2016

M.Sc.

1st Semester Examination

HUMAN PHYSIOLOGY

PAPER—PHY-102

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.

(Unit—03)

Answer all questions from the following :

1. (a) What do you understand by "plasma skimming" ?

(b) Define Posie.

(c) A 20 metres long steel pipe has a 25mm inner diameter. It carries water at a rate of $4.5m^3/hr$. The density of water is 1000 kg/m^3, and water has an absolute viscosity of 1.0×10^{-3} Pascal-second. Would the flow be laminar or turbulent ? 2+1+2

Or

(a) Discuss the factors influencing the anomalous viscosity of blood.

(b) Define Fahraeus-Lindquist effect inrelation to haemodynamics.

(c) Discuss the application and limitations of Poiseuille's law to the haemodynamics of living system.

2+1+2

2. (a) Briefly write the mechanism of phototransduction during vision.

(b) How can you correlate the relation between wavelength and velocity of light ? 3+2

Or

(a) What do you mean by critical fusion frequency ?

(b) Classify and explain temporal frequency.

(c) Write the diagnostic application of Flickering light.

1+2+2

3. (a) How does bioluminescence work ?

(b) Mention the biotechnological application of it.

(c) State the impact of UV rays on immune system. 2+1+2

Or

(a) Define the 1st law of thermodynamics and discuss the limitation of this law.

(b) Derive a mathematical expression for 1st law of thermodynamics.

(c) Define efficiency and entropy of thermodynamics system.

(d) Why is entropy of a system considered as a state function ? 2+1+1+1

4. (a) How are piezoelectric ceramics made ?

(b) What do you mean by actuators ?

(c) Write down the equation for measuring capacitance of transducer. 3+1+1

Or

(a) Write the principle and different applications of fluorescence spectroscopy.

(b) What do you mean by primary and secondary fluorescence ? 1+2+2

(Unit—04)

Answer all questions from the following :

1. (a) Write the principle of Ultrasonic blood flow meter.

(b) How can you calculate the doppler frequency (fd) during blood flow ?

(c) Classify NMR type of detector. 2+1+2

Or

(a) What do you understand by polarization ?

(b) Describe briefly about the electrodes used in ECG and EEG.

(c) Shortly describe the differences between compressed spectral array (CSA) and density spectral array (DSA) used in EEG signal analysis. 1+2+2

2. (a) State with labelled diagram a suitable electrode for measuring blood pO_2.

   (b) Write the Fick's equation during measurement of partial pressure of O_2. 3+2

Or

   (a) What do you mean by resolving power of microscope ?

   (b) Calculate the resolution of microscope, with angular aperture α.

   (c) Define numerical aperture of microscope. 2+2+1

3. (a) What do you understand by echocardiogram ?

   (b) How the test is performed ?

   (c) What is 3D-echocardiography ? $1+2\frac{1}{2}+1\frac{1}{2}$

Or

   (a) Describe the instrumental design of Gieger-Muller Counter, with suitable diagram.

(b) Write it's principle of operation.

(c) What is inorganic scintillators? $2\frac{1}{2}+1\frac{1}{2}+1$

4. (a) Write the operating principle of hemodialysis machine.

(b) What is bioengineered kidney?

(c) Mention the disadvantgaes of hemodialysis. 2+1+2

Or

(a) State the differences between primary and secondary transducer.

(b) Classify active type of transducer with example.

(c) How can you measure the Ratiometric correction of transudcer output? 2+2+1

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