

# 1<sup>ST</sup> YEAR

## SEMESTER-I

### HP-101C

#### Paper- 1 (Theory)

**Total Mark = 100 (IA = 40 + ESE = 60) Credit = 04**

#### **Unit-I: History of Physiology & Medicine and Contribution of Indian scientists in the field of Physiology and allied health sciences**

1. A history of Physiology and Medicine.
2. Contribution of India in ancient time - Charaka; Sushruta; Patanjali;
3. Landmark physiological experiments and discoveries.
4. Contribution of modern Indian scientists in physiology - U.N. Brahmachari, S.C. Mahalanobis, J.B.S. Haldane, A.S Paintal.

#### **Unit-II: Structural and functional basis of Human Body-I**

1. Cell theory, structure of eucaryotic cell, different human tissue types.
2. Structure and function of: Biomembrane- structure, composition and function, Use of Intracellular Vesicles to Replenish Cellular Membranes, Cell junction, transport through membrane,
3. Structure and function of Endoplasmic reticulum, Golgi body, Mitochondria,
4. Structure and function of Nucleus, Ribosomes, Cell inclusions.

#### **Unit-III: Structural and functional basis of Human Body-II**

1. Structure and function of Lysosomes, Peroxisomes,
2. Structure and function of Cytoskeletal system, Locomotion of Cells - ameboid locomotion and ciliary movement- cells in the body showing these movements
3. Functional Systems of the cell, endocytosis-phagocytosis and pinocytosis, mechanism, Digestion of Pinocytotic and Phagocytic Foreign Substances Inside the Cell,
4. Regression of Tissues and Autolysis of Cells,

#### **Unit-IV: Structural and functional basis of Human Body-III**

1. Structural and functional basis of different human body organ and organ systems,
2. Musculoskeletal system,
3. Homeostasis and its control systems,
4. Anthropometric landmarks.

#### **Paper- 2A (Theory)**

**Total Mark = 50 (IA = 20 + ESE = 30) Credit = 02**

### HP-102C

#### **Unit-I: Biophysics and Physicochemical Principles**

1. Diffusion, osmosis, surface tension & viscosity-definition and physiological applications.
2. Properties of water, pH and Buffer-definition, example of buffers, buffering properties of

- amino acids, zwitterion, pKa value, weak chemical bonds, biological significance
- Henderson-Hasselbalch equation, mathematical problems on Ph and buffer.
  - Gibbs-Donnan membrane equilibrium its biological application and relation with osmotic pressure and pH.
  - Colloids-Classification, properties optical and electrical, Physiological importance of Colloids.

### Unit-II: Chemistry of Biomolecules

- Carbohydrates-Definition and, Classification, Monosaccharides-classification, structure, stereoisomerism, optical isomerism, optical activity, epimerism.
- Cyclic structure-pyranose and furanose forms, anomerism, mutarotation and its mechanism, Polysaccharides-Starch, glycogen, cellulose, chitin, dextrin- structural comparism.
- Lipids - Definition and Classification. Fatty acids-Classification, and structure. Phospholipids and glycolipids-classification and physiological significance. Mono and poly unsaturated fatty acids and their physiological significance.
- Sterols-Chemical nature, structure, classification and physiological importance.
- Amino acids-Classifications. Peptide and Protein: Primary, secondary (alpha helix, beta-sheet and globular structure), tertiary, quaternary structure of proteins.
- Protein purification and separation methods.

### Paper-2B (Practical)

#### HP-102C

**Total Mark = 50 (IA = 20 + ESE = 30) Credit = 02**

Sl. No.	Practical	Marks
1.		
2.		
3		
4.		
5.	Laboratory Note book	
6.	<i>Viva voce</i>	
<b>TOTAL</b>		<b>40</b>

### CONTENTS:

- Study of Models/Charts of different body organ systems & organs –Anatomical position, Structure & Functions.
- Study of Body Anthropometry-Stature, weight, sitting height, shoulder height(standing), Elbow height (standing), Hip height (standing), hand length, shoulder elbow length, leg length, shoulder breadth (biacromial), Arm reach from wall (Arm span) Knee to Knee Breadth, Elbow to elbow breadth, Head circumference, Shoulder circumference, Chest circumference, waist circumference, hip circumference. Calculation of BMI, BSA, WHR, Head and Chest circumference ratio.

3. Qualitative identification of physiologically important substances –HCL, Lactic acid, Uric acid, Albumin, Peptone, Starch, Dextrin, Glucose, Fructose, Lactose, Maltose, Sucrose, Bile salt, Acetone, Glycerol, urea.
4. **Laboratory Records:** Student must get the laboratory note books duly signed by the respective teacher during practical classes.
5. **Viva voce:** Questions based on theory and practical syllabus of 1<sup>st</sup> semester.



**Tripura University**  
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**Course Structure of Human Physiology (UG Programme)**  
**As per NEP-2020 under Tripura University**  
**HUMAN PHYSIOLOGY INTERDISCIPLINARY**

**HP-101 ID**

**Paper- Fundamentals of Human Physiology (Theory)**

**Total Mark = 75 (IA = 30 + ESE = 45) Credit = 03**

**UNIT-I : The unit of life :**

1. Basic concept of cell ->tissue->organ-> system
2. Description of cell and its components, functional morphology of cell
3. Ionchannels, receptors, carriers and inter cellular communication
4. Human muscular and skeletal system
5. Basic concept of homeostasis and homeostatic control

**UNIT-II : Bodyfluids and cardio-pulmonary system**

1. Blood –its components and functions
2. Components of circulatory systems: heart- structure and functions, blood vessels, cardiac cycle and cardiac output.
3. Blood pressure-its regulation, Hypertension
4. Structure of respiratory tract and mechanism of respiration
5. Lung volume and capacities and regulation of respiration.

**UNIT-III : Neurophysiology**

1. Nerve, muscle and nerve-muscle physiology
2. Organization of nervous system- receptor and synapse
3. Sensory and motor nervous system
4. Fundamental physiology of vision
5. Fundamental physiology audition

**1<sup>st</sup> YEAR**  
**Semester-I**  
**Paper-1A- (Theory)**  
**HP-101M**

**Full marks-75 (Internal assessment-30; End Sem. Exam. - 45)**

**Unit-1: Structural and Functional basis of Human Body**

1. General structure and function of eukaryotic cell, Cell->tissue->organ->system concept.
2. Different types of human tissues-Functions.
3. Musculo-skeletal system: Types of muscle, Bone, Cartilage & ligament. Joints types-functions.
4. General idea about functional aspect of human body organ and organ systems.

