

JEE Main 2024 Physics Question Paper April 4

Shift 2

(B.E./B.Tech)

JEE Main Physics Questions

Ques 1. A massless rod has a point mass attached to one end while the other end is hinged. The rod is released from the position shown. The speed of the mass at the bottom most point is ($R = 14 \text{ m}$, $g = 10 \text{ m/s}^2$)

- A.** $\sqrt{560} \text{ m/s}$
- B.** $\sqrt{280} (1 + 1/\sqrt{2}) \text{ m/s}$
- C.** $\sqrt{280} \text{ m/s}$
- D.** $\sqrt{280} (1 + 1/\sqrt{3}) \text{ m/s}$

Ans. B

Ques 2. P, Q, R, S are 4 symmetric points on a horizontal circle of radius of 4 km. What is the displacement when a car moves from P to R along the given circular path.

- A.** $4\sqrt{2} \text{ km}$
- B.** $4\pi \text{ km}$
- C.** 8 km
- D.** 4 km

Ans. C

Ques 3. One mole of an ideal monatomic gas compressed adiabatically from volume $2V$ to V . If initially temperature of gas was T then the magnitude of work done in this process is

- A. $\frac{3}{2} RT (2^{1/2} - 1)$
- B. $\frac{3}{2} RT (2^{2/3} - 1)$
- C. $\frac{2}{3} RT (2^{2/3} - 1)$
- D. $\frac{2}{3} RT (\sqrt{2} - 1)$

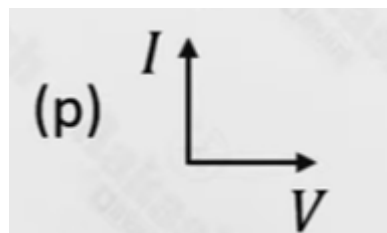
Ans. B

Ques 4. A 2 kg brick is placed on an inclined plane of inclination 45° . The brick is at rest. The minimum coefficient of static friction is:

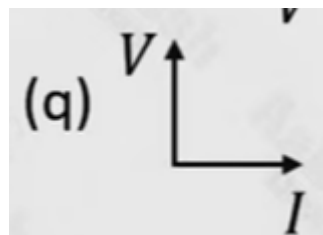
- A. 0.5
- B. $\sqrt{3}$
- C. 1
- D. $1/\sqrt{3}$

Ans. C

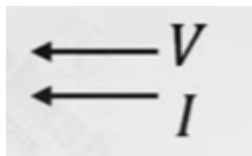
Ques 5. Correct match for phasors of voltage and current for given elements is



a. Inductive



b. Capacitive



C. Resistive

- A. $a \rightarrow p, b \rightarrow q, c \rightarrow r$**
- B. $a \rightarrow q, b \rightarrow p, c \rightarrow r$**
- C. $a \rightarrow p, b \rightarrow p, c \rightarrow r$**
- D. $a \rightarrow q, b \rightarrow q, c \rightarrow r$**

Ans. B

Ques 6. Assertion (A) : The contact angle depends on material of solid and liquid.

Reason (R) : Height of the liquid in a capillary tube is independent of the radius of the tube.

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A)**
- (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)**
- (3) (A) is true but (R) is false**
- (4) (A) is false but (R) is true**

Ans. C

Ques 7. A metallic rod of length 4 m is rotating about perpendicular bisector of the rod with angular velocity of 2 rad/s in presence of transverse magnetic field of 0.5 T. Potential difference developed across ends of rod is

- A. 16 V**
- B. 8 V**
- C. 0 V**
- D. 32 V**

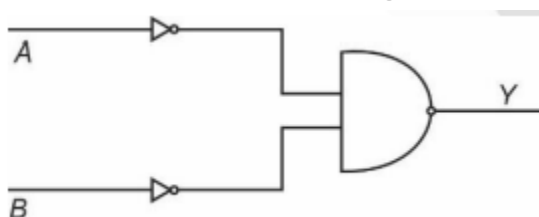
Ans. C

Ques 8. Statement 1 : In photoelectric effect, number of photoelectrons emitted are proportional to frequency of incident light.
Statement 2 : Maximum kinetic energy of photoelectrons is proportional to frequency of incident light.

- A. Statement 1 is true and Statement 2 is true and correct explanation of 1**
- B. Statement 1 is true and Statement 2 is true and not correct explanation of 1**
- C. Statement 1 is true and Statement 2 is false**
- D. Statement 1 is false and Statement 2 is true**

Ans. D

Ques 9. The circuit diagram shown is equivalent to



- A. OR**
- B. NOR**
- C. AND**
- D. NAND**

Ans. A

Ques 10. The width of the one slit in YDSE is four times the other slit.
Then ratio of maximum to the minimum intensity at screen is

- A. 9 : 1**
- B. 16 : 1**
- C. 4 : 1**
- D. 1 : 1**

Ans. A

Ques 11. Wavelengths assigned to gamma rays, infra-red rays, UV rays and microwaves are 1 , 2 , 3 & 4 respectively. Then :

- A. $1 < 2 < 3 < 4$**
- B. $1 < 3 < 2 < 4$**
- C. $1 > 2 > 3 > 4$**
- D. $2 < 3 < 1 < 4$**

Ans. B

Ques 12. A heater of rating of 50 W – 200 V is connected with source voltage of 100 V. Power consumed by heater is

- A. 100 W**
- B. 25 W**
- C. 50 W**
- D. 12.5 W**

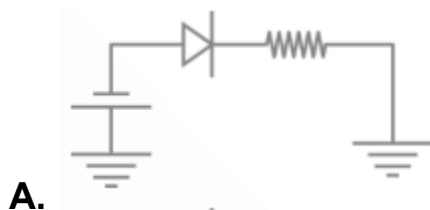
Ans. D

Ques 13. With regard to gravitation parameters, the dimensions of T^2 are same as that of

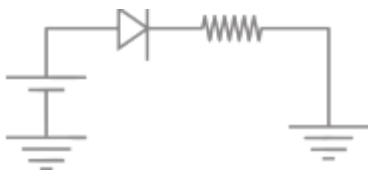
- A. r^3 / GM**
- B. GM/r^3**
- C. $r^{3/2} / GM$**
- D. r^2/GM**

Ans. A

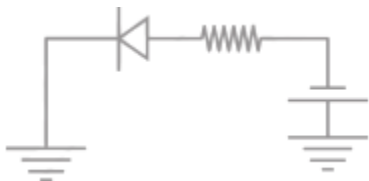
Ques 14. Which of the following circuits would have the diode in conducting state?



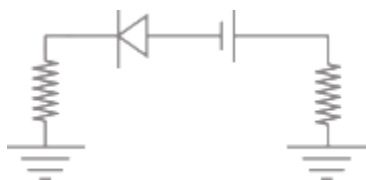
B.



C.



D.



Ans. B

Ques 15. Two point mass m and $2m$ are on straight line. If mass m moves toward centre of mass by distance 2 cm , then the distance must mass $2m$ should move so that centre of mass does not change _____ cm .

Ans. 1

Ques 16. A body of mass 4 kg is at a height of R (radius of earth) from surface of earth. The weight of the body is _____ N .

Ans. 10

Ques 17. A bar magnet of magnetic moment $M = 0.5\text{ A m}^2$ is under the influence of a magnetic field 8 T . Find the work done (J) to move the magnet from stable to unstable equilibrium position.

Ans. 8

Ques 18. For methane, translation degrees of freedom is f_1 while rotational degrees of freedom is f_2 . Find $f_1 + f_2$.

Ans. 6