Human Physiology (P.G.)

[CBCS]

M.Sc. First Semester End Examination-2023

(Regular & Supplementary Paper)

PAPER-102

Full Marks: 40 ***Time: 02 Hrs***

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.

Unit-3

Full Marks 20

[Medical Physics and Chemistry]

1. Answer any two questions of the following: 2x2= 4

a. What do you understand by 'Newtonian fluids'? Give an example. 1+1

b. Define Gigaseal. Why it is necessary for the patch-clamp technique? 1+1

c. Write down the Fick's law of diffusion in the light of mathematical expression. 1+1

d. Mention the significance of Reynold's number in hemodynamics. What is critical fusion frequency (CFF) 1+1

2. Answer any two questions of the following: 2x4= 8

a. Critically explain, how density and temperature of a liquid can affect its viscosity. 2+2

b. Write a short note on 'Patch-lamp technique' with proper diagrams. 4

c. Define anatomical dead space and physiological dead space. Write down the Bohr's equation. (1+1)+2

d. Elucidate the working principle of XRD. With proper diagram. Mention one application of Becenoulli's principle. 3+1

3. Answer any one question of the following: 1x8=8

a. Define Beer-Lambert law. A fluid following through a pipe has a dynamic viscosity of $8.9x10^{-4}$ Pa.s and a density of 1000 kg/m^3. The pipe has an internal diameter of 0.025m and the fluid flows at an average speed of 0.15m/s. Calculate the Reynold's number for the flow. 2+6

b. Mention the difference between brightness and illuminance. Explain in detail why eyes can be considered as an optical instrument? What is reduced eye? 2+4+2

Unit - 4

Full Marks 20

[Medical Instrumentation and Techniques]

1. Answer any two questions of the following: 2x2= 4

a. What is Evoked Potential? 2

b. What is artificial kidney? 2

c. Write in short about cardiac defibrillator. 2

d. Write one advantage of NMR blood flow meter. Write down the working principle of NMR blood flow meter. 1+1

2. Answer any two questions of the following: 2x4= 8

a. Discuss about paramagnetic oxygen analyser. What is the function of wedge spirometer? 3+1

b. What is the role of telemetry in ECG? What is multi-channel telemetry? 3+1

c. Explain the working principle of ultrasonic blood flow meter. What is LDPI? 3+1

d. Describe briefly about the implantable pacemakers. 4

3. Answer any one question of the following: 1x8=8

a. (i) Explain the principle and applications of fluorescence microscope. 3+2

(ii) Write down the working principle of ionization chamber for radiation measurement. 3

b. (i) Write down the primary components of audiometer with a suitable block diagram. 3

(ii) What do you mean by the term 'tomography'? Explain the basic principle of CT scan. 1+4

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