength
  - 1.3 Principles of strength training
  - 1.4 Methods and means of strength training
  
- 2 Endurance
  - 2.1 Definition and forms of endurance
  - 2.2 Factors determining endurance
  - 2.3 Methods and means of endurance training
  
- 3 Speed
  - 3.1 Definition and forms of speed
  - 3.2 Factors determining speed
  - 3.3 Methods and means of speed training
  - 3.4 Speed barrier and how to tackle it.

#### **UNIT-III**

##### Training for Motor Components-II

- 1 Flexibility
  - 1.1 Definition and forms of flexibility
  - 1.2 Factors determining flexibility
  - 1.3 Methods and means of flexibility training



## SUBSIDIARY AREA

### SCIENTIFIC PRINCIPLES OF SPORTS TRAINING

#### Syllabus

#### Paper-II

#### Unit-III

##### Training for Motor Components-II

- 1 Coordinative Abilities
  - 1.1 Definition of coordinative abilities
  - 1.2 Characteristics of coordinative abilities
  - 1.3 Importance of coordinative abilities
  - 1.4 Different coordinative abilities affecting performance in games and sports
  - 1.5 Training for coordinative abilities.

#### UNIT-IV

- 1 Technique Training
  - 1.1 Definition of skill, style, technique and technical training
  - 1.2 Characteristics of technique
  - 1.3 Phases of skill acquisition
  - 1.4 Methods of technique training
  - 1.5 Causes and correction of faults.
- 2 Tactical Training
  - 2.1 Definition of tactics and strategy
  - 2.2 Basic tactical concepts-Offensive. Defensive and High Performance Tactics
  - 2.3 Methods of tactical training

#### UNIT-V

- 1 Planning and Organization of training  
Definition and important of planning  
Principles of planning  
Systems of planning
- 2 Periodisation
  - 2.1 Definition and types of periodisation
  - 2.2 Content of training for different periods
- 3 Competition Planning and Preparation
  - 3.1 Meaning and importance of competition
  - 3.2 Frequency of competition
  - 3.3 Forms of competition
  - 3.4 Direct preparation for an important competition.

#### Reference Books:

- Dick W. Frank. Sports Training Principles (London: Lepus Books)  
Harre, Dietrich. Principles of Sports Training (Berlin: Sportverlag)  
Matveyew L. P. Fundamentals of Sports Training (Moscow: Progress Publishers)  
Paish Wilfred. The Complete Manual of Sports Science, A and C Black London, 1998  
Singh H. Sports Training: General Theory and Methods (Patiala: NSNIS)  
Tandon D. K, Uppal A. K., Alegaonkar P. M. and Singh Kanwaljeet. Scientific Basis of Physical Education and Sports. Friends Publication (India), Delhi. 2001.  
Uppal A. K. Scientific Principles of Sports Training. Friends Publication (India), Delhi, 2001.

## **SUBSIDIARY AREA**

### **MEASUREMENT AND EVALUATION**

#### **Syllabus**

#### **Paper I**

#### **UNIT-I**

- 1 Introduction:  
Meaning of Evaluation  
Importance of Evaluation  
Principles of Evaluation
  
- 2 Selection and constructions of tests  
Criteria of test selection-Scientific Authenticity (Reliability, Objectivity, Validity and Norms)  
Classification of tests-Standardized and Teacher made tests (Objective and Subjective tests)  
Construction of tests-Knowledge tests (written tests) and Skill tests.

#### **UNIT-II**

- 1 Measurement of Organic Functions. Motor Fitness and General Motor Ability  
Organic Function Tests  
Coopers 12 min Run/Walk Test  
Tuttle Pulse Ratio Test  
Harvard Step Test and its modifications  
Hymens Cardio-pulmonary Index (CPI)
  - 1.2 Motor Fitness Tests
    - 1.2.1 Oregon Motor Fitness Test
    - 1.2.2 J.C.R Test
    - 1.2.3 AAHPER Youth Fitness Test
    - 1.2.4 Canadian Fitness Test (CAHPER)
    - 1.2.5 Indian Motor fitness Test
  - 1.3 General Motor Ability Tests  
Mc Cloys General Motor Ability Test  
Methany Johnson Test

#### **UNIT-III**

- 1 Tests for Strength
  - 1.1 Rogers Physical Fitness Index
  - 1.2 Kraus Weber Strength Test

## SUBSIDIARY AREA

### MEASUREMENT AND EVALUATION

#### Syllabus

#### Paper-II

- 1 Skill Test
  - 1.1 Procedure of skill test construction
  - 1.2 Method of establishing reliability, objectivity and validity of a skill test
  - 1.3 Preparation of norms

#### UNIT-IV

- 1 Anthropometric Measurements
  - Height Measurement
  - Width Measurement
  - Length Measurement
  - Girth Measurement
- 2 Somatotypes
  - Sheldon's technique (Ectomorph. Mesomorph and Endomorph)
- 3 Posture tests
  - IOWA Posture Test
  - Kelley's Foot Test
  - Tests for detecting Kyphosis, Scoliosis and Lordosis.

