2007

HUMAN PHYSIOLOGY

PAPER-VIII

Full Marks : 100

Time : 4 hours

The figureshi the right-hand margin indicate marks

***Candidates are required** to give **their answers in their own words** as far as practicable*

illustrate the answers wherever necessary

Write the answers to Questions of each Unit **in separate books**

(Microbiology & Immunology)

UNIT-15

Answer Q. No. 1 and any two from the rest

1. Write short notes on any *two* of the following: 5x2

(a) Bacterial toxins

(b) Hershey Chase experiment

(c) Transforming principle

(d) Lysogeny

(e) Calvin cycle.

2. **(a) Describe the structural features of IS elements.**

(b) What is the mechanism of insertion of IS elements in a DNA molecule'?

(c) Discuss the mode of action of To 3 family of **transposons.**

(d) **What are (I) retrosposons and** *(ii)* **prions?**

4+6+6+(2+2)

3. (a) Give evidences in favour **of a single** giant DNA **molecule in a eukaryotic chromosome.**

(b) Discuss how a giant DNA molecule is packaged into an eukaryotic chromosome.

(c) How a renaturation kinetics of a DNA molecule can be derived? 8+7+5

4. **(a) Describe bacterial** conj **ugation.**

(b) What are Hfr. cells? How Hfr cells **are used in genetic mapping?**

(c) What is the significance of genetic recombination ? **6+(2+8)+4**

5. (a) Give a brief account of termination **of transcription.**

(b) What is antitermination ? **Mention its significance.**

(c) What do you understand by tanscription factors? Describe the roles of different **transcription factors in eukaryotes.** 6+(2+3)+(2+7)

UNIT-16

Answer Q. No. 1 and any two from the rest

1. What is inflammation? Discuss the multistep model of **leukocyte recruitment during inflammation.** **2+8**

Or

Discuss the ontogeny of T-lymphocytes. 10

2. (a) Describe **the activation** and effector function of **macrophages in cell** mediated **immunity.**

(b) Write **the mechanisms** of cytolytic T-lymphocytes (CTL) -mediated lysis of **target cells-**

(c) Discuss how immunological tolerance is **maintained** by host-**parasite interaction** in human being? 8+5+7

3. (a) Describe briefly the molecular structure of cytokinc. receptor family.

(b) Differentiate between Till and TH2 on the basis of their effector functions.

Write the role of caspases in Apoptosis. 7+6+7

4. (a) What are phases of changes found in the humoral response induced by antigen binding?

(b) Describe the bidirectional molecular interaction between B and T-cell.

(c) How B-cells are activated and state the importance of transcription factors ? 3+5+(9+3)

5. Write short notes on any *four* of the following: 5x4

(a) IFNr

(b) Antibody diversity

(c) DNA vaccine

(d) Graves disease

(e) Transgenic animal

(f) FACS

(g) JAK/STAT pathway.

(Sports Physiology and Ergonomics)

UNIT-15

Answer **Q. No. 1 and any two from the rest**

1. Explain any *two* of the following: 5x2

(a) Lactate threshold is an indicator of endurance training.

(b) Cocaine **has its killing action.**

(c) Muscular hypertrophy facilitates aerobic **endurance training.**

(d) Dynamic work is more preferred to static work.

2. (a) Discuss the exercise method for controlling body weight. How can you determine desired body weight **of a person?**

(b) What is COPD ?Discuss the procedureofspirometric **evaluation of obstructive lung diseases**. (6+4)+(2+8)

3. (a) State the basic principles of endurance training.

(b) Describe the important biochemical and muscle fibre **compositional** changes due to weight **training programmes in athletes.**

(c) What do you understand by strength and muscular endurance? 6+8+6

4. (a) Psychomotor abilities are needed in varying degrees in most of the sports events — Justify-

(b) Describe viscoelastic properties of muscle.

(c) State some common injuries of skeletal muscle, bone joint and tendon and ligament. 8+4+8

5. (a) What is the role of Mg** in the onset of short term fatigue?