**Unit-2: Biophysics and Physicochemical Principles**

1. Diffusion, Osmosis, Osmotic pressure. Tonicity-isotonic, hypertonic, hypotonic.
2. Basic idea about cell membrane transport: Passive transport-ligand and voltage gated ion channel transport, facilitated diffusion. Active transport, secondary active transport.
3. Gibbs-Donnan membrane equilibrium- its biological application.
4. Acids, bases, pH and Buffers: Definition, biological significance. Henderson-Hasselbalch equation. Important Buffers in the Body.

**Unit-3: Chemistry of Bio molecules**

1. Chemistry, classification and physiological importance of carbohydrates. Properties of carbohydrates.
2. Chemistry, classification and physiological importance of Proteins.
3. Chemistry, classification and physiological importance of Lipids & fatty acids. Mono and poly unsaturated fatty acids. Sterols.
4. Enzyme classification. Concept of apoenzyme, holoenzyme, coenzyme, cofactors, isoenzyme. Mechanism of enzyme action- models; activation energy; active site, regulatory site-Allosteric enzyme.

Paper-1B-(Practical)

**HP-101M**

**Full marks-25 (Internal assessment-05; End Sem. Exam. -20)**

Sl. No.	Practical	Marks
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1.		
2.		
3		
4.	Laboratory Note book	
5.	<i>Viva voce</i>	
<b>TOTAL</b>		<b>20</b>

**CONTENTS:**

1. Study of Models / Charts of different body organ systems & organs – Anatomical position, Structure & Functions.
2. Study of Human Skeleton
3. Study of Body Anthropometry- Stature, weight, sitting height, shoulder height (standing), Elbow height (standing), Hip height (standing), hand length, shoulder elbow length, leg length, shoulder breadth (biacromial), Arm reach from wall (Arm span), Knee to Knee Breadth, Elbow to elbow breadth, Head circumference, Shoulder circumference, Chest circumference, waist circumference, hip circumference. Calculation of BMI, BSA, WHR, Head and Chest circumference ratio.



**TRIPURA UNIVERSITY**  
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Suryamaninagar

**SYLLABUS**

OF

**Human Physiology**  
(General)

**Semester- III**

**UNDERGRADUATE**

# **HUMAN PHYSIOLOGY (GENERAL)**

**Semester 03**

**Paper 03**

**Total Marks — 100**

## **THEORY (P3A)**

**Total Marks — 50**

### **Unit VII: Neurochemistry and Neurophysiology (25 marks)**

1. Macromolecular neurochemistry: Carbohydrate utilization in the brain, Role of Protein and Lipids in the brain.
2. Transmitter neurochemistry: Acetylcholine, Catecholamines, serotonin, Amino acids and Peptides.
3. Skin and Cutaneous receptors: Skin structure, Diversity and types of receptors.
4. Structural and Functional organization of nervous system.
5. Properties of neuron, genesis and propagation of nerve impulse.
6. Transmission of impulse: Synaptic and Myoneural.
7. Reflex, Reflex arc. Properties of reflex action, Conditioned and unconditioned reflexes.
8. Ascending (sensory) tracts: origin, course, termination and function.
9. Descending (Motor) tracts: origin, course, termination and function.
10. Modern concept of Skeletal muscle contraction.

### **UNIT VIII: Renal Physiology and Environmental Stress Biochemistry (25 marks)**

1. Anatomical structure of kidney, Structure and function of nephron, GFR, factors affecting GFR.
2. Mechanism of urine formation, Formation of dilute and concentrated urine. Normal and abnormal constituents of urine- their significance, Inulin and creatine clearance test.
3. Micturition and reflexes.
4. Renal circulation: course and peculiarities.
5. Non-excretory functions of kidney: i) water balance, ii) renin-angiotensin system iii) acid-base balance, iv) Role in erythropoiesis.
6. Chronic renal failure- Causes, Renal Hypertension.
7. Free radicals and Oxidative Stress, Generation of free radicals in the blood.



8. Role of superoxide dismutase, catalase, Glutathion in oxidatrive stress physiology, Heavy metals as agents of oxidative stress.
9. Major antioxidants: role of Vitamins and minerals as antioxidant, pestisides, Organo-phosphate, Organo-Chlorine and carbamate: their toxic action on human body.
10. Actrive and passive smoking, Major harmful compounds in smoke and their deleterious effects on human body.

**Add on topics:**

1. Somatotyping- basic idea
2. Adolescence Growth- General Idea
3. Kidney stones formation –general idea
4. Diabetes and kidney function relationship
5. Heavy metal and their toxic effect

**Suggested Readings:**

- i. Concise text book of physiology – Indu Khurana; Arushi Khurana
- ii. Text Book of Physiology – Prof. A. K. Jain
- iii. Essentials of Medical Physiology - Anil Baran Singha Mahapatra; G S Mahaptra

## **PRACTICAL (P3B)**

Total Marks — 50

1. Identification of abnormal constituents of Urine: albumin, ketone, sugar (glucose), bile salt and blood.
2. Estimation of creatinine in blood.
3. Models of Excretory system: study of Kidney, Ureter, Urinary bladder and Urethra: their anatomical position, structure and function.
4. Identification of histological slides in relation to skin and excretory system.
5. Human Reflexes:  
Superficial (Planter/Abdominal reflexes), Deep (Knee-Jerk/ Biceps & Triceps jerk reflexes)
6. Determination of muscle strength and endurance by Handgrip Dynamometry.

### **Distribution of marks:**

Total Marks: 50

Internal assessment: 10

Term and exam: 40

1. Three experiments:

10 x 3= 30

2. Practical Note Book

05

3. Viva Voce

05



TRIPURA UNIVERSITY  
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Suryamaninagar

SYLLABUS

OF

Human Physiology  
(Hons.)

Semester- III

UNDERGRADUATE

# HUMAN PHYSIOLOGY (HONOURS)

**Semester 03**

**Paper 03**

**Total Marks — 100**

## **THEORY (H3A)**

**Total Marks — 60**

### **Unit VII: Metabolic Biochemistry and Molecular Respiration (30)**

1. Enzymatic mechanism and regulation of Glycolysis, Glycogenolysis and TCA cycle, Energetics of Glycolysis and TCA cycle, Anapleurotic cycle.
2. Oxidation and biosynthesis of fatty acids, Energetics of  $\beta$ -oxidation, Ketone bodies formation- function and fate.
3. Deamination and Transamination, Catabolism of Amino acids- Phenylalanin, Tyrosine, S-containing amino acids and tryptophan.
4. Urea formation- mechanism and regulation.
5. Inborn errors of metabolism- Glycogen storage diusease, Phenylketunuria, Albinism.
6. Gluconeogenesis, Pentose Phosphate and Uronic acid Pathway- mechanism and significance.
7. Biosynthesis of Cholesterol: mechanism and significance.
8. Catabolism of Purine and Pyrimidine.
9. Organisation of Electron Transport Chain, Chemi-osmotic hypothesis, Uncouplers.
10. Mechanism of Oxidative Phosphorylation:  $F_0F_1$  ATP-ase, Inhibitos.

