5/1/2021

TRIPURA UNIVERSITY

(A Central University)
Suryamaninagar

SYLLABUS

OF

Physiology

(General)

Semester-I

Year 2014

Human Physiology (General)

Semester 01, Paper 01

Unit I- STRUCTURAL UNITS OF HUMAN SYSTEM [25 Marks]

1. General concept of structure and function of cell organelles of Eukaryotic cell: Endoplasmic reticulum, Golgi body, Mitochondria, Nucleus, Lysosomes, Peroxisomes, Ribosomes, Cytoskeletal system, Cell junction, Cell inclusions.

2 Modern concept of membrane structure models, membrane transport: Active and passive transport, carrier proteins, ion-channels, ion-pumps, symport, antiport

3. Cytoskeleton: Classification, physiological functions .

2. Concept of cell cycle : Phases of cell cycle, phases and differences between mitosis and meiosis .

3. Concept and differences necrosis and apoptosis.

4. General structure and function of different types of tissues.

5. Musculo-skeletal system:

a. Muscle: Smooth, skeletal and cardiac muscle structure (macromolecular)

b. Skeletal system: Bones: structure and types, cartilage and ligament, joints- types, description and function, arthritis, osteoporosis.

Unit II- Biophysical and Biochemical Principles [25]

1. Biophysical processes- Osmosis, diffusion, surface tension and viscosity- definition, Biological significances, Factors influencing: basic concept of homeostasis.
2. Donnan membrane equilibrium- its biological applications and relation with osmotic pressure and pH.

3. Acid, bases, pH, Buffers: Definition, biological significances, Henderson-Hesselbach equation, mathematical problems on pH and buffers.
4. Colloids- Classification, properties; Protective colloids and biological importance of colloids.
5. Dialysis and ultra filtration: definition, biological significance.
6. Radioactivity- Isotopes and their major biological applications, radiation hazards on human.
7. Principles of chromatography and electrophoresis.

Unit III - Blood, other body fluids and clinical hematology (25)

1. Composition and general functions of blood. Plasma proteins: types and functions.
2. Bone marrows: general structure and functions. Hemopoetic stem cells
3. Erythropoiesis, factors influencing erythropoiesis. Leucopoiesis, Thrombopoiesis.
4. Blood volume: Hypervolimia, hypovolemia, factors affecting blood volume.
5. Structure, Synthesis, functions and degradation of hemoglobin.
6. Hemostasis, Blood coagulation: mechanisms
7. Lymph and tissue fluid: Composition, Origin, formation, circulation and functions. Oedema: types and causes, Compartmentation of fluid in the body.

Clinical Hematology:

8. Blood indices: TC, DC, PCV, MCV, MCHC, Colour index, Arneth and Schilling index ESR -their determination and significances.
9. Anemia: types, causes and preventive measures, thalassaemia, haemoglobinopathies, Leucocytosis, Leucopenia, Leukemia, purpura - basic concept.
10. Concepts of Jaundice and its types, features,
11. Disorder of coagulation, haemophilia, types and reasons, BT, CT and PT. Anticoagulants and their mode of action, prevention of intravascular coagulation.
12. Blood groups: Biochemical characteristics of ABO and Rh system- their determination, transfusion hazards and precautionary measures.

Unit IV- Biochemistry and Enzymology (25)

1. Definition, chemistry and classification of carbohydrate, protein, lipids and amino acids- physiological significance and functions.
2. Properties of carbohydrates: Isomerism -types, functional groups, osazone reaction.
3. Ppolysaccharides (starch, glycogen, dextrin, cellulose): Their structure, occurance and physiological significance.
4. Mucopolysaccharides, glycosides- structure and function.
5. Amino acids, peptides and protein: effect of pH, Zwitterion; primary, secondary (alpha helix, beta sheet, globular structure), tertiary, quaternary structures of proteins: coagulation, denaturation, salting in, salting out.
6. Fats and fatty acids: properties, hydrolysis, hydrogenation, saponification number, iodine number, rancidity, mono and poly unsaturated fatty acids and their significances.
7. Sterols: chemical nature, structure, classification and physiological importance
8. Enzymology: Enzymes-definition, classification, activation energy, mechanism of enzyme action
9. Definition and significance of K_m value, effect of temperature, pH on enzyme action.
10. Enzyme regulation: Allosteric regulation and covalent modifications, regulation of enzyme synthesis.
11. Enzyme inhibition: their types.

