

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 3

**P712**

**[5117]-2**

**F.Y.B.Sc.**

**BIOTECHNOLOGY**

**Bb - 102 : Fundamentals of Physics**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Use of calculator is allowed.*
- 4) Neat diagrams must be drawn wherever necessary.*

**Q1)** Attempt all of the following:

**[16]**

- a) Define a standard. Define standard used for length.
- b) What do you understand by the limit of elasticity.
- c) State Pascal's Principle.
- d) Define surface tension. Give its S.I. unit.
- e) Define heat. Give its unit.
- f) A refrigerator works under reversible cycle between the temperatures  $450^{\circ}\text{K}$  &  $600^{\circ}\text{K}$ . Calculate the coefficient of performance.
- g) What do you understand by interference?
- h) Define magnetic flux and give its S.I. unit.

**Q2)** Answer any four of the following:

**[16]**

- a) Write a note on system of units.
- b) Explain the terms elastic limit, breaking stress and breaking point with the help of stress -strain curve.

**P.T.O.**

- c) Write a note on open-tube manometer.
- d) The pressure inside a soap bubble of radius 2cm balances a 1.5 mm column of oil having density  $0.8 \text{ gm/cm}^3$ . Find the surface tension of soap solution.
- e) A motor car approaches towards a crossing with a velocity of 75km/hr. A policeman standing at the crossing hears a horn of frequency 260 cycles per second from the car. What is the original frequency of the horn? ( $V = 332\text{m/sec}$ ).
- f) Explain the role of physics in life sciences.

**Q3)** Answer any four of the following:

**[16]**

- a) State and explain Zeroth law of thermodynamics.
- b) Explain the change in entropy during a reversible cyclic process.
- c) Explain the air compression refrigeration cycle.
- d) State and explain Brewster's law.
- e) A source of alternating e.m.f.  $e = 300 \sin \omega t$  is connected to a lamp whose filament is of resistance  $1000\Omega$ .  
Calculate
  - i) peak current
  - ii) r.m.s. current passing through the lamp.
- f) What is biomagnetism? How it is useful in healthcare.

**Q4)** Answer any two of the following:

**[16]**

- a) With the help of energy band diagrams, distinguish between the conductors, insulators and semiconductors.
- b) Differentiate between Fraunhofer diffraction and Fresnel Diffraction.

A slit of variable width is illuminated by red light of wavelength  $6500 \text{ \AA}$ . At what width of the slit the first minimum will fall at  $\theta = 30^\circ$ ?

- c) State Bernoulli's theorem.

How is the Pitot's tube used to measure the rate of flow of liquid through a horizontal tube.

- d) What is Poisson's ratio? Show that its maximum value is 0.5.

Why Poisson's ratio can not take negative value?

**Q5)** Answer any one of the following:

**[16]**

- a) State and explain Doppler effect in sound.

Derive expression for apparent frequency in following cases.

- i) Source moving and observer stationary.
- ii) Observer moving and source stationary.
- iii) Both source and observer are moving.

OR

- b) Explain the terms:

- i) Isobaric change
- ii) Isochoric change
- iii) Adiabatic change
- iv) Isothermal change

What is an isolated system?

