

2018

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—01)

1. Answer any two questions : 2×2
- (a) Define Fahraeus-Linguist effect. What is its significance ? 1+1
- (b) What is Viscosity Coefficient ? Discuss the factors that affect viscosity coefficient of a fluid. 1+1

(Turn Over)

(c) Write the name of the muscles involved during phonation. 2

(d) Write the application of ferroelectricity. 2

2. Answer any *two* questions : 2×4

(a) Discuss the different physical properties of interaction of ultrasound with tissues.

(b) Write the Bernoulli energy law in respect to phonation. Why neurochronaxie theory was discarded during development of phonation theory ?

(c) State a mathematical relation between Enthalpy (ΔH), Entropy (ΔS) and Free energy (ΔG) of a system. What is the difference between ΔG° and ΔG ? 2+2

(d) Discuss the role of venous valves and muscle pump in circulation. What is varicose vein ? 2+2

3. Answer any *one* question : 1×8

(a) How does bioluminescence work ? Describe the role of GFP and BFP at the time of colour light generation. State the important functions by bioluminescence. Write down its biotechnological applications.

2+2+2+2

- (b) A Newtonian fluid with viscosity of 0.38 Ns/m^2 and density 910 kg/m^3 flow through a 25 mm diameter pipe with a velocity of 2.6 m/s. Calculate its Reynold's number. ($1\text{N} = 1 \text{ kgm/s}^2$)

What type of flow does this fluid represent ?

What do you understand by lung compliance ?

Discuss briefly about the application of Pouseilli's law in biological systems (hemodynamics).

(Unit—02)

1. Answer any *two* questions : 2×2
- (a) What do you understand by transit time ? 2
- (b) What do you mean by quenching ? Calculate dead time during radiation measurement through GM tube. 1+1
- (c) State the Fick's equation in respect to permeability of oxygen. 2
- (d) Distinguish between glass microelectrodes and metal microelectrodes. 2
2. Answer *two* questions : 2×4
- (a) Write the working principle of stow—severinghaus PCo_2 sensor. What is T_2 weighted MRI ? 2+2

- (b) Schematically describe the organisation of Gigar-Miller counter. 4
- (c) State the drawbacks and limitations of the ultrasonic doppler flowmeter. Write the principle of ultrasonography. 2+2
- (d) With a neat diagram describe the components of a EEG recorder. State the use of defibrillators. 2+2
3. Answer any *one* question : 1×8
- (a) Discuss briefly about the electrodes that are used for recording ECG. What do you understand by baseline drift in ECG recording ? What are the merits of a microprocessor based ECG over conventional ECG ? 3+1+4
- (b) Write the clinical application of laser doppler blood flow meter. State the working principle of MRI technique. Mention the differences between CT scan and MRI. Briefly describe the different types of cross coil Nuclear Magnetic Resonance (NMR) blood flow meter. 2+2+2+2
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