2022

M.Sc.

4th Semester Examination

HUMAN PHYSIOLOGY

PAPER—PHY-403

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Special paper: MICROBIOLOGY AND IMMUNOLOGY

UNIT–403A.1 Microbial Genetics : Advanced Studies

Group–A

Answer any *two* questions. 2×2

1. Mention the types of *RNA polymerases in eukaryotes.* 2

2. What are polycistronic mRNA? 2

3. Differentiate between conservative and replicative transpositions. 2

4. What are dicers? 2

Group–B

Answer any *two* questions. 2×4

5. Describe transforming principle in the light of Griffith's experiment. 4

6. What are Inducers? Explain it in relation to an operon model. 2+2

7. Write down the major features of conjugation. How is it related to genetic recombination? 2+2

8. Give a brief note on promoter consensus in prokaryotic transcriptional unit. 4

Group–C

Answer any *one* question. 1×8

9. What is co-repression? Describe attenuation as a mode of regulation in gene expression. 3+5

10. What is transduction? Mention its types. Describe specialized transduction with a suitable example. 2+2+4

UNIT–403A.2 Clinical Immunology

Group–A

Answer any *two* questions. 2×2

1. Define graft. 2

2. What is anaphylactic shock? 2

3. What are CAMs? 2

4. What is meant by tumor associated transplantation antigeiy (TATA)? 2

Group–B

Answer any *two* questions. 2×4

5. What is autoimmunity? How does it differ from hypersensitivity? 2+2

6. Describe the underlying reasons for degranulation of mast cells during type-I hypersensitivity. What is ADCC? 3+1

7. Write a brief note on secondary immunodeficiency. 4

8. How do 'killed' vaccines give protection against infectious diseases? 4

Group–C

Answer any *one* question. 1×8

9. Differentiate between isograft and allograft. Describe the mechanism of transplant rejection. 2+6

10. What is delayed type hypersensitivity (DTH)? Discuss on the DTH response generation mechanism in the sensitization phase. 3+5

[Internal Assessment – 10 Marks]

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Special paper: BIOCHEMISTRY, MOLECULAR ENDOCRINOLOGY AND REPRODUCTIVE PHYSIOLOGY

UNIT–403C.1 Advanced And Applied Biochemistry

Group–A

Answer any *two* questions. 2×2

1. Differentiate between asymmetric and symmetric karyotype. 2

2. Write down the name of major small nitrogen containing neurotransmitters. 2

3. What is nanocrystallite? 2

4. State the medical importance of non-functional plasma enzymes. 2

Group–B

Answer any *two* questions. 2×4

5. Describe the process of Q-banding and C-banding karyotyping techniques. 2+2

6. Mention the sources of glutamate in nerve terminals. State the mechanism of action of glutamate as a neurotransmitter. 1+3

7. Describe the cytokines of adaptive immunity mentioning their principal cell sources and biologic effects. 4

8. Write a note on quantum confinement. 4

Group–C

Answer any *one* question. 1×8

9. Mention the advantages and disadvantages of enzyme immobilization. Discuss the different carrier binding methods of enzyme immobilization. 4+4

10. Give examples of some important Phase I and Phase II detoxification enzymes. Describe the catalytic cycle of cytochrome P450. Describe one Phase II reaction. 3+3+2

UNIT–403C.2 Applied Molecular Endocrinology And Reproductive Physiology

Group–A

Answer any *two* questions. 2×2

1. What is essential hypertension? 2

2. Define stimulant drugs with examples. 2

3. State the antiatherogenic effect of insulin. 2

4. What are Scrtoli cell aging? 2

Group–B

Answer any *two* questions. 2×4

5. How salt and water homeostasis is maintained in our body? 4

6. How mTOR is associated with insulin resistance? 4

7. State the functions of angiotensin II mediated through the AT1 receptor. 4

8. How does aging influence testosterone synthesis and male sexual function? 2+2

Group–C

Answer any *one* question. 1×8

9. Discuss the pathophysiologic features of macrovascular complications seen in diabetes mellitus. Describe the effect of alcohol on gamma-glutamyl transpeptidase (GGT). 5+3

10. Describe the pharmacological effect of cocaine. Discuss critically the growth and endocrine effects of alcohol in our body. 4+4

[Internal Assessment – 10 Marks]

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Special paper: BIOPHYSICS AND ELECTROPHYSIOLOGY WITH STRUCTURAL BIOLOGY

UNIT–403E.1 Biophysics And Electrophysiology With Structural Biology

Group–A

Answer any *two* questions. 2×2

1. Mention the significance of Nernst equation. 2

2. Classify kinematic motion in the light of biomechanics. 2

3. Mention the manmade and natural sources of ionising radiation. 2

4. Define decay constant of radiation. 2

Group–B

Answer any *two* questions. 2×4

5. Write a short note on the combinatorial coding of olfactory receptors. 4

6. Briefly explain the types of machine found in the musculoskeletal system. What do you mean by osteokinematics? 2+2

7. Graphically describe the potential nature of wave of ERG during eye scanning. What are oscillatory potentials? 3+1

8. Write down the cellular mechanism of phototransduction in eyes. 4

Group–C

Answer any *one* question. 1×8

9. Define Roentgen unit of ionisation. Classify ionising radiation with examples. Explain the relationship between decay energy and binding energy of an Alpha (α) particle during ionizing radiation with an equation. Write short note on Beta (β) decay. 1+2+2+3

10. Describe the mechanisms of olfactory transduction and adaptation. What is dysosmia? Briefly mention about the labelled line and across fibre taste coding. 4+1+3

UNIT–403E.2 Photophysics And Experimental Methods In Structure Education

Group–A

Answer any *two* questions. 2×2

1. What is partition coefficient? 2

2. What is the significance of Bragg's diffraction equation? 2

3. State the first law of photochemistry. 2

4. Mention the sources of non-ionizing radiation. 2

Group–B

Answer any *two* questions. 2×4

5. What are Miller indices? What are FCC and BCC crystal structure? 2+2

6. Write the principle of ion exchange chromatography. Mention its application. 2+2

7. Briefly explain the types of photochemical reaction. 4

8. Justify the principle of Beers-Lamberst law in the light of photochemistry. 4

Group–C

Answer any *one* question. 1×8

9. What is Relative Centrifugal Force (RCF)? Discuss the difference between differential centrifugation and density gradient centrifugation. Describe in brief the applications of ultracentrifugation. 2+4+2

10. What do you understand by bioelectromagnetism? With a suitable diagram explain the types of magnetic-dipole presentation. Write down the therapeutic applications of biomagnetism. 2+3+3

[Internal Assessment – 10 Marks]