Tripura JEE 2024 Physics Set Q Question Paper

Time Allowed :45 Minutes	**Maximum Marks :**120	**Total questions :**30

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The Tripura Joint Entrance Examination will be conducted in a single day as notified.
2. There will be three shifts: the first shift will consist of Physics and Chemistry question papers, and the subsequent two shifts will consist of Biology and Mathematics question papers.
3. The Board is conducting the examination through Optical Marks Recognition (OMR) system. The pattern of questions is Multiple Choice Question (MCQ) type.
4. The medium of the Question Paper shall be in English and Bengali.
5. There will be 30 (thirty) compulsory questions for each subject, taking 3 (three) questions from each Module.
6. Each question will carry 4 (four) marks, i.e., the total marks will be 120 (30×4) for each subject.

1. In a Young's double slit experiment, light of wavelength 620 nm is used with slit separation 0.3 mm and width of fringe 1.3 mm. The distance of the screen from source will be

(A) 62.9 m

(B) 6.29 m

(C) 0.629 m

(D) 0.0629 m

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2. 27 water droplets of radius 3 mm each and charged with the same charge are coalesced to form a big water drop. The ratio of surface charge density of the small drop and large drop will be

(A) 1 : 1

(B) 1 : 3

(C) 3 : 1

(D) 1 : 27

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3. An electron of charge e and mass m is kept in a uniform electric field E, then the acceleration of the electron will be

(A) $\frac{mE}{e}$

(B) $\frac{eE}{m}$

(C) $\frac{e^2}{m}$

(D) $\frac{eE^2}{m}$

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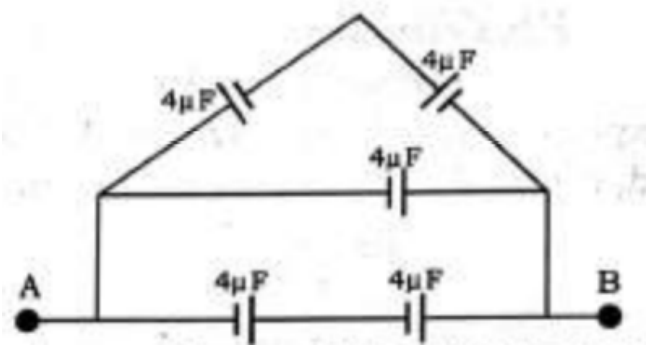
4. The equivalent capacitance of the circuit given between A and B is



(A) $\frac{10}{3}\ \mu F$

(B) 6 μF

(C) 8 μF

(D) 26 μF

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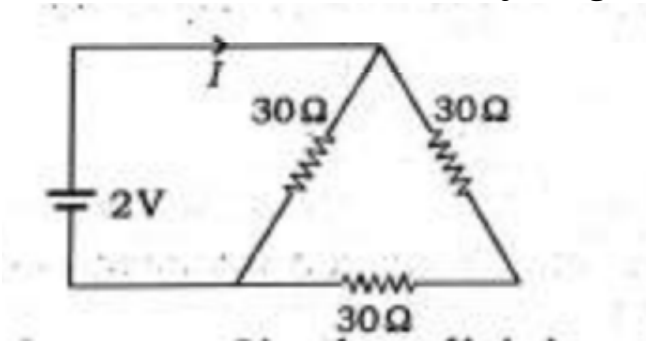
5. The value of current I in the adjoining circuit will be



(A) $\frac{1}{45}\ A$

(B) $\frac{1}{15}\ A$

(C) $\frac{1}{5}\ A$

(D) $\frac{1}{10}\ A$

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6. The magnetic moment of a magnetized wire is M. Now it is bent to form a section of a circle which subtends 60° on its center. Magnetic moment of the bend-shaped wire is

(A) $\frac{M}{\pi}$

(B) $\frac{2M}{\pi}$

(C) $\frac{3M}{\pi}$

(D) $\frac{4M}{\pi}$

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7. If the minimum wavelength of Lyman series is 911 Å, the minimum wavelength of Paschen series will be

(A) 8200 Å

(B) 7300 Å

(C) 5500 Å

(D) 4600 Å

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8. The work function of a photosensitive metal is 0.5 eV. If photons of energy 1 eV and 2.5 eV are incident on this metal separately, then the ratio of maximum kinetic energies of ejected electrons will be

(A) 1 : 5

(B) 1 : 4

(C) 1 : 2

(D) 1 : 1

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9. A and B are two radioactive samples of half-life 12 hours and 16 hours respectively. The number of nuclei in them are in the ratio 2:1. After 48 hours, this ratio will become

(A) 1:1

(B) 2:1

(C) 1:2

(D) 1:4

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10. At 300 K, both electron and hole density in an intrinsic silicon crystal is 15×10^{15} m^{-3}. When it is doped with indium, the hole density becomes 4.5×10^{22} m^{-3}. The extrinsic electron density will be

(A) $6 \times 10^9\,\mathrm{m}^{-1}$

(B) $5 \times 10^9\,\mathrm{m}^{-3}$

(C) $4 \times 10^9\,\mathrm{m}^{-3}$

(D) $3 \times 10^9\,\mathrm{m}^{-3}$

11.

