2018

M.Sc.

4th Semester Examination

HUMAN PHYSIOLOGY

PAPER—PHY-403

Subject Code—30

Full Marks : 40

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 & Immunology)

(Unit—37)

Answer all questions :

1. (a) Write down an experiment in support of DNA as genetic material in virus.

   (b) What is transforming principle ? 3+2

Or

(a) What is genetic recombination ?

Mention the three different methods those promote genetic recombination ?

(b) What is transduction ? Write down its features. (1+1)+1+2

2. (a) Write down the major constituents in eukaryotic chromosome.

(b) Name the major functional elements in eukaryotic chromosome.

(c) Mention the organization of genes in eukaryotic chromosomes.

(d) Differentiate between introus and exous. 1+1+2+1

Or

(a) Give a brief account of chromatin packaging within a chromosome.

(b) What is telomere and how these sequences are added by telomerase. 3+2

3. (a) Write briefly on 'Recognition' and 'Initiation' phases of gene transcription.

(b) What is induction of transcription ? How does it take place ? (1½+1½)+1+1

Or

(a) Write briefly on eukaryotic RNA polymerases.

(b) What are 'TATA box' and 'enhancer' ? 3+(1+1)

4. (a) What is mobile DNA ? Write down its importance.

(b) Write down the structure of 1S elements and function of each unit. (1+1)+(1+2)

Or

Write brief notes on :

(a) anti-sense RNA

(b) RNAi mediated gene silencing 2+3

(Unit—3B)

Answer all questions :

1. (a) Write the different types of CAM molecules.

(b) Describe the multistep model of neutrophil recruitment during inflammation. 2+3

Or

Why malaria vaccine is not effective to kill malaria parasites ? 5

2. Write short notes on :

(a) Hashimoto's thyroiditis

(b) Multiple sclerosis. 2½+2½

Or

Describe the role of mast cells in causing Type 1 hypersensitivity. How do cytokines regulate 1 gE production ? 3+2

3. (a) Discuss the role of T-cell in graft rejection.

(b) Write the name of two different drugs and explain why they are used in graft rejection. 3+2

Or

(a) What is 'cross presentation' ?

(b) Describe dendritic cell-based cancer vaccines. 2+3

4. (a) What is the difference between 'toxiod vaccines' and 'live attenuated vaccines'.

(b) Write immunization schedule for infant and children in India. 2+3

Or

Write short notes :

(a) FACS

(b) ELISA. 2½+2½

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Special Paper

(Biochemistry, Molecular Endocrinology and Reproductive Physiology)

(Unit—37)

Answer all questions :

1. (a) Describe the molecular structure of chromation in interphase nuclens.

   (b) What are the different types of banding seen in Karyotyping process.

   (c) What do you mean by 'nondisjuction as a cause of aneuploidy' ? 2+2+1

   Or

   (a) What is RNA interference ? Mention the difference between miRNA and SiRNA ?

   (b) Illustrate miRNA processing with proper diagram. 1+(1+1)+2

2. (a) Discuss the pleiotropic and redundant effects of cytokines with suitable diagram.

   (b) Discuss the biologic actions of IL-2.

   (c) What are IL-2 receptor isoforms ? 2+1½+1½

   Or

   (a) What is 'single cell protein (SCP)' ?

   (b) What are the limitations of using of SCP ?

   (c) Mention briefly the synthesis metabolism and functions of serotonin in brain. 1½+1+2½

3. (a) What is the chemical foundations of genomics ?

(b) State the principles of genome annotation.

(c) Mention the current proteomics technologies.

1½+1½+2

Or

(a) What is nano quantum dot ?

(b) State the chemical properties of nanomaterials.

(c) What is 'Top down' and 'Bottom up' approach of nanobiotechnology' ? 1+2+(1+1)

4. (a) Describe the catalytic cycle of cytochrome P450.

(b) What are the cyp P450 isoforms present in human liver ?

(c) Mention the induces's of Cyto P450. 2+1½+1½

Or

(a) What is enzyme immobilization ?

(b) Describe the 'Entrapment method' of enzyme immobilization.

(c) Mention the source and medical importance of non-functional enzymes. 1+2+(1+1)

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Special Paper

(Biochemistry, Molecular Endocrinology and Reproductive Physiology)

(Unit—38)

Answer all questions :

1. (a) How does salt and water homeostasis occur in our body ?

(b) Discuss AT1 and AT2 receptor mediated functions of angiotensin II. 2½+2½

Or

(a) How fatty acid and insulin resistance are correlated ?