(b) `IRIS buffer reduces fatigue'-State whether the **statement is true or false. Justify your answer.**

(c) Elucidate the role of adenylate kinase as the stabilizer of intracellular adenylate gradients. What are other manifestations of the reaction catalyzed by this enzyme? 5+5+10

UNIT 16

Answer Q. No. 1 and any two from the rest

1. Answer any *four* of **the following:** $2\frac{1}{2} \times 4$

(a) Why is **a taller person** more prone to injuries during **manual material** handling?

(b) Why excessive light in **the visual** field should be avoided?

(c) How can you determine **utter size** of a alphanumeric display ?

(d) What will be the problem if upholstery of a chair become too soft?

(e) In which condition the input vibration is amplified in human body?

(f) What is `Speech Intelligibility Score'?

2. (a) What do you understand by thermal indices? How do you determine WBGT index in indoor and outdoor conditions ? How do you compute average WBGT for a person who is exposed to different thermal conditions in a workshift?

(b) Discuss the effects of heat stress on human performance.

(c) Discuss different methods for reducing thermal stress in an industry.

(d) What is heat stroke? 7+5+5+3

3. (a) What do you mean by poor body posture? State the common complaints of the workers due adopting poor work posture. Describe a subjective and an objective method for assessment of work posture.

(b) What do you mean by Lordosis and Kyphosis? How these are related to sitting posture ?

(c) Is sitting-standing posture beneficial for the workers? (2+4+6)+5+3

4. (a) Why is coding of control necessary? Discuss different methods of coding of control.

(b) Discuss different types of pneumoconiosis with special reference to silica and organic dust.

(c) 'The attitude of employees can increase or decrease the productivity of an industry'--.Comment on the statement. 10+5+5

5. (a) How the intensity of physical work is classified? Discuss the role of short and long pauses of rest in between work in improving the work output of an individual.

(b) Mention **the principle of design** of work rest cycle **for physical and mental** work. (4+10)+6

(Endocrinology Reproductive Physiology and Family Welfare)

UNIT-15

(Endocrinology and Family Welfare

Answer Q. No. 1 and any two from the rest

1. Write short notes on any *four* of the foll owing: $2\frac{1}{2} \times 4$

(a) Bioactive molecules of prostate

(b) IRMA

(c) Role of testosterone on immune responses

(d) Components of MCH care,

(e), Fixed model receptor

(f) Hormone therapy in andropause.

2. **(a) Describe** the specific experiment for the detection of DNA acceptor site of progesterone-receptor **complex.**

(b) State the functional significance of tyrosine phosphorylation.

(**c) Discuss the downstream signaling** pathways of **tyrosine** kinase receptors. 6+6+8

3. (**a) Write the fundamentals** of ELISA for **hormone quantification.**

(**b) What precautions** you will consider **for hormone quantification** using ELISA technique?

(c) What is pedigree? Give a brief account of a X-linked **trait** inheritance through pedigree. 4+5+(2+9)

4. (a) What is`proto-oncogene'?

(b) Describe the molecular structure of the parathyroid hormone-cyclin D,-DNA rearrangement in a subset of parathyroid adenomas and state its functional consequences.

(c) What do you know about `estrogen-induced **carcinogenesis'?**

(**d) Discuss briefly the nature of action of hormonal therapy used in breast cancer** .

2+(21+21)+5+8
2 2

5. (a) What are `the renin-angiotensin aldosterone and potassium aldosterone negative feedback loops'?

(b) Discuss the correlation between insulin resistance and hypertension.

(c) Mention the age-related thyroid and pancreatic dysfunctions. What is `adrenopause'? 5+8+(5+2)

UNIT-16

(Reproductive Physiology)

Answer Q. No. 1 and any two from the rest

1. Write **short notes on any *four* of the following:** 21×4
2

(a) Classification of sperm on the basis of head's morphology

(b) Assay of Germ cell apoptosis **in seminiferous tubule**

(c) Emergency contraceptive

(d) Seminal fructose

(e) Tight junctions in testicular structure

(f) Luteal-placental shift.

2. **(a) What are** the major causes of male infertility'?

(b) Write the conditions that should be followed for **quality sperm count.**

(c) What are the conditions that should be studied for **adoption of ICSI to challange infertility?**

(**d) Describe the fundamental steps of ICSI.**

(e) Write the differences between globospermia and necrospermia. 3+3+4+6+4

3. **(a) What is acrosomal reaction?**

(**b) Discuss the role of capacitation as a preparatory** phase of AR.