### **Unit VIII: Digestive system & Nutrition (30)**

1. Anatomy and histology of alimentary tract and digestive glands.
2. Composition, function, formation, mechanism of secretion, regulation of secretion of digestive juices, enterohepatic circulation of bile salts and bile pigments – their significance, role of bile in fat digestion and absorption.
3. Formation of HCL, cholelithiasis, concept of hyperacidity, achlorohydria.
4. Digestion and absorption of carbohydrate, fats, proteins, vitamin B<sub>12</sub>, iron, calcium and iodine.
5. Enteric nervous system, movements of alimentary canals, swallowing phenomenon- mechanism, defecation mechanism.

6. Disorders of digestive system, peptic ulcer, vomiting, constipation.
7. Vitamins- water and fat soluble vitamins-sources, daily requirements and function.
8. Chemical nature and structure of vitamins; biosynthesis of vitamin C, A and D.
9. Co-enzymatic role of vitamins in metabolism.
10. Vitamin deficiency symptoms and disorders; hyper-vitaminosis.
11. Bulk and trace elements and physiological roles of  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Se}^{2+}$ ,  $\text{Cu}^{2+}$ , Iodine.
12. Calorific value of foods and determination by Bomb calorimeter, SDA of foods, RQ, their definition and physiological importance.
13. BMR, factors affecting BMR, determination by Benedict's Roth apparatus.
14. Nutritional importance and dietary requirements of carbohydrate, protein and fat. RDA- carbohydrates, protein, fats and other nutrients. Complete and incomplete proteins, biological value of proteins, essential amino acids and fatty acids.
15. Food groups, formulation of balanced diet for growing child, adult man and women, pregnant and lactating mother, elderly people.
16. Malnutrition, protein calorie malnutrition (Kwashiorkor) and undernutrition (marasmus), their preventive and curative measures, obesity.

### **Add on topics:**

1. Cellular respiration and metabolism- relationship
2. Dietary time management- importance
3. Anthropometry- basic idea
4. Somatotyping- basic idea
5. Adolescence Growth
6. Xenobiotics

### **Suggested Readings:**

- i. Concise text book of physiology – Indu Khurana; Arushi Khurana Text Book of Physiology – Prof. A. K. Jain
- ii. Essentials of Medical Physiology - Anil Baran Singha Mahapatra; G S Mahapatra
- iii. Ganong's Review of Medical Physiology- Kim E Barrett; Susan M Barman; Jason Yuan
- iv. Essentials of human nutrition- Mann and Turswell

## **PRACTICAL (H3B)**

Total Marks — 40

### A. Clinical Biochemistry

1. Qualitative identification of bio-chemical samples of physiological importance – HCl, Lactic acid, Uric acid, albumin, peptone, gelatin, Stach, dextrin, Glucose, Fructose, Maltose, Lactose, Sucrose, Urea, Bile Salt, acetone, Glycerol.
2. Estimation of serum cholesterol by Ferric chloride method.
3. Estimation of blood glucose by Folin-Wu method.
4. Estimation of serum/plasma protein by Biuret method.
5. Estimation of serum triglyceride by Nerl and Fringe method.
6. Estimation of serum SGPT/SGOT.

### B. Nutritional Biochemistry

1. Colorimetric estimation of blood hemoglobin
2. Estimation of vitamin C in blood by 2,6-dichlorophenol indophenol method.
3. Estimation of lactose content of milk by Benedict's method.
4. Estimation of percentage quantity of carbohydrate in rice and potato.
5. Estimation of moisture content of food.

### C. Assesment of Nutritional statusby Anthropometric and diet survey method (Compulsory).

#### **Distribution of marks:**

TOTAL MARKS: 40

Internal assessment: 08

Term and exam: 32

A. Clinical Biochemistry (any-one experiment): 08

B. Nutritional Biochemistry (any-one experiment): 08

C. Nutritional Status Survey Reports 08

a) Anthropometry 04

b) Diet Survey Report 04

D. Practical Note Book 04

E. Viva Voce 04



**TRIPURA UNIVERSITY**  
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**SYLLABUS**

OF

**Human Physiology**  
(General)

**Semester- V**

**UNDERGRADUATE**

# **HUMAN PHYSIOLOGY (GENERAL)**

**Semester 05**

**Paper 05**

**Total Marks — 100**

**THEORY (P5A)**

**Total Marks — 50**

## **Unit – XI: Nutrition and dietetics**

1. Role of carbohydrates, fat, protein, vitamins and minerals in nutrition.
2. Nutritional requirements and formulation of balanced diet for adolescents and college students, workers with sedentary, moderate and heavy physical activity, pregnant and lactating women.
3. BMR- Definition and determination, controlling factors affecting and its significance.
4. Biological value of protein, RQ, SDA and RDA. Protein calorie malnutrition – definition, symptoms, classifications, major causative factors and remedial measure.
5. Vitamins – source, requirements, deficiency symptoms and functions.
6. Minerals and trace elements – iron, calcium and iodine: source, requirements, deficiency symptoms and physiological functions.
7. Diet survey- principle, significance.
8. Diets in diarrhoea, diabetes, goitre, obesity, hypertension.

## **Unit XII: Molecular biology and Immunology**

1. Chemical nature of DNA and RNA.
2. DNA- the genetic material experimental evidences.
3. Semi conservative model of DNA replication – Meselson and Stahl's experiment. Concept of gene.
4. DNA replication in prokaryotes. Okazaki fragments.
5. DNA transcription in prokaryotes
6. Protein synthesis in prokaryotes, activation of amino acids, initiation, elongation, termination, role of A site, P site.
7. Cloning of DNA into cloning vectors.
8. Immune system, Innate and Acquired Immunity- their components.
9. Primary & secondary lymphoid organs, their functions.



10. Antigen, immunogen, epitope, hapten, paratope, MHC molecules, CDr, CD markers- general idea.
11. Humoral immunity- (a) General structure of IgG antibodies, physiological functions of each class of antibody molecules. (b) Complement system- classical pathway.
12. Primary and secondary immune responses, vaccination.
13. Clonal selection hypothesis of antibody production. Activation of B- cells by T- cells. Basic concepts of polyclonal and monoclonal antibodies.
14. Cell mediated immunity – role of cytotoxic T cell in cell mediated immunity, role of T- helper cell in activation of T- cytotoxic cell.
15. Basic principles of Enzyme Linked Immuno sorbent assay (ELISA), radioimmunoassay (RIA).

