

M.Sc. 1st Semester Examination, 2023

PHYSIOLOGY

(Human Physiology)

PAPER — PHY-102.1 & 102.2

Full Marks : 50

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

PAPER — PHY-102.1

[Marks : 20]

A . Answer any *two* questions from the following :

2 × 2

1. What is Poise ? Write down the principle of Oswald viscometer.

1 + 1

(Turn Over)

2. What are intensive properties and extensive properties in thermodynamics? 2
3. What is vocal attack? Write the differences between vocal register and glottal fry. 1 + 1
4. Write down the features of photoreceptors absorption spectra of cone cells. 2

B. Answer any *two* questions from the following :

5. Classify UV light in relation to wave length. Which types of UV light has maximum penetration and why? 4×2
2 + 2
6. Describe briefly the anatomic distribution of bioluminescence system? What is the role of Ca^{2+} ion in bioluminescence reaction. 2 + 2
7. "Resistance to flow can be measured by Poiseuille's equation" – Explain. What are the assumptions of this equation and explain its application in hemodynamics. 2 + 2

8. Elucidate the second law of thermodynamics and write a note on entropy. $2 + 2$

C. Answer any *one* question from the following : 8×1

9. Define piezoelectricity with example. Write down the general application of piezoelectricity. Classify and describe the nature of polarization developed in ferroelectric materials. What is Curie temperature? How could you calculate the capacitance of ferroelectricity? $1 + 2 + 3 + 1 + 1$
10. Why is C_p for a gas bigger than C_v ? State the first law of thermodynamics and prove $C_p - C_v = R$ using this law. Calculate the Reynolds number, Re , for oil flow in a circular pipe. The diameter of the pipe is 60 mm, the density of the oil is 910 kg/m^3 , the volumetric oil flow rate is 60 L/min and the dynamic viscosity of the oil is 50 m Pa s. $2 + 3 + 3$

PAPER — PHY-102.2**[Marks : 20]**

A . Answer any *two* questions from the following :

1. What is amplifier gain ? 2 × 2
2
2. Write down the principle of NMR blood flow meter. Draw a block diagram of NMR blood flow meter. 1 + 1
3. Write the functions of a notch filter system ? 2
4. Write down the detection limit (DL) formula of radiation. How could you calculate the electric charge (Q) in ionization chamber radiation detector. 1 + 1

B. Answer any *two* questions from the following :

5. Why NPN transistor are mostly used than PNP transistor ? Draw and label the "Common Emitter (CE) configuration" of a transistor. 4 × 2
3 + 1

6. Draw a block diagram of airborne data acquisition system of telemetry. Write down the functions of multiplexer used in telemetry. 2 + 2

7. What is the function of an amplifier in ECG machine? What is the nature of artefact associated with ECG recording? 2 + 2

8. Describe the classification of resistance variation types of transducers. What is primary and secondary transducer. 2 + 2

C. Answer any *one* question from the following :

9. With a suitable diagram write down the components and functions of wireless telemeter capsule. Describe the rendering techniques used in CT scan for 3D imaging. Classify different types of echocardiogram. 8 × 1
3 + 3 + 2

10. Write the advantages of microprocessor-based ECG machine. Write down the principle of a defibrillator. What is motion artefact? 4 + 2 + 2

[Internal Assessment — 10 Marks]