Elective

Semester 01, Paper 01

SAME AS HONOURS

Semester 02, Paper 02

Total Marks: 50

Module V: Cardiovascular and Respiratory Systems

Cardiovascular System

1. Anatomy of human heart and its innervations, course of circulation of blood through it
2. Properties of cardiac muscle and junctional tissues, origin and spread of cardiac impulse
3. Cardiac cycle and heart sound; significance of different heart sounds
4. Cardiac output – its determination and factors controlling cardiac output – regulation of cardiac output
5. Hear rate – factors controlling it, tachycardia, bradycardia
6. Blood pressure – regulation of blood pressure, concept of hypertension
7. Atherosclerosis, coronary thrombosis
8. E.C.G. different lead systems, different waves and intervals, their significances

9. Einthoven's law, determination of electrical axis

10. Anatomy of respiratory tree and histology of trachea,alveoli, lung compliance, surfactants, airways reistance

11. Respiratory muscles, mechanism of respiration

12. Regulation respiration

13. Transport of respiratory gases, oxygen dissociation curve, factors affecting dissociation curve and their significances

14. Spirometry, lung volume and capacity

15. Coronary and pulmonary circulation

Respiratory system

Module VI: Digestion and Metabolism (25)

Digestion

1. Anatomy, histology and function of alimentary tract and digestive glands.
2. Composition of different digestive juices, mechanism of secretion. Formation of saliva. HCl, gastric juice, pancreatic juice, bile-functions.
3. Digestion and absorption: Carbohydrates, Proeins, Fats.
4. Movements of alimentary tract
5. Absorption of Iron, Vitamin B_{12}, Calcium.
6. Gastrointestinal hormones- gastrin, secretin, cck: source and function.

Meatbolism

7. Enzymetic steps in glycolysis, TCA cycle, Cori cycle and their significance. HMP pathway and its significance.
8. Glycogenesis, glycogenolysis, gluconeogenesis

9. Energy during glycolysis and TCA cycle, brief description of E.T.C, oxidative phosphorylation
10. Beta oxidation, steps, energy change, ketone bodies, prostaglandins-significance.
11. Deamination and transamination of amino acids. urea formation

Elective

2nd SEMESTER

PRACTICAL- 50 Marks

A) HEMATOLOGICAL EXPERIMENTS:- 07

1. Preparation of blood film and identification of blood cells.
2. Arneth count, Differential count.
3. Estimation of hemoglobin,
4. Total count of RBC and WBC
5. Blood group determination
6. Coagulation time and bleeding time
7. Preparation of Hemin crystal.

B) Measurement of blood pressure, heart rate. : 07

C) Study of microscope & squamos epithelium.: 05

D) Qualitative identification of physiological important substances- HCL, Lactic acid, Uric acid, Albumin, Peptone, Gelatin, Starch, Dextrin, glucose, Fructose, Lactose, Maltose, Sucrose, Urea, Bile salt, acetone, glycerol. 07

E) Study of human skeleton. 04

HUMAN PHYSIOLOGY ELECTIVE (TDPG)

Semester-03 PAPER-03 (P3A) Total Marks: 50

UNIT- VII : NEUROCHEMISTRY AND NEUROPHYSIOLOGY (25 marks)

1. Macromolecular Neurochemistry : Carbohydrate utilization in the brain. Role of Proteins and Lipids in the brain.
2. Transmitter- neurochemistry : Acetylcholine, Catecholamines, Serotonin, Amino acids and Peptides.
3. Skin and cutaneous receptors : Skin structure. Overview 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 & ENVIRONMENTAL STRESS BIOCHEMISTRY (25 marks)

1. Anatomical structure of Human 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 creatinine clearance test.
3. Micturition and reflexes.
4. Renal circulation: course & 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 body ..
8. Role of superoxide dismutase catalase, Glutathione in oxidative stress physiology Heavy metals as agents of oxidative stress.
9. Major antioxidants: role of Vitamins and Minerals e as antioxidant; Pesticides: Organo-phosphates, Organo-chlorine and Carbamate ; their toxic action in human body.
10. Active and Passive smoking. Major harmful compounds in smoke & their deleterious effects on human body.

