B.D.S COURSE
PHYSIOLOGY/SYLLABUS
(With effect from 2010-11 onwards)
GENERAL HUMAN PHYSIOLOGY

a) GOAL
The broad goal of the teaching undergraduate students in Physiology aims at providing the student comprehensive knowledge of the normal functions of the organ systems of the body to facilitate an understanding of the physiological basis of health and disease.

b) OBJECTIVES
i. Knowledge
At the end of the course, the student will be able to:
(1) Explain the normal functioning of all the organ systems and their interactions for well co-ordinated total body function.
(2) Assess the relative contribution of each organ system towards the maintenance of the milieu interior.
(3) List the physiological principles underlying the pathogenesis and treatment of disease.

ii. Skills
At the end of the course, the student shall be able to:
(1) Conduct experiments designed for the study of physiological phenomena.
(2) Interpret experimental and investigative data
(3) Distinguish between normal and abnormal data derived as a result of tests which he/she has performed and observed in the laboratory.

iii. Integration
At the end of the integrated teaching the student shall acquire an integrated knowledge of organ structure and function and its regulatory mechanisms.

c) THEORY: 120 Hours

<table>
<thead>
<tr>
<th>1. GENERAL PHYSIOLOGY</th>
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<tbody>
<tr>
<td>Homeostasis: Basic concept, Feedback mechanisms</td>
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<tr>
<td>Structure of cell membrane, transport across cell membrane</td>
</tr>
<tr>
<td>Body fluid Compartments: distribution of total body water, intracellular &amp; extracellular compartments, major anions &amp; cations in intra and extra cellular fluid. Membrane potentials. RMP &amp; Action Potential</td>
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<table>
<thead>
<tr>
<th>2. BLOOD:</th>
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<tbody>
<tr>
<td>Functions of reticulo-endothelial system.</td>
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<tr>
<td>Specific gravity.</td>
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<td>Packed cell volume.</td>
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<tr>
<td>Methods of estimation [in practicals]</td>
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<tr>
<td>Blood Indices - MCV, MCH, MCHC - definition, normal values, variation.</td>
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<tr>
<td>Leucopoiesis</td>
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<tr>
<td>Thrombopoiesis</td>
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</table>

### 3. MUSCLE AND NERVE

- Classification of nerves,
- Structure of skeletal muscle - Molecular mechanism of muscle contraction,
- Neuromuscular junction and NM transmission.
- Properties of skeletal muscle.
- Structure and properties of cardiac muscle & smooth muscle.

### 4. DIGESTIVE SYSTEM:

- Introduction to digestion: General structure of G.I. tract, Innervation.
- Stomach: Composition and functions of gastric juice, mechanism and regulation of gastric secretion.
- Exocrine Pancreas - Structure, composition of pancreatic juice, functions of each component, regulation of pancreatic secretion.
- Liver: structure, composition of bile, functions of bile
- Gall bladder: structure, functions.
- Small intestine - Composition, functions
- Large intestine - Functions.
- Motor functions of GIT: Mastication, deglutition, gastric filling & emptying, movements of small and large intestine, defecation.

### 5. EXCRETORY SYSTEM:

- Formation of Urine: Glomerular filtration rate - definition, normal values, factors influencing G.F.R.
- Determination of GFR.
- Role of kidney in the regulation of pH of the blood.
- Urinary bladder: abnormalities.

### 6. SKIN AND TEMPERATURE REGULATION [basics only]

### 7. ENDOCRINOLOGY

- General endocrinology - endocrine glands & hormones. Second messengers.
- Endocrine function of hypothalamus.
- Hormones of anterior pituitary & their actions, Disorders of secretion of anterior pituitary hormones.
- Posterior pituitary hormones: actions
- Thyroid: secretion & transport of hormones, actions of hormones, regulation.
- Adrenal cortex & Medulla - action.
- Other hormones - Angiotensin, local hormones
- Pancreatic Hormone
- PTH
- Endocrine Disorders to be taught with each gland.

### 8. REPRODUCTION

- Physiological anatomy of male and female sex organs,
- Gonadotrophic hormones. Sex chromatin.
- Lactation, milk ejection reflex.
- Male reproductive system, spermatogenesis, hormones-testosterone. Semen.
- Contraception.

### 9. CARDIO VASCULAR SYSTEM

- Functional anatomy and innervation of heart. Properties of cardiac muscle. Origin & propagation of
cardiac impulse and Pacemaker potential. Action potential.
Cardiac cycle - Phases, Pressure changes in atria, ventricles & aorta. Volume changes in ventricles.
Heart sounds.
Jugular venous pulse
Arterial pulse.
Electrocardiogram- Basic principles only. Normal electrocardiogram.
Heart rate: Normal value, variation.
Stroke volume and Cardiac output: definition, normal values, variations, factors affecting.
Arterial blood pressure: Definition, normal values, variations, determinants. Regulation of heart rate,
stroke volume, blood pressure: integrated concept.
Coronary circulation: special features.
Cardiac murmurs
Cardiac output: one method of determination
Cardio vascular homeostasis in exercise & posture.

