

## JEE Main Shift 2 Analysis 27 JANUARY 2024

Physics:

1. If the work function of a metal is 6.63 eV, then find the threshold frequency for the photoelectric effect.

Answer.  $1.6 \times 10^{15} \text{ Hz}$

2. If  $(p - a/V^2)(V - b) = nRT$  where P, V, R, & T are pressure, volume, universal gas constant, and temperature, then  $a/b^2$  has the same dimensional formula as that of:

- i. R
- ii. PV
- iii. RT
- iv. P

Answer. P

3. Statement 1: Positive zero error is added to the measured value.

Statement 2: Defects may occur during the manufacturing of measuring instruments

- i. Statement 1 is true while statement 2 is false
- ii. Statement 1 is false while Statement 2 is true
- iii. Both statements are true
- iv. Both statements are false

Answer. ii.

4. A particle loses  $1/3$ rd of its velocity when it strikes a block and covers a distance of 4 cm inside the fixed block. Then find D, if D is the distance covered by the particle inside the block and comes at rest.

Answer:  $36/5 \text{ cm}$

5. A ring and solid sphere of the same mass and radius slide down an inclined plane of the same angle  $\theta$ . Find the ratio of their kinetic energies.

Answer. 1:1

6. If two bodies with masses 4 kg and 5 kg have the same kinetic energy, then find the ratio of their linear momentum.

Answer: 4:5

7. A train moving at a speed of 12m/s takes a circular turn of radius 500 m. The rails are 1.5m apart, then by what height the outer rail should be raised with respect to the inner rail?

Answer:  $432 \times 10^{-4} \text{ m}$

8. In an adiabatic process, the pressure of a gas is proportional to the cube of absolute temperature, then the ratio of  $C_p/C_v$  is?

Answer.  $3/2$

9. A ball suspended by a thread swings in a vertical plane so that its acceleration in the extreme position and lowest position are equal. The angle  $\theta$  of thread deflection in the extreme position will be?

Answer.  $53^\circ$

10. A particle moves 80 m in the last 2 seconds of free fall of height  $h$ , then find the height  $h$ .

Answer. 125m

11. If a current of  $200 \mu\text{A}$  deflects the coil of a moving galvanometer through  $60^\circ$ , then what is the current required to cause deflection through  $\pi/10$  radians?

Answer.  $60 \mu\text{A}$

12. A uniform ring and uniform solid sphere roll down the same inclined plane at the same distance. If the ratio of their translational kinetic energies is  $7/x$  then find  $x$ . It is given that the mass and radius of the ring and sphere are equal and the situation is pure rolling.

Answer. 10

13. There exists a uniform electric field of  $20 \hat{i} \text{ N/C}$ . A dipole of dipole moment  $|P| = 15 \text{ C} \cdot \text{m}$  is placed at an angle of  $30^\circ$  with the electric field, then find the torque on the dipole.

Answer.  $5 \times 10^{-8} \text{ T}$

14. If a man is carrying the weight of a rod with mass  $m$  leaning against his head such that the rod forms an angle of  $60^\circ$  with the horizontal, then find the weight of the rod experienced by him.

Answer.  $mg/4$

15. A bullet is fired into a fixed target. It loses  $1/3$ rd of its velocity after travelling for 4 cm. It penetrates further  $p \times 10^{-3} \text{ m}$  before coming to rest. Find  $p$ .

Answer.  $P=32$

16. If the primary side of a transformer is connected with 230 V, 50 Hz AC supply and the ratio of the number of turns of primary to the secondary winding is 10:1. The load resistance at the secondary coil is  $46 \Omega$  then find the power of the secondary winding output.

Answer. 11.5 watt

17. Three voltmeters ( $V_1, V_2, V_3$ ) are connected in a circuit such that  $V_1$  and  $V_2$  are in series with each other and both are in parallel with  $V_3$ . Find the correct relation among their readings.

Answer.  $V_1 + V_2 = V_3$