#### UNIT-V

- 1 Introduction
  - Meaning and definition of statistics
  - Importance of statistics
  - Meaning of data and types of data
  - Frequency Table-Meaning and construction
- 2 Fundamentals of Statistics
  - Measures of Central Tendency-Meaning, Uses and Calculation
  - Measures of Variability-Meaning, Uses and Calculation.
  - Percentiles and their Calculation
  - Correlation - Meaning, Uses and Calculation.

#### Reference Books:

Barrow M. Harold and Mc Ghee Rosemary A. Practical Approach to Measurement in Physical Education (Philadelphia: Lea and Febiger)

Clarke H. David and Clarke Harrison H. Application of Measurement to Physical Education (Englewood Cliffs: Prentice Hall. Inc)

Larson L. A. and Yocom R. C. Measurement and Evaluation in Physical. Health and Recreation Education (St. Louis: C. V. Mosby Co)

Mathew, Donald K. Measurement in Physical Education (London: W. B. Saunders Co.)

## **DIPLOMA IN SPORTS SCIENCE**

### **GENERAL RULES (Examination Ordinance)**

1. The examination for Diploma in Sports Sciences shall consist of two parts:

Part A (Theory)  
Part B (Practical)

The duration of the course shall be one academic year.

2. A candidate shall be eligible for appearing at the examination for Diploma in Sports Sciences if:
  - (a) He/She has passed the Bachelor Degree Course from any recognized university of Bangladesh or the other equivalent examinations conducted by any university recognized by Bangladesh.
  - (b) Has gone through the admission criteria and secured admission to the course.
  - (c) Has put in 90% attendance in theory and practical classes separately.
3. There shall be a final examination at the end of the academic year and a candidate shall have to separately pass in Part-A (Theory) and Part-B (Practical).
4. To pass the examination, a candidate must secure 40% marks in each theory paper, sessional and practical examination.
5. The sessional marks in each theory paper and in practical examination shall be added to the total marks secured by the candidate in the final examination.
6. The sessional marks shall be calculated based on the marks secured by the candidate in the term examinations, unit tests and assignments.
7. If a candidate fails in any one part (Theory or Practical) or both, he/she will be required to reappear and pass the examination in full.
8. A candidate must complete the course of study and pass the examination within a total period of three years commencing from his first admission to the course.
9. The division shall be assigned to the successful candidate on the following basis:

Second Division: 45% and above but below 60% of the aggregate marks.  
First Division: 60% and above of the aggregate marks.

Distinction: 80% and above in a paper of Part-A (Theory) or Part-B (Practical) Distinction and division obtained by the candidate shall be Mentioned in the Diploma awarded to the candidate.
10. Those candidates who fail in only one theory paper or Part-B (Practical) shall be eligible to appear at the supplementary examination in that paper of Part-A (Theory) or Part-B (Practical) to be held as per the dates announced by the university.
11. For supplementary candidates, the result of the final examination shall be declared on the basis of the marks actually obtained by the candidate in each of the papers he/she has passed in the

annual examination plus the marks obtained in the paper in which he/she took the supplementary examination. The supplementary candidate shall be ineligible for division and place on the merit list.

12. The candidate who is declared failed in the annual examination shall appear as an ex-student in all the papers and the sessional marks previously obtained by him shall be carried over.
13. The examination fee as prescribed by the university will be charged.
14. In partial fulfillment for the requirements of the course every candidate shall write a project on an approved topic and submit to the Institute one week prior to the commencement of final examination. The Project will carry 200 marks of which 50 marks will be assigned for viva-voce.

### **SCHEME OF EXAMINATION**

Paper Marks	Nomenclature of paper	Sessional Marks	Min. pass marks	
I	Specialization (Theory)-Two Papers	20	40%	200
II	Specialization (Practical)	20	40%	200
III	Subsidiary Area-I - Two Papers	20	40%	150
IV	Subsidiary Area-II - Two Papers	20	40%	150
V	Project	20	40%	200
<b>Total</b>		<b>100</b>		<b>900</b>
<b>Grand Total</b>				<b>1000</b>