**Add on topics:**

- i. Toxicology- general concept.
- ii. T cell, B cell, Macrophages, Dendritic cells.

**Suggested readings:**

- i. Text book of Physiology – Prof. A.K.Jain (7<sup>th</sup> edition)
- ii. Essential of human nutrition – Mann and Turswell (4<sup>th</sup> edition)
- iii. Biochemistry – U. Satyanarayan and U. Chakrapani
- iv. Cell biology, Genetics, Molecular Biology, Evolution and Ecology- Dr. PS Verma ; Dr. VK Agarwal.
- v. Roitt's Essential Immunology – Delvis, Martin, Burton, Roitt-Willy Blackwell

## **PRACTICAL (P5B)**

Total Marks — 50

### **A. Biochemistry and nutrition:**

1. Estimation of lactose content of milk.
2. Estimation of percentage quantity of carbohydrate in food.
3. Quantitative estimation of glucose and sucrose.
4. Ouster long double diffusion test (Ag-Ab reaction).
5. DNA electrophoresis – Demonstration.

### **B. Assessment of Nutritional Status by Anthropometric and Diet Survey method.**

(Attendance in survey programme conducted by the department and submission of Diet survey report are compulsory pre-requisites for appearing Term – End Examination).

### **Marks distribution:**

Total marks – 50

Internal assessment – 10

Term End Exam – 40

- A. Biochemical/Nutritional experiment (any one experiment) : 15 [marks distribution for estimation: Principle -2 , Procedure – 2 , Calculation – 3, Result – 8. (Error : upto 5% : 08, upto 8% : 06, upto 10%: 04, upto 12% : 02, upto 14%: 01, above 14%: 00)]
- B. Diet survey report – 10 (Attendance – 4, report – 6)  
Anthropometric measurements & interpretation of results – 5
- C. PNB- 5
- D. VIVA VOCE - 5



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SYLLABUS

OF

Human Physiology  
(Hons.)

Semester- V

UNDERGRADUATE

# **HUMAN PHYSIOLOGY (HONOURS)**

**Semester 05**

**Paper 05 (H5)**

**Total Marks — 100**

## **UNIT – XI: Nervous System (25 marks)**

1. Structural organization of different parts of brain and spinal cord.
2. Cerebrum: Histology, area and centers in the central cortex and their functions, method of localization of function; Thalamus and Hypothalamus – their nuclei, connections and functions.
3. Cerebellum: Histology, nuclei, connections and functions.
4. Concepts of ANS- Classification, structural and functional organization.
5. Basal ganglia: Structure, connection and functions.
6. Electrical activities of cerebral cortex, physiological basis of EEG, waves of EEG with their significances; epilepsy, physiology of sleep, types of sleep, effect of sleep deprivation.
7. Brain ventricles- basic concepts; CSF – composition, formation, circulation and functions.
8. Ascending tracts carrying touch, pain, pressure, temperature, kinesthetic sensation; descending tracts- corticospinal, corticobulbar, extra pyramidal, rubrospinal, reticulospinal tracts. Upper and lower motor neurons and their lesions.
9. Cerebral circulation- course, factors affecting.
10. Limbic system- structure, connection and function.
11. Maintenance and regulation of posture and equilibrium
12. Neurophysiology of learning and memory
13. Macromolecular neurochemistry: carbohydrate utilization in the brain, role of proteins and lipids in the brain.
14. Neurotransmitter chemistry: acetylcholine, catecholamine, serotonin, amino acids and peptides.

## **UNIT - XII: Excretory System , Skin and Thermoregulation (25 marks)**

1. Anatomy of kidney, Histology of nephron and function in relation to structure.
2. Course, peculiarities and regulation of renal circulation.
3. GFR- factors affecting and regulation.
4. Juxta – glomerular apparatus – structure and function.

5. Hypo and hypertonic urine formation with reference to counter-current exchanger and multiplier mechanism.
6. Non-excretory functions of kidney – i) water balance, ii) blood volume, iii) blood pressure, iv) acid base balance, v) erythropoiesis.
7. Renal function tests – Plasma clearance concept, inulin and creatinine clearance test.
8. Composition of normal urine, composition and significance of abnormal constituents of urine. Diabetes insipidus- causes.
9. Physiology of urinary bladder, micturition process and reflexes.
10. Diuretics, mode of action of osmotic diuretics.
11. Chronic renal failure – causes and renal hypertension
12. Cutaneous circulation and its significance
13. Structure of sweat glands, structure of sebaceous gland and its significance. Mechanism and regulation of sweat secretion.
14. Concept of homeothermy and poikilothermy, processes of heat loss and heat gain. Mechanism of temperature regulation.
15. Heat stress, pyrexia, hypothermia and physiology of hibernation.

### **UNIT – XIII: Endocrinology & Chronobiology (25 marks)**

1. Concept on autocrine, paracrine and endocrine system. Anatomical organization of endocrine glands in the body. Chemical classification of hormones. Different types of hormone receptors.
2. Mode of actions of hormones with examples; signal transduction, second messengers.
3. Pituitary glands – anatomy, histology and function of anterior and posterior pituitary hormones.
4. Hypothalamo- hypophyseal portal system and tracts and their significance.
5. Thyroid, parathyroid and adrenal glands – anatomy, biosynthesis and physiological functions of their hormones.
6. Endocrine pancreas: Hormones of Islets of Langerhans, chemistry and functions of insulin and glucagon.
7. Blood sugar regulation – Role of different hormones. Diabetes mellitus – Type- I and Type - II, their causes and symptoms, glucose tolerance test and its significance, role of GLUT transporters.

8. Hormones related to hunger and satiety – leptin and ghrelin and adiponectin.
9. Hypo and hyper functions of endocrine glands.
10. Regulation of hormones – feedback mechanism.
11. Biological clock- concept, role of pineal glands, pituitary and hypothalamus
12. Different biological rhythms: circadian, infradian, ultradian, tidal and linear rhythms. Gene oscillations.

#### **UNIT-XIV: Reproductive Physiology & Development Biology (25 marks)**

1. Anatomical organization of male and female reproductive system: primary and secondary sex organs. Puberty.
2. Testis- Histology, hormones of testis & their functions.
3. Ovary- Histology, hormones of Ovary – their functions; Menstrual cycle – ovarian and uterine changes & its hormonal regulation.
4. Embryogenesis: Gametogenesis- Spermatogenesis, Oogenesis, role of hormones in gametogenesis; Fertilization process; Cleavage (blastulation) process; Implantation – hormonal control; Gastrulation (formation of endoderm – its fate, formation of embryonic disc, formation of mesoderm, and ectoderm – their fates, formation of embryonic cavity);
5. Placenta – placental hormones and their function.
6. Physiological changes during pregnancy. Pregnancy tests (Immunological).
7. Physiology of parturition.
8. Development of mammary gland, physiology of lactation, - its control. Mechanism of milk ejection. Importance of colostrums.
9. Physiology of menopause.
10. Fertility control- hormonal.

