Sub.Code : 9131

NEB - GRADE XII
2080 (2023)
Physics
(New Course)
(Regular students for technical stream)

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Time: 3 hrs. **Full Marks: 75**

Attempt **all** the questions.

Group 'A' 11×1=11

Rewrite the correct options of each questions in your answer sheet.

1. Two bodies have their moment of inertia I and 2I respectively about their axis of rotation. If their kinetic energies of rotation are equal, the angular momentum will be in the ratio of

   (A) 1:3 (B) $\sqrt{2}:1$ (C) 2:1 (D) $1:\sqrt{3}$

2. The thermodynamic process in which temperature remains constant is called
   (A) Isobaric (B) Isothermal
   (C) Isochoric (D) adiabatic

3. Internal energy of real gas depends on:
   (A) Volume and temperature (B) Pressure and Temperature
   (C) Volume only (D) Temperature only

4. The distance travelled by a wave in one complete cycle is called.
   (A) amplitude (B) wavelength
   (C) frequency (D) displacement.

5. Kirchhoff's current law is based on the principle of conservation of
   (A) charge (B) mass
   (C) linear momentum (D) energy

6. The instrument used for the accurate measurement of the emf of a cell is
   (A) a voltmeter (B) a potentiometer
   (C) an ammeter (D) a slide wire bridge

7. Which of the following is ferromagnetic material ?
   (A) Nickel (B) Bismuth (C) Aluminum (D) Quartz

8. X-rays of wavelength 3 $\overset{o}{A}$ have a frequency of
   (A) 10 Hz (B) 10^2Hz (C) 1×10^4Hz (D) 1×10^{18}Hz

Contd...

9. The dynamic mass of photon is

(A) $\frac{\lambda}{hc}$ (B) $\frac{h}{\lambda c}$ (C) $\frac{h^2}{\lambda c}$ (D) $\frac{hc}{\lambda}$

10. As the quantum number increases, the difference in energy between two consecutive energy levels.
(A) remain same (B) decreases
(C) increases (D) some times increases and sometimes decreases

11. Holes exists in
(A) metals (B) insulators (C) semiconductor (D) conductor

Group 'B' 8x5=40

12. a) Define simple harmonic motion (SHM). 1
b) Show that the motion of simple pendulum is simple harmonic for small amplitude and also find an expression for its time period. 3
c) Does the time period of a simple pendulum depend on mass of the bob ? Justify. 1

13. a) Define viscosity. 1
b) Obtain an expression for terminal velocity of the spherical solid object falling inside the viscous liquid. 3
c) Sketch a graph between the velocity of falling spherical object with time. 1

14. a) State Newton's formula for the velocity of sound in gases. 1
b) What correction was done by Laplace on Newton's formula ? 1
c) Derive Laplace's corrected formula for the velocity of sound. 3

15. a) Define organ pipes. 1
b) Describe various modes of vibration of air column in a closed organ pipe. 3
c) What is end correction of an organ pipe ? 1

16. a) What is meant by interference of light ? 1
b) Explain Brewster's law of polarization. 2
c) Find the refractive index of material for which polarizing angle is 30° 2

17. a) State the principle of meter bridge. 1
b) Describe how it is used to determine the value of unknown resistance of wire. 3
c) What is meant by balanced condition ? 1

Contd...

Or

a) Define Lorentz force with mathematical expression. 2

b) State Biot-Savart law and use it to find the magnetic field at the centre of a current carrying circular coil. 3

18. a) How can you convert a galvanometer into a voltmeter ? Explain. 3

b) Why a voltmeter is connected in parallel in a circuit ? 2

19. a) Show that the motion of electrons in electric field is parabolic in nature. 3

b) An electron and a proton enter in the electric field normally with the field with same velocity. Which particle path is more curved ? 2

Or

a) How p - n junction is formed ? Explain. 2

b) Describe full wave rectification by using p - n junction diodes. 3

Group 'C' 8x3=24

20. a) What do you mean by rigid body ? 1

b) Deduce an expression for the moment of inertia of a thin and uniform rod about an axis through the center and perpendicular to its length. 4

c) A ballet dancer spins with 2.4 rev/s with her arms outstretched when the moment of inertia about an axis of rotation is I. With her arms folded, the moment of inertia about the same axis becomes 0.6 I. Calculate the new rate of spin. 3

21. a) What do you mean by resonance in LCR circuit ? 2

b) Obtain an expression of resonating frequency in LCR series circuit ?2

c) Draw a graph showing the variation of capacitive reactance of a capacitor with the frequency of applied alternating current. 2

d) A series LCR circuit consists of R=300Ω, L=60mH and C=0.5μF. Calculate the value of resonant frequency. 2

22. a) What is photoelectric effect ? 1

b) How stopping potential is related to kinetic energy of photoelectrons ? 2

c) Describe Millikan experiment to determine Planck's constant. 3

d) Sodium has work function of 2eV. Calculate the maximum kinetic energy of the emitted electrons when sodium is illuminated by a radiation of 150nm . 2

Or

a) What are X-rays ? 1

b) Describe the working of modern Coolidge tube to produce X-rays. 3

c) How do you control quality of X-rays ? 2

d) Determine the ratio of frequency a X-rays of wavelength 10^{-10} m and 10×10^{-10}m. 2