(c) Enumerate the post-**zona binding** array of events that lead to AR.

(d) Write the **role of zona pellucida protein in** fertiliza-**tion**. 3+6+6+5

4. (a) Present briefly the role of placental inhibin and activin in the regulation of placental progesterone synthesis.

(b) Explain the mechanism of progesterone withdrawal at the myometrial level in preparation for the onset of human labour.

(c) Describe the sequence of myometrial events following progesterone withdrawal that leads to parturition.

(d) Discuss the role of placental corticotrophin-releasing hormone (CRH) in the process of human parturition. 3+5+7+5

5. (a) Describe a method for the initiation of forward motility *in vitro* in-the immature caput-epididymal **sperm.**

(b) Elaborate the major biochemical parameters of sperm motility initiation.

(c) Mention the major approaches of contraception.

(d) Discuss the mechanism of action of different hormonal contraceptives that are used in different phases of female reproductive cycle. 4+6+2+8

(Neurophysiology)

UNIT-15

Answer **Q. No. I** and any **two from the rest**

. Answer any *two* of the following : x2

(a) Describe different types of Spina bifida.

(b) Discuss briefly the process of adaptation in hair cells **in organ** of corti.

(c) Discuss the glial cell contribution to blood brain barrier.

(d) Describe the structure and functions of NMDA receptors.

2. (a) Describe the role of different factors in neural induction. Discuss the molecular basis of action of these factors.

(b) Describe the pattern of mitotic division of neural stem cells in the neural tube. (6+8)+6

3. (a) Describe the process of formation of neural tube in human embryo. What are caudal and cranial neuropore?

(**b) Discuss the formation of major subdivision of brain from neural tube. What is pontine flexure?**

(c) What are basal and alar plates? Describe the development of myelencephalon in human embryo. (6+2)+(5+1)+(2+4)

4. (Describe the jelly roll model of myelinogenesis. What do you mean by major dense line and intraperiod fine?

(b) What is MBP? Describe different proteins involved in myelin formation and mention different diseases resulted from the mutated form of these proteins. State the cause of Pelizaeus-Merzbacher disease. (6+2)+(2+8+2)

5. (a) Discuss the metapotropic and ionotropic receptors in the autonomic junctions.

(b) Describe briefly the process of excitation of rod cells.

(c) State functions of homeobox **genes.** **8+8+4**

UNIT-16

Answer **Q. No.** ***1 and any*** **two** from the rest

1. **Answer** any *two* of the following: 5x2

(a) Discuss importance of **operant conditioning in psychopharmacological investigation.**

(b) Describe the properties **of conditioning variables.**

(c) What is Jet**-lag? Discuss** the role of **melatonin in the management** of jet-lag.

(d) Describe the physiological asymmetries of brain.

2. (a) What do you mean by `Kemp echo'? Discuss the sound frequency dependent active process in hair cells. Comment on the structural and functional differences of outer hair cells at the basal end and apex of cochlea.

(b) Describe the tunning curve of the auditory neurons of brain stem and thalamus.

(c) Discuss the tonotopic organization of auditory areas of cerebral cortex.

(d) How the olivo cochlear **efferent system is** involved **in frequency discrimination of sound** ? (1+3+2)+4+4+6

3. **(a) Discuss the incentive-sensitization model and opponent-process model of drug dependence with their merits and demerits.**

(b) What is biopsychosocial model of drug dependence? Briefly describe different factors involved in the development and maintenance of compulsive substance use.

(c) Discuss the role of mesolimbic dopaminergic system in drug dependence. (4+4)+(2+4)+6

4. **(a) What is aging? Describe the morphological changes of aged brain.**

(b) Describe the biochemical **changes associated with aging.**

(c) Describe the behavioral and biochemical changes in Alzheimer's disease. (2+5)+6+(3+4)

5. (a) Discuss the ionic basis of transmission tonic mode and bursting oscillatory mode of thalamocortical relay **neurons.**

(b) Discuss the mechanism of sleep induction by muramyl peptide.

(c) Discuss the neural mechanism of primary generalized seizure with emphasis on T-type Ca.' **channel and GABAR receptors.** **8+4+8**