#### **Add on topics:**

- i. Bioinformatics- general concept
- ii. Blotting techniques – basic idea
- iii. Endocrine disrupters
- iv. Polycystic ovary syndrome, anovulation.
- v. Male sterility, androgen deficiency syndrome

**Suggested readings:**

- i. Guyton and Hall text book of Medical Physiology - John E. Hall; Michael E Hall.
- ii. Concise text book of physiology – Indu Khurana; Arushi Khurana.
- iii. Text book of Physiology- A.K.Jain.

3. Qualitative identification of physiologically important substances –HCL, Lactic acid, Uric acid, Albumin, Peptone, Starch, Dextrin, Glucose, Fructose, Lactose, Maltose, Sucrose, Bile salt, Acetone, Glycerol, urea.
4. **Laboratory Records:** Student must get the laboratory note books duly signed by the respective teacher during practical classes.
5. **Viva voce:** Questions based on theory and practical syllabus of 1<sup>st</sup> semester.

## **SEMESTER-II**

### **HP-103C**

#### **Paper-3 (Theory)**

**Total Mark = 100 (IA = 40 + ESE = 60) Credit = 04**

#### **Unit-I (Cardiovascular System-I)**

1. Anatomy of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Heart Block.
2. Cardiac cycle-Pressure and volume changes. Heart sounds. Murmurs.
3. Cardiac output-Measurement by application of Fick's principle & factors affecting. Starling's law of heart.
4. Electrocardiography- Principles of Electrocardiography, Normal electrocardiogram, different waves, intervals and segments; different electrocardiographic lead systems. Cardiac Arrhythmias. The pulse- Arterial and venous. Hemodynamic of blood flow.

#### **Unit-II (Cardiovascular System-II)**

1. Innervation of the heart and blood vessels, cardiac and vasomotor reflexes.
2. Coronary Circulation. Coronary artery disease- Atherosclerosis.
3. Blood vessels-types, structure. Hemodynamics: velocity of blood flow, nature of blood flow, Flow-Pressure- Resistance relationship.
4. Blood pressure-regulation with special reference to sino-aortic mechanism. Its controlling factors.
5. Immediate and delayed effects of haemorrhage.

#### **Unit-III (Respiratory System-I)**

1. Anatomy and histology of the lung and airways.
2. Mechanics of breathing: Role of respiratory muscles, Compliance of lungs and chest wall, pressure-volume relationships, alveolar surface tension and surfactant. Spirometry: Lung volumes and capacities. Dead space.
3. Pulmonary Circulation.
4. Ventilation-perfusion ratio, Transport of gases (O<sub>2</sub> and CO<sub>2</sub>) in body: Partial pressure and composition of normal atmospheric gases in inspired, expired, alveolar airs and blood.



#### Unit-IV (Respiratory System-II)

1. Oxygen dissociation curve of haemoglobin – factors affecting. Carbon dioxide dissociation curve.
2. Regulation of respiration -- neural and chemical, respiratory centers, chemoreceptors, baroreceptors, pulmonary receptors.
3. Disorders of Breathing: Hypoxia: Types & effects. Asphyxia, Cyanosis, Periodic breathing, Apnoea, Asthma, Emphysema.
4. High altitude pulmonary oedema (HAPO). Oxygen therapy. Decompression sickness, caisson's disease.

#### Paper- 4A (Theory)

HP-104C

Total Mark = 50 (IA = 20 + ESE = 30) Credit = 02

#### Unit-I (Physiology of Blood and body fluids-I)

1. Bone marrow: Formed elements of blood–origin, formation, functions and fate.
2. Plasma proteins: Origin and functions.
3. Erythropoiesis-factors effecting and leucopoiesis.
4. Haemoglobin-Structure, types. Anaemia.

#### Unit-II (Physiology of Blood and body fluids-II)

1. Blood volume-factors effecting.
2. Haemostasis-Factors, mechanism, anticoagulants, procoagulants. Disorders of haemostasis -Haemophilia.
3. Blood group-ABO, Rh system and other minor blood group systems. Blood transfusion and its hazards.
4. Lymph and tissue fluids-Formation, circulation, functions and fate.
5. Lymphaticorgans-  
Histologicalstructuresandfunctionsoflymphglandandspleen.Spleno  
megalycauses andeffects.

#### Paper-4B (Practical)

HP-104C

Total Mark = 50 (IA = 20 + ESE = 30) Credit = 02

Sl. No.	Practical	Marks
1.		
2.		
3		
4.	Laboratory Note book	
5.	<i>Viva voce</i>	
<b>TOTAL</b>		<b>40</b>

## **CONTENTS:**

1. Haematological experiments: Preparation and staining of blood film with Leishman's stain. Identification of blood cells. Total count of W.B.C and R.B.C. Differential count of W.B.C. Haemoglobin estimation by Sahli's hemoglobinometer. Preparation of haemin crystals.
2. Cardiovascular Physiology Experiments: Determination of Blood pressure in different body posture. Determination of pulse rate.
3. Interpretation of Kymographic recording of the movements of perfused heart of toad and the effects of Excess Calcium, acetylcholine and adrenaline on the contraction of heart.
4. Respiratory Human Experiments: Pneumographic recording / demonstration of effects of hyperventilation, breath-holding and talking. Interpretation of lung function tests using Spirometry (Digital) and analysis of the results.
5. Determination of Peak Expiratory Flow Rate
6. **Laboratory Records:** Student must get the laboratory note books duly signed by the respective teacher during practical classes.
7. **Viva voce:** Questions based on theory and practical syllabus of 3<sup>rd</sup> semester.

## **2<sup>ND</sup> YEAR**

### **SEMESTER-III**

#### **HP-201C**

#### **Paper- 5 (Theory)**

**Total Mark = 100 (IA = 40 + ESE = 60) Credit = 04**

#### **Unit-I (Enzyme classification and kinetics-I)**

1. Classification of enzymes
2. Co enzymes and co factors, prosthetic group
3. Models of enzyme action
4. Multi-enzyme system-example, advantages

#### **Unit-II (Enzyme classification and kinetics-II)**

1. Enzyme kinetics: Factors affecting enzyme activity.
2. Michaelis-Menten constant ( $K_m$ ); Lineweaver-Burk plot.
3. Enzyme Inhibition: Type – competitive, non competitive and uncompetitive
4. Feedback and allosteric regulation of enzymes.

