

# MODEL PAPER-1

Time: 3Hrs.

PHYSICS

Max. Marks: 60

## SECTION - A

Answer all questions.

Each question carries 2 marks.

All are very short answer type questions.

$10 \times 2 = 20$  Marks.

1. Define temperature coefficient of resistance.
2. A concave mirror of focal length 10cm is placed at a distance 35cm from a wall. How far from the wall should an object be placed so that its real image is formed on the wall?
3. Mention the basic methods of modulation.
4. Draw the circuit symbols for p-n-p and n-p-n transistors.
5. What are "beats"?
6. What is Malus law?
7. A current carrying circular loop is placed in a uniform external magnetic field. If the loop is free to turn, what is its orientation when it achieves stable equilibrium?
8. Three capacitors of capacitances  $1\mu F$ ,  $2\mu F$  and  $3\mu F$  are connected in series
  - a) What is the ratio of charges?
  - b) What is the ratio of potential differences?
9. Give two uses of infrared rays.
10. What is the phase difference between AC emf and current in the following: Pure resistor, pure inductor and pure capacitor?

## SECTION - B

Answer any six questions.

Each question carries 4 marks.

All are short answer type questions.

$6 \times 4 = 24$  Marks.

11. Derive an expression for the capacitance of a parallel plate capacitor?
12. State Kirchhoff's law for an electrical net work. Using these laws deduce the condition for balance in a Wheatstone bridge.

13. Derive an expression for the magnetic induction at the centre of a current carrying circular coil using Biot-Savart law.
14. What is the position of the object for a simple microscope? What is the maximum magnification of a simple microscope for a realistic focal length?
15. Explain Doppler effect in light. Distinguish between red shift and blue shift.
16. Derive the equation for the couple acting on a electric dipole in a uniform electric field.
17. Derive an expression for the axial field of a solenoid of radius 'r', containing 'n' turns per unit length and carrying current 'i'.
18. Describe the ways in which Eddy currents are used to advantage.

### SECTION - C

**Answer any two of the following.**

**Each question carries 8 marks.**

**All are long answer type questions.**

**8 × 2 = 16 Marks.**

19. Explain the formation of stationary waves in stretched strings and hence deduce the laws of transverse waves in stretched strings.

A stretched wire of length 0.6m is observed to vibrate with a frequency of 30Hz in the fundamental mode. If the string has a linear mass of 0.05 kg/m find (a) the velocity of propagation of transverse waves in the string (b) the tension in the string?

20. Deduce an expression for the force on a current carrying conductor placed in a magnetic field. Derive expression for the force per unit length between two parallel current carrying conductors.
21. Explain the source of stellar energy. Explain the carbon-nitrogen cycle and proton-proton cycle occurring in stars.

If one microgram of  $^{235}\text{U}_{92}$  is completely destroyed in an atom bomb, how much energy will be released?