2019

MSc

4th Semester Examination

HUMAN PHYSIOLOGY

PAPER – PHY-403 (SPECIAL PAPER)

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.

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Biochemistry, Molecular Endocrinology and Reproductive Physiology (SPL)

Answer all questions from the following

1. a) What is karyotyping? Mention the methods for the determination of G and C banding in karyotyping.

   b) What is chromosome jumping? (1+1.5+1.5)+1

   Or

   a) What is gene silencing? Mention any two technological application of gene silencing.

   b) State the mechanism of gene silencing. (1+2)+2

2. a) What are interferons ? Compare critically IFN-α, -β and -δ.

   b) Mention the biological effects of TNF. (1+2)+2

   Or

   a) Write down brief notes on acetylcholine and serotonin.

   b) What is the function of GABA? (2+2)+1

3. a) What is nanocrystallite? What do you know about quantum confinement?

   b) Discuss the electrical and magnetic properties of nanoparticles. (1+2)+2

   Or

   a) What is proteomics? Briefly describe the types of proteomics?

   b) Write a note on MALDI-TOF-MS. (1+2)+2

(Continued)

4. a) Define detoxification enzymes. What are Phase I and Phase II enzymes?

   b) Describe oxidation and epoxidation reactions with suitable examples. (1+1)+(1.5+1.5)

   Or

   a) Mention the advantages and disadvantages of enzyme immobilization.

   b) What is 'cross-linking' method of enzyme immobilization?

   c) Distinguish between functional and non-functional enzymes with examples.

   (1+1)+2+1

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1. a) What is insulin resistance? Discuss the association of central adiposity with insulin resistance.

   b) Describe the micro vascular complications of diabetes mellitus. (1+1.5)+2.5

   Or

   a) What is essential hypertension?

   b) Mention the components of renin-angiotensin-aldosterone system.

   c) State the classical and non-classical functions of aldosterone. 1+1+(1.5+1.5)

2. a) Discuss about the dysfunction of Sertoli and Leydig cells in elderly persons.

   b) How does aging affect testosterone level?

   c) Mention the genetic risks of aging. (1+2)+1+1

   Or

   Describe the effect of alcohol on liver, neuroendocrine system and bone. 2+2+1

3. a) What is ZP domain?

   b) Describe the events associated with ZP 3 mediated acrosome reaction in mammalian sperin. 2+3

Or

Discuss about the cardiac and respiratory changes occurred during gestation period. 3+2

4. a) What is meant by 'Dominant traits'? Give an example of dominant single gene inheritance.

   b) What is Y-linked inheritance? (2+2)+1

Or

   a) What is LNG-ECPs?

   b) How does it prevent pregnancy? 1+4

Microbiology and Immunology (SPL)

UNIT – 37

Answer all questions from the following:

1.

a) What is meant by genetic material?

b) Give an experimental evidence in support of DNA as genetic material. 1+4

Or

a) Write briefly on the mechanism of genetic recombination.

b) What is conjugation?

c) How are Hfr cells superior to F^+ cells for genetic recombination? 1½+1+2½

2.

a) Write down the key features of eukaryotic chromosome.

b) Describe briefly the structure of nucleosome.
Why is nucleosome structure in chromosome important? 2+2+1

Or

a) Differentiate euchromatin and heterochromatin.

b) Give a brief account of repetitive sequences in eukaryotic chromosomes including its types.

c) What are SINEs? 1+3+1

3.

a) Describe in brief the organization of 'promoter' region in prokaryotes

b) Discuss briefly the features of intrinsic terminator of transcription in bacteria. 2½+2½

Or

a) Write down a brief note on "co – repression" with an example.

b) Discuss the event of 'attenuation' with reference to trp operon in bacteria. (1+1)+3

4.

a) What are transposons? State their structural features.

b) Differentiate 'conservative' and 'replicative' transposons. (1+2)+(1+1)

Or

i) What is RNA interference?

ii) Discuss one mechanism of RNA interference in gene expression. 1+4

UNIT – 38

1.

a) Describe the protective role of $cD4^+$ T – cell in Mycobacterium tuberculosis infection. 3+2

b) What do you mean by antigenic shift and antigenic drift?