#### **Unit-III (Digestion & absorption-I)**

1. Anatomy and histology of alimentary tract & digestive glands.
2. Mastication, Deglutition and movements of alimentary canal.
3. Composition, function and regulation of secretion of salivary, gastric, pancreatic and intestinal juice and bile.
4. Formation, secretion and regulation of HCL, concept of hyperacidity, achlorhydria
5. Gastro-intestinal hormones.

1.		
2.		
3.		
4.	Laboratory Note book	
5.	<i>Viva voce</i>	
<b>TOTAL</b>		<b>20</b>

### CONTENTS:

1. Study of Models / Charts of different body organ systems & organs – Anatomical position, Structure & Functions.
2. Study of Human Skeleton
3. Study of Body Anthropometry- Stature, weight, sitting height, shoulder height (standing), Elbow height (standing), Hip height (standing), hand length, shoulder elbow length, leg length, shoulder breadth (biacromial), Arm reach from wall (Arm span), Knee to Knee Breadth, Elbow to elbow breadth, Head circumference, Shoulder circumference, Chest circumference, waist circumference, hip circumference. Calculation of BMI, BSA, WHR, Head and Chest circumference ratio.

**Semester-II**  
**Paper-2A (Theory)**  
**HP- 102M**

**Full marks-75 (Internal assessment-30; End Sem. Exam. -45)**

#### **Unit-1: Physiology of Blood and body fluids-I**

1. Composition and general functions of blood. Plasma - Plasma proteins- types and functions.
2. Haematopoiesis. Haemopoietic stem cell, Site of Blood cells Formation. Erythropoiesis –factors effecting. Fate of RBC.
3. Tissue fluid and Lymph- Composition and function.
4. ESR-its importance. Haemoglobin-structure, types. Thalassemia and Haemoglobinopathies- HbS, HbE, HbD.

#### **Unit-2: Physiology of Blood and body fluids-II**

1. Blood coagulation : mechanism, role of platelets. Hemophilia, purpura
2. Blood group -ABO, Rh system. Blood transfusion and its hazards.
3. Blood volume- Factor effecting and determination of blood volume.
4. Anaemia-types, leukemia, lekopenia, polycythemia.

### Unit-3: Immunology

1. WBC-morphology, types. Functions of different types of WBC:
2. Primary and secondary lymphoid organ. Antigen, Immunogen. Primary and secondary immune response. Innate and acquired immunity.
3. Immunity-- Humoral immunity - classification, functions of antibodies. General structure of IgG antibody.
4. Cell mediated immunity-Role of NK cells, T<sub>H</sub> and T<sub>C</sub> cells. Vaccination.

### Paper-2B (Practical)

#### HP- 102M

Full marks-25 (Internal assessment-05; End Sem. Exam. -20)

Sl. No.	Practical	Marks
1.		
2.		
3		
4.	Laboratory Note book	
5.	<i>Viva voce</i>	
<b>TOTAL</b>		<b>20</b>

#### CONTENTS:

1. Introduction to compound microscope.
2. Preparation and staining of blood film with Leishman's stain. Identification of blood cells.
3. Determination of differential leukocyte count (DLC).
4. Hemoglobin estimation by Sahli's hemoglobinometer.
5. Preparation of haemin crystals.
6. Determination of bleeding time and clotting time.
7. Determination of Blood group.



TRIPURA UNIVERSITY  
(A Central University)

Suryamaninagar

SYLLABUS

OF

Human Physiology  
(General)

Semester- IV

UNDERGRADUATE

# **HUMAN PHYSIOLOGY (GENERAL)**

**Semester 04**

**Paper 04**

**Total Marks — 100**

**THEORY (P4A)**

**Total Marks — 50**

## **Unit IX: Brain and Sensory Physiology (25)**

1. Cerebrum: Histology, area and centers in the central cortex, method of localization and function, Thalamus, Hypothalamus, connections and functions.
2. Cerebellum- Histology, Nuclei, Connections and Functions.
3. Concept of ANS- Classification, Structural and Functional organisation.
4. Basal ganglia structure, connections and functions.
5. Electrical activities of cerebral cortex, Physiological basis of EEG, epilepsy, Types of Sleep and effect of sleep deprivation.
6. CSF- composition, formation, circulation and function.
7. Eye: histology of retina, Photochemical changes after exposure of light on retina, accommodation, refractive errors and their corrections, Argyll Robertson pupil, visual pathway.
8. Ear: Structure of external, internal and middle ear. Propagation of sound waves through different parts of ear and their role in hearing, Auditory pathway.
9. Olfaction and Gustation: Receptors involved and their mode of perception, Neural pathway for transmission.
10. Parkinson and Alzheimer's disease.

## **Unit X: Endocrinology and Reproductive Physiology (25)**

1. Anatomical organization of endocrine glands in the body, Chemical classification of hormones, Mode of action of hormones, Signal Transduction and Second messengers.
2. Pituitary gland: histology, function of the anterior and posterior pituitary glands, their hormones, Symptoms of hypo and hyper function of TSH and ACTH.
3. Thyroid, Parathyroid and Adrenal gland: Histology, chemical nature, mode of action, physiological function.

4. Endocrine Pancreas: Histology of Islets of Langerhans, Chemistry and Function of insulin and glucagon; Diabetes mellitus- type I and Type II diabetes; their cause, Blood sugar regulation, role of different hormones, Glucose tolerance and their importance, Mode of action of insulin, role of GLUT transporters.
5. Regulation of hormones feedback mechanism.
6. Anatomical organization of male and female reproductive system; Primary and Secondary sex organs.
7. Testis-histology, Spermatogenesis, Factors affecting Spermatogenesis, Hormones of testis and their functions.
8. Ovary-Histology, Oogenesis, Hormones of Ovary their function and mode of action. Menstrual cycle and its regulation.
9. Concept of Fertilization, Structure of Placenta, Placental hormone and their functions, Development of three germinal layers, Pregnancy Test.

**Add on topics:**

1. Toxicology- general concept
2. Importance of Physical exercise.
3. Role of Physical exercise on lung function.
4. Binocular and stereoscopic perception
5. Abnormalities of taste
6. Abnormalities of smell sensation
7. Neuroscience method- neuroimaging.

**Suggested Readings:**

- i. Text Book of Physiology – A. K. Jain
- ii. Guyton and Hall text book of Medical Physiology - John E. Hall; Michael E Hall.
- iii. Concise text book of physiology – Indu Khurana; Arushi Khurana.