### 10. RESPIRATORY SYSTEM

- Intra pleural & intra pulmonary pressures & their changes during the phases of respiration.
- Mechanics of breathing - surfactant, compliance & work of breathing [basics only].
- Spirometry: Lung volumes & capacities definition, normal values, significance, factors affecting vital capacity, variations in vital capacity. Pulmonary ventilation- alveolar ventilation & dead space-ventilation.
- Pulmonary circulation: Functional features.
- Composition of inspired air, alveolar air and expired air.
- Exchange of gases: Diffusing capacity, factors affecting it.
- Transport of Oxygen & carbon dioxide in the blood. Regulation of respiration- neural & chemical
- Hypoxia, cyanosis, dyspnoea, periodic breathing.
- Artificial respiration.
- FEV & its variations.
- Pulmonary function tests
- Respiratory changes during exercise

### 11. CENTRAL NERVOUS SYSTEM

- Organisation of central nervous system
- Neuronal organisation at spinal cord level,
- Synapse: functional significance.
- Receptors, reflexes, sensations and sensory tracts
- Physiology of pain. Referred pain. Analgesia systems.
- Functions of thalamus, cerebellum.
- Vestibular apparatus [basics only]
- Cerebral cortex: Basics of higher functions.
- Formation and functions of CSF: clinical significance.
- Autonomic nervous system

### 12. SPECIAL SENSES

- Fundamental knowledge of vision, hearing, taste and smell.
- Errors of refraction.
- Tests of auditory function

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d) **PRACTICALS**

The following list of practical is minimum and essential. The entire practical have been categorized as procedures and demonstrations. The procedures are to be performed by the students during practical classes to acquire skills. All the procedures are to be included in the University practical examination. Those categorized as demonstrations are to be shown to the students during practical classes. However these demonstrations would not be included in the University examinations but question based on this would be given in the form of charts, graphs and calculations for interpretation by the students.
Practicals & demonstrations: 60 hours

<table>
<thead>
<tr>
<th>Practical</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Study of Microscope and its uses</td>
<td>02</td>
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<tr>
<td>Collection of blood and study of haemocytometer</td>
<td>02</td>
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<tr>
<td>Haemoglobinometry</td>
<td>02</td>
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<tr>
<td>Determination of RBC count</td>
<td>08</td>
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<tr>
<td>Determination of WBC count</td>
<td>04</td>
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<tr>
<td>Determination of blood groups</td>
<td>02</td>
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<tr>
<td>Leishman's staining and differential leucocyte count</td>
<td>10</td>
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<tr>
<td>Calculation of blood indices</td>
<td>02</td>
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<tr>
<td>Determination of bleeding time</td>
<td>01</td>
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<tr>
<td>Determination of clotting time</td>
<td>01</td>
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<tr>
<td>Blood pressure recording</td>
<td>03</td>
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<tr>
<td>Auscultation of Heart sounds</td>
<td>02</td>
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Demonstrations

<table>
<thead>
<tr>
<th>Demonstration</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Determination of Erythrocyte Sedimentation rate(ESR)</td>
<td>02</td>
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<tr>
<td>Determination of packed cell volume(PCV)</td>
<td>02</td>
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<tr>
<td>Determination of specific gravity of blood</td>
<td>02</td>
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<tr>
<td>Fragility test for RBC</td>
<td>02</td>
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<tr>
<td>Clinical examination of Cardiovascular and Respiratory System</td>
<td>03</td>
</tr>
<tr>
<td>Determination of vital capacity</td>
<td>02</td>
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<tr>
<td>Artificial respiration</td>
<td>02</td>
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<tr>
<td>Demonstration of deep and superficial reflexes</td>
<td>02</td>
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<tr>
<td>Activity of frog’s heart and effects of Acetyl Choline, Atropine and Adrenaline.</td>
<td>02</td>
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<tr>
<td>Electrocardiography: Demonstration of recording of normal Electrocardiogram</td>
<td>02</td>
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<tr>
<td>Total</td>
<td>60</td>
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e) SCHEME OF EXAMINATION

Types of Questions for written examination

<table>
<thead>
<tr>
<th>Type of Questions</th>
<th>Marks</th>
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</thead>
<tbody>
<tr>
<td>Structured Essays</td>
<td>14</td>
</tr>
<tr>
<td>1x 14marks</td>
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<tr>
<td>Brief structured Essays</td>
<td>16</td>
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<tr>
<td>2 x 8marks</td>
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<tr>
<td>Short Answers</td>
<td>20</td>
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<tr>
<td>5x4marks</td>
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<tr>
<td>Total</td>
<td>50</td>
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i. Theory:

- University written Examination: 50Marks
- University Viva: 10Marks
- Internal Assessment: 15 Marks

ii. Practicals:

- Internal Assessment: 10 Marks
- University Practicals: 40Marks

Mark distribution for University practical examination

- Major Experiments: 20Marks
- Any one of the Major Experiments: R.B.C. Count, W.B.C. Count, Differential Count, Blood Pressure
Recording

**Minor Experiments:** 15 Marks

*Anyone of the minor Experiments:* Determination of Blood Groups, Determination of Bleeding & Clotting time, Haemoglobin Estimation, Calculation of absolute Haematological Indices–MCH, MCV, MCHC

**Practical Work record:** 5 Marks