

PHYSICS

(312)

Day and Date of Examination.....

Signature of Invigilators 1.

2.

Time : 3 Hours]

[Maximum Marks : 80

Note (i) This Question paper consists of two Sections, viz., 'A' and 'B'

(ii) All questions from Section 'A' are to be attempted.

(iii) Section 'B' has got more than one option. Candidates are required to attempt questions from one option only.

SECTION-A

1. Given that what is the angle between and
2. is the speed-time graph, shown in the figure, possible ? Give reason.
3. What kind of change occurs in a body when shearing stress is developed in the body?
4. Write the difference between a 'periodic motion' and an 'oscillatory motion'.
5. Is electric potential a scalar or a vector quantity. ?
6. Name the electromagnetic waves used for studying crystal structure .

7. What will happen to a ray of light, incident normally on the surface of a plane glass plate ?
8. Define the term 'threshold frequency' in respect of photoelectric effect.
9. A particle moves an initial velocity of 3.0 ms^{-1} along the positive x-direction and it accelerates at the rate of $.06 \text{ ms}^{-2}$. (a) Find the distance traveled by it in first three seconds. (b) How much time would it take to reach the velocity of 9.0 ms^{-1} ?
10. Find out the expression for acceleration due to gravity at a depth, d , below the surface of the earth in terms of its radius, R_e , and acceleration due to gravity, g , on the surface.
11. Show that kinetic energy at a height, h due to acceleration due to gravity, g .
12. Two charges of $+2.5 \text{ C}$ and -1.6 C are kept at a certain distance apart in vacuum. If they attract each other with a force of 0.4 N , find the separation between the charges. If the charges were placed in a medium of dielectric constant of 1.6 , how would the force be affected?
13. Distinguish between diamagnetic and Paramagnetic materials in terms of their (a) susceptibility (b) permeability.
14. Define the term 'Thomson coefficient' of a metal. Give its unit. Is it a constant?
15. waves are generated on a water surface. Calculate the phase difference between two points A and B, when (a) A and B are on the same wavefront at a distance twice the wavelength, between them, (b) A and B lie on successive crests separated by 1 metre and (c) A and B lie on successive crests and troughs separated by $.5 \text{ m}$.

- 16.** In a single –slit diffraction experiment, the width of the slit is made double of the original width. How does it effect (a) intensity and (b) the size of the central diffraction band ? Justify your answer.
- 17.** Define the term ‘half-life period’ of a radioactive element. Obtain the relation between half – half period ($T_{1/2}$) and decay constant of a radioactive element.
- 18.** Distinguish between ‘energy levels’ and ‘energy bands’ in a crystal.
- 19.** Write the name of logic gate used in the given circuit. If the output of this logic gate so formed.
- 20.** Show that when a body suffers an elastic collision with another body of the same mass at rest, it is stopped whereas the second body starts moving with the same velocity as that of the first. Give an example of this type of collision from daily life.
- 21.** The blades of an aeroplane propeller are 2m long and rotate at the rate of 300 r.p.m. Calculate (a) the frequency and period of rotation, (b) angular velocity and (c) the linear velocity of a point of a point .5 m from the tip of the blades.
- 22.** Define the term ‘surface tension’. Obtain an expression for the rise of the liquid in a capillary tube.
- 23.** What is meant by the term ‘thermal equilibrium’? State Zeroth law of thermodynamics , How does this law give the concept of temperature?
- 24.** One end of a 0.25 m long metal bar is in steam and the other in contact with ice. If 12×10^{-3} kg of ice melts per minute, find the thermal conductivity of the metal. (Given : Cross-section of bar = $5 \times 10^{-4} \text{m}^2$ and latent heat of ice=80 kcal/kg)
- 25.** State the principal of an a.c. generator.

26. Draw diagrams to show the formation of harmonics in a pipe closed at one end. The fundamental harmonic.
27. What information does the 'output' characteristics of a transistor in common base configuration give? Draw a labeled circuit diagram to study characteristic curves of an n-p-n transistor in common base configuration. Show the nature of the curves for its output characteristics.
28. State and deduce (a) Avogadro's law and (b) Charles' law on the basis kinetic theory of gases.
29. Name the factors responsible for the internal resistance of a primary cell. Draw a circuit diagram to show how you will determine the internal resistance of the cell.
30. An object AB is placed between the focus F and pole P of a concave mirror as shown in the figure. Draw a ray diagram to show the formation of the image of the object. Using this ray diagram and proper convention of signs, obtain the relation between u, v and f for the concave mirror.
31. With the help of a labeled diagram, describe Rutherford's scattering experiment. Write the main conclusions of the experiment. Give two main drawbacks of Rutherford model of the atom.

OPTION-III

(Photography and Audio-Videography)

32. Which two parts of the camera control the light entering the camera lens.?
33. What is zoom lens?
34. list properties of lens, you must look for when you choose a camera . what should be the range for best working aperture?

35. Describe three categories of films according to their colour sensitiveness.

What is meant by the term 'scanning'? Draw a labeled diagram to show the scanning of electric image by a narrow beam in a TV camera