## **PRACTICAL (P4B)**

Total Marks — 50

1. Histological slides and models on brain and endocrine system. Study of anatomical position, structure and function.
2. Model of Reproductive system. Study of reproductive system: organs in female pelvic cavity- their anatomical position Structure and Function (uterus, cervix, falopian tube, ovary).
3. Histological slides on ovary, uterus and cervix. Study of primary, secondary and Tertiary graffian fillicles, corpus leuteum, oocyte and sperm.
4. Models of eye, ear, nose, skin and tongue, structure and function of different parts.
5. Tests foe detecting defects of color vision.
6. Rinne's/Weber's tests for deafness.
7. Romberg's sign- Vestibular function.

### **Distribution of marks:**

Total Marks: 50

Internal assessment: 10

Term and exam: 40

- |                        |            |
|------------------------|------------|
| 1. Three experiments   | 10 x 3= 30 |
| 2. Practical Note Book | 05         |
| 3. Viva Voce           | 05         |





TRIPURA UNIVERSITY  
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Suryamaninagar

SYLLABUS

OF

Human Physiology  
(Hons.)

Semester- IV

UNDERGRADUATE

# HUMAN PHYSIOLOGY (HONOURS)

**Semester 04**

**Paper 04**

**Total Marks — 100**

## **THEORY (H4A)**

**Total Marks — 60**

### **Unit IX: Respiratory System and Aviation Physiology (30)**

1. Anatomy and histology of respiratory tract and organs: Muscles of respiration.
2. Mechanisms of breathing: Mechanism of breathing, respiratory pressure, lung compliance, surfactant, airway resistance.
3. Pulmonary function test: lung volume and capacities, Spirometry: measurement of Vital capacity, FVC, Timed Vital capacity, FEV1, MVV or MBC, PEFV with their significance.
4. Course, peculiarities and control of pulmonary circulation.
5. Transport of O<sub>2</sub> and CO<sub>2</sub>, O<sub>2</sub> dissociation curve- factors affecting and significance.
6. Regulation of Respiration – neural and chemical
7. Hypoxia-types, causes and effects
8. Basic concepts on Asphyxia, Apnoea, Hyperapnoea, Cyanosis, Periodic breathing, Dyspnoea, Chronic obstructive pulmonary disease – asthma, restrictive pulmonary disease – emphysema.
9. High Altitude Physiology: Barometric and partial pressure of O<sub>2</sub> at high altitude, changes in the body at high altitude, motion sickness, acclimatization of high altitude.
- 10 Aviation Physiology- Acceleration and gravitational force, effects of positive and negative G force on body, space physiology, effects of weightlessness on cardiovascular system. Musculo-skeletal system, blood, immune system, Space motion sickness.

### **Unit X: Ergonomics and Sports Physiology (30)**

1. Scope and application of ergonomics and work Physiology, Static and Dynamic work, Classification of work and exercise.
2. Energy cost of different Physical activities-its determination, Ergometry-working principle of ergometers – bicycle and treadmill.
3. Importance of measurement of different physiological parameters like heart rate (pulse rate), O<sub>2</sub>-consumption, blood pressure.

4. Anthropometry in ergonomics, common anthropometric measurements used in work place design.
5. Muscles in exercise strength, power and endurance of muscles, muscles metabolic system in exercise (energy source during muscular exercise) Nutrients used during exercise.
6. Physiological changes during exercise- cardiovascular (circulatory) and respiratory changes, steady state, second wind, Fatigue-causes.
7. Metabolic changes during exercise-anaerobic power capacity, maximum aerobic power  $VO_2\text{max}$  – its determination and significance, Recovery of metabolic systems after exercise,  $O_2$  debt.- lactacids and alactacids.
8. Exercise training: Principles of training, aerobic and anaerobic training, Effects of training on muscles, cardiovascular (circulatory) and respiratory system.
9. Nutrition/Diet in athletics performance- pregame meal, Glycogen/carbohydrate loading.
10. Doping in sports; ethical issues, harmful effects of caffeine, steroids, amphetamine and cocaine abuse on health.

### **Add on topics:**

1. Toxicology- general concept
2. Importance of Physical exercise.
3. Role of Physical exercise on lung function.
4. Binocular and stereoscopic perception
5. Abnormalities of taste
6. Abnormalities of smell sensation
7. Neuroscience method- neuroimaging, non- invasive electrophysiology, classical electrophysiology-basic idea.

### **Suggested Readings:**

- i. Text Book of Physiology – A. K. Jain .
- ii. Guyton and Hall text book of Medical Physiology - John E. Hall; Michael E Hall.
- iii. Concise text book of physiology – Indu Khurana; Arushi Khurana.
- iv. A text book of sports and exercise physiology – Swapan Kumar Dey.

## **PRACTICAL (H4B)**

Total Marks — 40

### Group –A

1. Spirometric determination of VC, FVC, FEV1, FRV1, MVV
2. Determination of heart rate, P-R interval, Q-T, QRS duration and S-T segment from electrocardiogram.
3. Determination of electrical axis of heart from stenoid
4. Effect of posture and exercise on blood pressure.
5. Determination of VO<sub>2</sub> max by Queens college step tests.

### Group –B

1. Prediction of BMR using prediction equation of ICMR and determination of BMR of a person from the graphical record of Benedict Roth apparatus from the applied graphical record.
2. Estimation of body fat by using skin fold method.
3. Determination of respiratory rate by pneumograph: Effects of Hyperventilation, Breath holding and exercise on respiratory pattern.

### Group –C

1. Determination of PFI by Harvard step test and graphical representation of recovery pulse rate.
2. Determination of muscle strength and endurance by hand grip Dynamometer.
3. Determination of muscular efficiency by ergography.

### **Distribution of marks:**

Total Marks: 40

Internal assessment: 08

Term and exam: 32

Group A (any-one experiment):	08
Group B (any-one experiment):	08
Group C (any-one experiment):	08
Practical Note Book	04
Viva Voce	04



TRIPURA UNIVERSITY  
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SYLLABUS

OF

Human Physiology  
(Hons.)

Semester- VI

UNDERGRADUATE

# HUMAN PHYSIOLOGY (HONOURS)

**Semester 06**

**Paper 07 (H7)**

**Total Marks — 100**

## **Unit XIV: Sensory Physiology (25)**

1. Olfaction and gustation: Structure of taste buds, mechanism of taste sensation, neural pathways for taste and smell sensation with centres involved. Taste and smell adaptation. Olfactometer, electro-olfactogram (EOG).
2. Audition: Structure and function of auditory apparatus, organ of corti- Histology, function, propagation of sound waves, through different parts of ear and their role in hearing, auditory pathway, perception of sound frequency and loudness. Deafness, audiometry, hearing tests.
3. Vision : anatomy and structure of eye ball , histology of retina , photochemical changes of retina on exposure to light, visual pathway, reflexes of the eye, accommodation, refractive errors and their remedies, visual field – scotopic and photopic vision, visual acuity, perception of depth, positive and negative after image, light and dark adaptation, theories of colour vision, colour blindness, basic idea about glaucoma.