Or

Discuss the multistep model of neutrophil recruitment during inflammation. 5

2. a) What is the sequence of events in type I hypersensitivity reactions? 4+1

b) Why is epinephrine treatment an effective treatment for anaphylactic shock?

Or

Write short notes on –

a) Rheumatoid arthritis.

b) Grave's disease. 2½+2½

3. a) What do you mean by allogenic and xenogenic transplantation?

b) What are the methods of HLA – typing

c) Define oncofaetal antigens and tumor – associated transplantation antigens. 2+1+2

Or

a) Differentiate autograft, isograft, allograft and xenograft.

b) Discuss the sensitized and effector phase of graft rejection. 2+3

4.

a) Give an example of live attenuated vaccine. (1+1+1+2)

b) What are obstacles for the development of HIV vaccine?

c) What are the advantages of ELISPOT?

d) Write down the difference between competitive and sandwich ELISA.

Or

a) Describe the Immunization schedule in implants.

b) Differentiate between active and passive immunity. 2½+2½

Biophysics & Electrophysiology With Structural Biology (SPL)
Unit - 37

Answers all the question.

1. a) Explain kinematics of walking.

b) Enumerate the motion of kinematics.

c) What is Osteo kinematics ? Briefly describe the fundamental motions of osteo kinematics . 1+1+(1+2)

Or

a) How would you measure the mechanical advantage of lever system ?

b) Explain the advantages of first class levers in human body .

c) Find out the relation between torque and length of lever arms. 1+2+2

2. a) Describe the Nernst equation for membrane potential.

b) With a neat diagram describe the molecular structure of sodium channel.

c) Mention different abnormalities in EEG recording . 2+2+1

Or

a) Briefly describe the molecular basis of photoreceptor potentials with a suitable diagram .

b) What is meant by electroretinogram ?

c) Define oscillatory potentials. 3+1+1

3. a) With a pie diagram describe shortly the contribution of radiation from Manmade and natural back ground sources .

b) What is atomic g-atom?

c) How could you calculate kinetic energy(E_k)of α particle during ionising radiation ? 2+1+2

Or

a) What is radio therapy ?

b) How does radiation therapy work ?

c) Write the principle of operation of gamma camera of SPECT. 1+2+2

4. a) Write the basic principle of FRET microscopy and its application .

b) What is photo bleaching ?

c) Describe in short the basic modes of operation of atomic force microscopy and explain the working principle of an AFM. 2+1+2

Or

a) Define the term " optical pumping " and " population inversion " with respect to laser technology.

b) Write down the application of CO_2 laser in medicine.

c) What is Airy disc ? 2+2+1

Unit—38

Answer all questions:

1. a) Define RCF.

b) Discuss briefly about the differences between differential centrifugation and density gradient centrifugation. (1+2+2)

c) Write the principle of operation and applications of ultra centrifuges

OR

a) What do you understand by adsorption chromatography ?

b) Write the basic principle of ion- exchange chromatography.

c) Cite the difference between thin layer chromatography and paper chromatography (1+2+2)

2. a) What do you mean by photochemistry ?

b) State the first law of photochemistry .

c) Briefly describe the types of photochemical reactions. (1+2+2)

OR

a) Describe the Lambert's law in the light of photochemistry.

b) Explain the justification of Beer- Lambert law.

c) What do you mean by quenching of fluorescence . (2+2+1)

3. a) What do you understand by circular polarisation of light ?

b) Describe the application of CD and ORD in structural elucidation studies of biomolecules (2½+2½)

OR

a) Define Bragg's law and write the Bragg's diffraction equation.

b) What are ionic and covalent crystals ?

c) What are Miller indices ?

d) What are face centred cubic (fcc) and body centred cubic (bcc) crystal systems ? (2+1+1+1)

4. a) Define non-ionizing radiation .

b) How does non-ionizing radiation affect on intracellular function ?

c) Write the characteristics of laser light (1+2+2)

OR

a) Cite the different sources of microwave (1+3+1)

b) Write down the principle of Biomagnetism physical therapy (BPT)

c) State the biological effects of microwave.