(b) Describe the proatherosclerotic and antiatherosclerotic actions of insulin on vascular cells.

(c) What is IDDM ? What are the major complications of IDDM ? 1½+1½+(1+1)

2. (a) What are the effects of 'Sertoli and Leydig cell aging' ?

(b) How antimullerian hormone is affected by oranian aging ? (1½+1½)+2

Or

Discuss the synthetic processes of insulin from bacteria. 5

3. (a) How does species-specific binding of sperm to eggs occur ?

   (b) Discuss about the interaction of mZP_3, Ca^{2+} and G-proteins. What is aerosome reaction ? 2+(2+1)

Or

   (a) What do you know about endometrial receptivity regarding implantation ?

   (b) How does plasma membrane transformation of luminal epithelium occur during the window of implantation (WOI) ? 2+3

4. Discuss about the formulations, efficacy, mode of action and side effects of Combined oral Contraceptive pills. 1+1+1½+1½

Or

   (a) Describe the effect of Leydig cell-secreted proteins on Sertoli and germ cell functions.

   (b) Mention the role of Sertoli cell products on Leydig functions.

   (c) What is 'Pedigree analysis' . Write on sex chromosomal recessive pedigree. 1½+1½+(1+1)

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Special Paper

(Biophysics and Electrophysiology with Structural Biology)

(Unit—37)

Answer all questions :

1. (a) What is Wolfe's law of bone remodeling.

(b) How does mechanotransduction is so important for bone remodeling.

(c) Briefly state the Kinematic concept in analysing human motion. 1+2+2

Or

(a) Define and classify biomechanics with suitable example.

(b) Critically explain different types of machine found in the body.

(c) What do you understand by limits of stability (LOS). (1+1)+2+1

2. (a) What do you understand by skin contract impedance of electrode ?

(b) Describe the basic postulates of Hodgkin-Huxley model. 2+3

Or

(a) What do you understand by receptor adaptation.

(b) Discuss the molecular basis of transduction of sweet and bitter taste. 2+3

3. (a) What types of radioactive sources are found in nature.

(b) Describe shortly the possible biological effects of ionizing radiation at molecular level.

(c) Briefly discuss the primary types of ionizing radiation. 1+2+2

Or

(a) Schematically describe the different functional unit of CRO.

(b) Write the different uses of CRO.

(c) State the advantages of SPECT. 3+1+1

4. (a) What is deconvolution ?

(b) What do you mean by point-spread-function (PSF) and contract-transfer-function in image processing.

(c) Write the principle of tandem-scanning-based confocal microscopy. 1+2+2

Or

(a) Define the terms—optical pumping and Q-switching in relation to laser technology.

(b) Write briefly with a neat diagram the working principle and application of a pulsed ruby laser.

(c) What is a four-level laser. 2+2+1

(Unit—38)

Answer all questions :

1. (a) Derive a mathematical expression for the rate of sedimentation (v) of a particle (p) and its relation with n(viscosity) of the medium, r_p (radius) of the particle and ρ_p and ρ_m (densities of the particle and medium).

(b) Mention the difference between rate-zonal and isopycnic centrifugation.

(c) State *two* properties of the gradient materials used for density gradient centrifugation. 2+2+1

Or

(a) What is partition coefficient ?

(b) Define the properties of solvent systems that are used for paper chromatography.

(c) Discuss briefly the applications of thin layer chromatography. 1+2+2

2. (a) Write the principle of quantum photochemical.

(b) Briefly discuss the types of photochemical reactions with examples.

(c) How chemiluminescence is differ from bioluminescence ? 2+2+1

Or

(a) What do you mean by photo-toxicity ?

(b) How laser are applied in surgical system for medical treatement ?

(c) Write the beneficial effects of artificial light energy. 1+2+2

3. (a) Show how Beer's law can be applied to circular dichroism. 5

(b) Define molar ellipticity (Q) and molar rotation (m') with their units.

(c) What do you mean by plane polarised light ? 2+2+1

Or

(a) Describe the basic instrumentation involved in measurement of Optical rotatory dispersion.

(b) Discuss the application of CD and ORD in biology.

(c) What is Bragg's law ? 2+2+1

4. (a) What do you mean by nuclear medicine ?

(b) Write a short note on HIDA (hepatobiliary iminodiacetic acid).

(c) State the role of radioactive tracer in nuclear medicine. 1+2+2

Or

(a) Write a note on decay by positron emission.

(b) Write on the production and properties of microwave

(c) What is biological impedance. 1+(1½+1½)+1

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