## **Unit XVI: Microbiology, Biotechnology & Immunology (25)**

### **Microbiology:**

1. Bacteria, virus and fungus – their structure and characteristics, bacterial classification.
2. Bacterial growth cycle, and factors (pH, temperature, nutritional requirement) controlling bacterial growth.
3. Bacterial genetics- transformation, conjugation, transduction
4. Bacteriostatic and bactericidal agents and their effects.
5. Brief idea of antibiotics with examples.
6. Some common diseases caused by bacteria, fungus and virus- cholera, eczema and influenza- their symptoms and preventive measures.

### **Biotechnology**

7. Recombinant DNA technology, DNA cloning, cloning vector, restriction endonuclease, cloning of DNA into cloning vectors.
8. DNA Gel electrophoresis.

9. Southern blot and western blot.
10. Colony hybridization.
11. Basic concepts of PCR.

### **Immunology**

12. Immune system, innate and acquired immunity- their components.
13. Primary and secondary lymphoid organs, T- cell, B cell, macrophage, neutrophil, dendritic cells their functions.
14. Antigen, immunogen, epitope, hapten, paratope, MHC molecules, CD-4 and CD-8 markers- general idea.
15. Humoral immunity- general structure of IgG antibodies, Primary and secondary immune responses. Clonal selection theory of antibody production.
16. Cell mediated immunity – role of CTL and T<sub>H</sub> in cell mediated immunity.
17. Complement components of classical and alternative pathways, their activation, and physiological function of complement system.

### **Unit XVII: Molecular biology & genetics (25)**

1. DNA- the genetic material, transformation in pneumococcus (Avery, MacLeod and McCarty), Griffith and Hershey- Chase experiments.
2. Semi conservative model of DNA replication.
3. DNA polymerase I and III, DNA ligase, function of different subunits, Okazaki fragments.
4. DNA transcription: Concept of gene, difference between prokaryotic and eukaryotic gene, mechanism of gene transcription, template and non-template strand. Promoter sites, RNA polymerase- functions of different components of RNA polymerase. Post transcriptional processing of eukaryotic mRNA.
5. Protein synthesis: genetic code, codons, reading frame, Nirenberg's experiment, initiation codon, terminator codon, degeneracy of genetic code, Wobble hypothesis.  
Mechanism of translation: activation of amino acid, formation of initiation complex, Shine-Dalgarno Sequence, role of A site and P site. Elongation: role of elongation factors, translocation. Termination: role of terminators and release factors, post transcriptional modification.
6. Mutation: spontaneous and induced mutation, mutagens- chemical, physical; transition and transversion of mutation – mechanism, chemical inducing transition and transversion.

7. Chromosomal mutation: Structural, inversion, translocation, deletion, duplication, chromosomal number: euploidy, aneuploidy, polyploidy, repair of mutation: mismatch repair, excision repair.
8. Regulation of gene expression, operon concept, lac operon, cistron.
9. Different stages of meiosis, and behaviour of chromosome, during meiosis,
10. Mendelian genetics- Mendel's experiments, monohybrid crosses, principles of dominance, dihybrid crosses, incomplete dominance, Co-dominance.
11. Human genetics- importance, pedigree analysis, karyotyping, human genetic disorders, gene incompatibility, (ABO blood group), autosomal (phenyl ketonuria), albinism, sex linked (haemophilia, red green colour blindness) diseases

### **Unit XVIII: Research methodology & Epidemiology (25)**

1. Meaning of research, objectives and significance of research, research ethics, types of research.
2. Scientific methods in research, selecting the research problem, need for research design, sample design and its different steps, need for basis of selecting a sampling procedure, characteristics of a good sample design, type of data.
3. Utility of statistics in research, measures of central tendencies (mean, median, mode), standard deviation (SD), standard error of mean (SEM), student's T- test, graphical representation of data frequency, polygon, histogram, normogram, bar diagram, pie diagram. Testing of hypothesis, null hypothesis, test of significance, degree of freedom.
4. Definition of epidemiology, recent development in epidemiology, definition, scope and use of epidemiology, concepts of disease occurrence, chain of infection, epidemic disease occurrence, measuring disease frequency, population at risk.

#### **Add on topics:**

- i. Case control study (CCS)
- ii. Basic steps of CCS; Odd ratio
- iii. Cohort study and its framework
- iv. Dynamics of disease transmission



**Suggested Readings:**

1. Guyton and Hall text book of Medical Physiology - John E. Hall; Michael E Hall.
2. Basic physiology- C.C Chatterjee.
3. Ganong's Review of Medical Physiology- Kim E Barrett; Susan M Barman; Jason Yuan.
4. Kuby Immunology.
5. Cell biology, Genetics, Molecular Biology, Evolution and Ecology – Dr. PS Verma; Dr. VK Agarwal
6. Microbiology – Michael J Pelczar, JR. E.C.S. Chan; Noel R. Krieg.
7. Lehninger's Principles of biochemistry.
8. Lewen's Gene XII
9. Research methodology- C, R. Kothari.
10. Basic epidemiology – R. Bonita, R. Beaglehole, T Kjellstrom.

# HUMAN PHYSIOLOGY (HONOURS)

**Semester 06**

**Paper 08 (H8)**

**Total Marks — 100**

## **PRACTICAL**

- A. Microbiology & Immunology [20 marks]
- a. Gram staining of bacteria
  - b. Ouchterlony double diffusion test (pattern of antigen antibody interaction)
  - c. Single colony isolation by agar streak method.
- B. Sensory physiology [20 marks]
- a. Models of eye, ear, nose, tongue, skin, structure and functions
  - b. Tests for detecting defects of colour vision
  - c. Rinne's weber's test for deafness
  - d. Visual acuity- snellen's chart
  - e. Audiometry
- C. Molecular biology & genetics [20 marks]
- a. DNA isolation
  - b. DNA/Protein separation by paper electrophoresis & gel electrophoresis
- D. Research methodology [20 marks]
- a. Mean, median, mode, standard deviation, standard error of mean calculation.
  - b. Test of significance (t-test) calculation.

Viva voce [10 marks]

Laboratory note book [10 marks].

### **Add on topics:**

1. Entrance exam preparation for M.Sc. Human Physiology
2. Use of tools and applications for bioinformatics.
3. Types of research
4. Research Ethics.