M.Sc. 1st Semester Examination, 2015

HUMAN PHYSIOLOGY

PAPER — H.PHY-102 (Unit-03 & 04)

Full Marks : 40

Time : 2 hours

Answer all questions

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

Write the answers to questions of each Unit in separate books

UNIT — 03

[*Marks* : 20]

1. (a) Write briefly the method of determination of viscosity of a liquid by Oswald's viscometer.

(*Turn Over*)

(b) Define coefficient of viscosity.

(c) Calculate the Reynold's number in an aorta of radius 1 cm. with average speed of blood flowing is at a rate of 30 cm/sec. ($\rho = 1 \cdot 05$ gm/cm^2 and $\eta = 4 \times 10^{-2}$ poise) where ρ and η are the density and viscosity of whole blood respectively. $2 + 1 + 2$

Or

(a) Discuss the significance of Reynold's number in haemodynamics.

(b) Write the factors that influence the velocity of blood in cardiovascular system.

(c) What is varicose vein ? $2 + 2 + 1$

2. (a) What is electroglottography ?

(b) "The aerodynamic theory is based on the Bernoulli energy law." — Explain.

(c) Classify and briefly write the characteristic of supra-glottal phonation. $1 + 2 + 2$

(3)

Or

(a) State the Snell's law of light in different medium.

(b) Briefly describe the application of light fields.

(c) What do you mean by critical fusion frequency ?   2 + 2 +1

3. (a) "Living system is a non-equilibrium open system in a steady state." — Explain.

(b) Write briefly the difference between living system and non-living system in the light of thermodynamics.

(c) What is standard free energy change (ΔG^{o}) of a reaction ?   2 + 2 +1

Or

(a) What do you understand by bioluminescence ?

(b) Write the geographic distribution of it.

(c) How blue fluorescent protein is responsible for bioluminescence ?   2 + 2 +1

4. (a) How can you calculate the wave length of ultrasound ?

   (b) What do you mean by intensity reflection coefficient (IRC) of ultrasound ?

   (c) Describe in brief the non-thermal effect of ultrasound during therapeutic application.

$$1 + 1 + 3$$

Or

   (a) Define Piezoelectricity.

   (b) Classify different types of man made piezoelectric materials.

   (c) Explain the different polarization effects of ferroelectricity. $1 + 2 + 2$

UNIT − 04

[*Marks* : 20]

1. (a) What are the advantages and disadvantages of glass microelectrode ?

   (b) Write the artefacts of ECG recording.

(Continued)

(c) What do you mean by evoked potential ?

$$2 + 2 + 1$$

Or

(a) Write the principle of electromagnetic blood flow meter.

(b) What is doppler effect ? $3 + 2$

2. (a) State the principle of stow-severinghus CO_2 sensor.

(b) Briefly write the mechanism of pH determination by pH electrode sensor. $2\frac{1}{2} + 2\frac{1}{2}$

Or

(a) Write the operating principle of scanning electron microscope.

(b) How can you calculate angular resulation of a single telescope ? $3\frac{1}{2} + 1\frac{1}{2}$

3. (a) Briefly write the mechanism of A-scan biometry.

(*b*) Describe briefly the principle of ultrasono-graphy in 'M' scanning.   3 + 2

Or

(*a*) What do you mean by time-division multiplexing of wireless telemetry ?

(*b*) Describe the functions of miniatured vedio telemetry capsule during bio-medical intervention, with a suitable diagram.

(*c*) Draw the ground station block diagram of telemetry system.   1 + 3 + 1

4. (*a*) Briefly discuss the role of pure tone generator system in case of advanced audiometer.

(*b*) What is speech reception thresold test ?   3 + 2

Or

(*a*) Write the differences between sensor and actuators.

(b) Mention the factors for selection of transducer.

(c) Classify and briefly write the function variable resistance transducer. $1 + 1 + 3$

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