PG/IIIS/H.PHY - 304/14

M.Sc. 3rd Semester Examination, 2014

HUMAN PHYSIOLOGY

PAPER– H.PHY - 304

Full Marks : 40

Time : 2 hours

The figures in 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

(*Microbiology and Immunology*)

UNIT – 31

1. (*a*) What are xenobiotic compounds ?Why are they recalcitrant in nature ?

   (*b*) Briefly state the mechanisms for microbial degradation of xenobiotics. 1 + 2 + 2

Or

(*a*) What is bioleaching ?

(*b*) Discuss and differentiate between 'direct' and 'indirect' bleaching processes. 1 + 4

2. (*a*) What is indigenous microbiota of human ? Give example.

(*b*) Describe in brief the different types of associations of normal flora with human host. (1 + 1) + 3

Or

(*a*) Define microbial pathogenicity.

(*b*) Describe the underlying reasons of bacterial colonization. 2 + 3

3. (*a*) What is Calvin-Bension cycle ? Why is it called C3 cycle ?

(*b*) Describe the different factors regulating the key enzyme of Calvin-Bension cycle. (1 + 1) + 3

Or

(*a*) What is chemolithotrophy ?

(*b*) Describe in brief the NADP + Maleic Enzyme mediated C-4 pathway for CO_2 fixation. $1\frac{1}{2}+3\frac{1}{2}$

4. (*a*) Discuss in brief the different mechanisms of nitrogen fixation beside biological nitrogen fixation.

(*b*) What are diazotrophs ?

(*c*) Distinguish between symbiotic N_2-fixation and asymbiotic N_2 fixation. 2 + 1 + 2

Or

Discuss in brief the electron transport mechanism involved in production o f ammonia in microbial BNF. 5

UNIT – 32

1. Describe the mechanism of B-cell activation. 5

Or

Draw the structure of different receptors present on the T-cell mentioning their ligands and functions. 5

2. What is antigen processing ? Write the cytosolic pathway of antigen presentation with suitable diagram. 1 + 4

Or

Write short notes on : $2\frac{1}{2} + 2\frac{1}{2}$

(*i*) MHC restriction

(*ii*) Polymorphism.

3. (*a*) Define positive and negative selection.

(*b*) What are the role of caspases ? $2\frac{1}{2} + 2\frac{1}{2}$

Or

Write briefly on : $2\frac{1}{2} + 2\frac{1}{2}$

(*i*) T-cell anergy

(*ii*) Immunological tolerance.

4. What do you mean by antibody diversity ? How the most possible numbers of Ig gene generated ? 1 + 4

Or

(*a*) What are the basic differences between chemokines and cytokines ? Explain with example.

(*b*) Give the name of specific cytokines released by T-helper cell and T-regulatory cell. 3 + 2

(*Ergonomics and Sports Physiology*)

UNIT – 31

1. Justify the classification of fast twitch fibers from the view points of their oxidative characteristics and suitability in athletes. 5

Or

Discuss briefly the cardio-respiratory factors influencing aerobic endurance capacity in athletes. 5

2. What are the merits and demerits of indirect measurement of VO_2 max ? Describe cooper's 12-min run test for measuring VO_2-max. 2 + 3

Or

What is lactate threshold ? How does training improve the lactate threshold of a person ? 2 + 3

3. Describe a method for glycogen loading in athletes. 5

Or

State the characteristics of a pre-game meal suitable for endurance athletes. Mention the importance of spacing of meals. $3\frac{1}{2} + 1\frac{1}{2}$

4. Mention the role of the following hormones in exercise : 2 + 2 + 1

(*a*) Catecholamines

(*b*) Insulin

(*c*) Testosterone.

Or

State the effects of exercise on antibody production. Why functional capacity of leucocytes are decreased in prolonged intense exercise ? $2\frac{1}{2}+2\frac{1}{2}$

UNIT – 32

1. How can endomorphy of a person be determined ? Mention the significance of body composition in relation to athletic performance. $3+2$

Or

State the principle of Fartlek training. Mention the adverse effects of overtraining. $2\frac{1}{2}+2\frac{1}{2}$

2. Discuss briefly the 'RICE' method for speady healing of sports injury. 5

Or

Define ergogenic aid ? How cocaine and caffine improve endurence performance in athletes ? $1+4$

3. State the benefits of performing yoga on psycho-motor and cognitive functions. Mention the effects of yoga on parasympathetic nervous system. 4 + 1

Or

Discuss the effects of practicing yoga on hand grip strength. 5

4. What do you mean by kinetics and kinematics ? State the principles of biomechanics from 'laws of inertia', which can be applied in sports. 1 + 4

Or

State the biomechanics of movement in tibiofemoral and patellofemoral joints of the knee. 5

(*Endocrinology, Reproductive Physiology and Family Welfare*)

UNIT – 31

1. Elaborate the chemical signalling of hormones with proper diagram. 5

Or

Discuss briefly the synthesis of protein and peptide hormones within the endoplasmic reticulum and their post-translational modification. 5

2. (*a*) Describe the assay protocol of Sandwich ELISA.

(*b*) Mention the advantages and applications of ELISA. 3 + (1 + 1)

Or

(*a*) How the different hormones/growth factors transmit their signal through JAK/STAT pathway ?

(*b*) How does prostate gland help in sperm motility and survival ? 3 + 2

3. (*a*) What are the bioactive components that are released from thymus ?

(*b*) Elaborate the role of thymosin β_4 in actin binding, tissue regeneration and inflammation ? $1+1\frac{1}{2}+1+1\frac{1}{2}$

Or

Describe how increased thyroid hormone secretion during cold stress exerts immunoenhancing effects. 5

4. (*a*) In what ways apoptosis differs from necrosis ?

(*b*) Discuss apoptosis via the intrinsic pathway during development of male germ cell. 1 + 4

Or

Mention the role of G_1 and G_2 Checkpoints in cell cycle control. 5

UNIT – 32

1. Describe the phases of spermiogenesis with proper diagram. 5

Or

Describe the maturation process of oocyte in the dominant follicle shortly before ovulation. 5

2. Elaborate the role of interlenkin-1 in the testicular steroidogenesis. 5

Or

State how ovarian steroidogenesis is modulated by TNF-α ? 5

3. Describe the oxidative stress generated ROS involved in impairment of sperm motility and sperm DNA damage and mention briefly the possible mechanism behind. $2\frac{1}{2}+2\frac{1}{2}$

Or

How does estrogen influence on macrophage proliferation and function ? 5

4. (*a*) Define assisted reproductive technology (ART).

(*b*) Describe the IUI procedures and insemination methods. 1 + 4

Or

Write a brief note on *in Vitro* embryo production mentioning its significance. 3 + 2