HUMAN PHYSIOLOGY

TDPG , 3rd SEMESTER, PRACTICAL

PAPER-P3B **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 on 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 (Plantar /Abdominal reflexes) , Deep (Knee-Jerk / Biceps & Triceps jerk reflexes).
6. Determination of muscle strength & endurance by Handgrip Dynamometry.

Distribution of marks:

TOTAL MARKS:	50
Internal Assessment:	10
Term end Exam :	40

1. Three experiments:	10 X 3 =30
2. Practical Note book	05
3. Viva voce	05

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Practical examination: 2nd semester:

General(practical)- 50

Internal- 10

Termed-40

Breakup

Heamatology- 07

CVS- 07

Skeletal muscle / node of Ranvier- 05

Unknown qualitative- 04

Human skeleton- 05

Viva- 05

Practical notebook-05

Major (Practical)- 40

Internal assessment- 08 Termed-32

Breakup

a) Heamatology- 10
b) CVS- 06
c) Skeletal muscle/NOR- 04
d) Human skeleton-04

Viva- 04

Notebook- 04

HUMAN PHYSIOLOGY

TDPG, 4th SEMESTER, THEORY

PAPER-P4B MARKS-50

UNIT IX: BRAIN AND SENSORY PHYSIOLOGY

1. Cerebrum: Histology, area and centers in the central cortex. Method of localization and function; Thalamus, Hypothalamus-nuclei, connections and functions.
2. Cerebellum- Histology, Nuclei, Connections and functions.
3. Concepts of ANS- Classification, Structural and Functional organization.
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 gestation: Receptors involved and their mode of perception, Neural pathway for transmission.
10. Perkinson and Alzaimers disease.

UNIT – X : ENDOCRINOLOGY AND REPRODUCTIVE PHYSIOLOGY

1. Anatomical organization of endocrine glands in the body. Chemical classification of hormones. Mode of action of hormones, signal transduction, second messengers
2. Pituitary gland: Histology, function of the anterior and posterior pituitary hormones, Symptoms of hypo and hyper function of STH and ACTH.
3. Thyroid, Parathyroid and Adrenal glands: Histology, Chemical nature, Mode of action and 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 and their causes; Blood sugar regulation- Role of different hormones; Glucose tolerance and their importance; Mode of action of Insulin ; Role of GLUT transporters.
5. Regulations 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 actions; Menstrual cycle and its regulation.
9. Concept of Fertilization. Structure of Placenta, Placental hormones and their functions. Development of three germinal layers. Pregnancy test.

HUMAN PHYSIOLOGY

TDPG , 4th SEMESTER, PRACTICAL

PAPER-P4B **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, fallopian tube, ovary)
3. Histological slides on ovary, uterus, and testis; Study of Primary, Secondery, Tertiary graafian follicles, corpus luteum, oocyte and sperm.
4. Models of Eye, ear, nose, skin and tongue: structure and function of different parts
5. Tests for detecting defects of color vision.
6. Rinne's/Weber's test for deafness.
7. Romberg's sign- Vestibular function.

Distribution of marks:

TOTAL MARKS:	50
Internal Assessment:	10
Term end Exam :	40

2. Three experiments:	10 X 3 =30
2. Practical Note book	05
3. Viva voce	05

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HUMAN PHYSIOLOGY ELECTIVE (TDPG)

Semester-05 PAPER-05 (P5A) Total Marks: 50

UNIT-11: NUTRITION AND DIETETICS

1. Role of carbohydrates, fats, 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 diarrhea, 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 function 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 immunosorbent assay (ELISA), radioimmunoassay (RIA)

HUMAN PHYSIOLOGY ELECTIVE (TDPG), 5th SEMESTER

PRACTICAL **PAPER-P5B** **MARKS-50**

A. Biochemistry & 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 [Mark 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