



TRIPURA UNIVERSITY

(A Central University)

Suryamaninagar

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_H 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.