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

The corresponding logic gate for the given truth table is

(A) XOR

(B) OR

(C) AND

(D) NAND

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12. If the dimensional unit of magnetic permeability (μ) is given by $[MLT^{-2}I^{-2}]$, then the dimensional unit of electric permittivity (ϵ) will be

(A) $[ML^3T^{-4}I^{-2}]$

(B) $[M^{-1}L^{-3}T^4I^2]$

(C) $[M^{-1}L^3T^{-4}I^{-2}]$

(D) $[ML^3T^{-4}I^{-2}]$

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13. If two vectors are $\vec{a} = \hat{i} + \hat{j}$ and $\vec{b} = \hat{j} + \hat{k}$, then the value of $\vec{a} \times \vec{b}$ will be

(A) $\hat{i} + \hat{j} - \hat{k}$

(B) $-\hat{i}+\hat{j}-\hat{k}$

(C) $\hat{i}-\hat{j}+\hat{k}$

(D) $\hat{i}-\hat{j}-\hat{k}$

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14. Two projectiles are thrown at angles θ and $(90^\circ-\theta)$ with same initial velocity and range R. If maximum height attained by them are H_1 and H_2 respectively, then

(A) $R=H_1+H_2$

(B) $R=\sqrt{H_1^2+H_2^2}$

(C) $R=\sqrt{H_1H_2}$

(D) $R=4\sqrt{H_1H_2}$

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15. The distance covered by a particle moving in a straight line path at time t (in seconds) is given by $s=(t^3-6t^2+3t+4)$ m. The velocity of the particle when its acceleration is zero, will be

(A) 3 m/s

(B) 42 m/s

(C) -12 m/s

(D) -9 m/s

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16. The position of a particle at time t is given by $\vec{r}=\vec{r_0}(1+at)$, where $\vec{r_0}$ and a are two constants. When will the particle come back to its starting position?

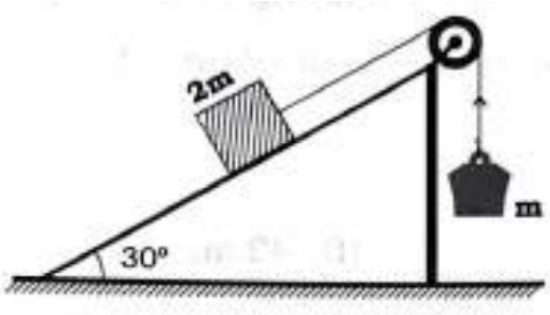
(A) $\frac{1}{a^2}$

(B) $\frac{1}{a}$

(C) a

(D) a^2

17.



In the adjoining figure, if the pulley and the inclined plane are frictionless, then upward acceleration of the mass m will be

(A) zero

(B) $\frac{g}{4}$

(C) $\frac{g}{3}$

(D) $\frac{g}{2}$

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18. 100 N horizontal force is applied on a body of mass 10 kg kept on a rough horizontal surface. If coefficient of friction between the surface and the body is 0.5, then the acceleration produced in the body will be

(A) 0

(B) 5 m/s^2

(C) 5.2 m/s^2

(D) 10 m/s^2

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19. A uniform meter-scale is bent at the middle to form a perfect rectangle. Now the distance of the centre of gravity of this rectangle from middle of the scale will be

(A) zero

(B) 35.4 cm

(C) 25.2 cm

(D) 17.7 cm

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20. Material in earth and moon is same but radius of earth is 10 times that of moon and acceleration due to gravity in earth is 6.4 times that in moon. Then the ratio of escape velocity in earth and in moon will be

(A) $1 : 56$

(B) $10 : 3$

(C) $6.4 : 5$

(D) $8 : 1$

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21. Young's modulus of steel is 2×10^{11} N/m^2 and strain at elastic limit is 0.15. The value of limiting stress will be

(A) 1.33×10^{12} N/m^2

(B) 1.33×10^{11} N/m^2

(C) 3×10^{10} N/m^2

(D) 3×10^{11} N/m^2

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22. The weights of a hollow metallic sphere in air and when submerged in water are 264 gm-wt and 221 gm-wt respectively. If specific gravity of the metal is 8.8, then volume of the hollow portion is

(A) 11 cm^3

(B) 12 cm^3

(C) 13 cm^3

(D) 14 cm^3

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23. Two springs of spring constants k_1 and k_2 are joined together in series combination. The spring constant of the combination is

(A) $k_1 + k_2$

(B) $\frac{k_1+k_2}{2}$

(C) $\frac{k_1 k_2}{k_1+k_2}$

(D) $\frac{k_1+k_2}{k_1 k_2}$

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24. In the wave equation $y = 3\cos\pi(100t - x)$ cm, the wavelength is

(A) 2 cm

(B) 3 cm

(C) 5 cm

(D) 100 cm

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25. 1 mole gas at standard pressure and at 27°C temperature is heated such that its volume and pressure both become doubled. The final temperature will be

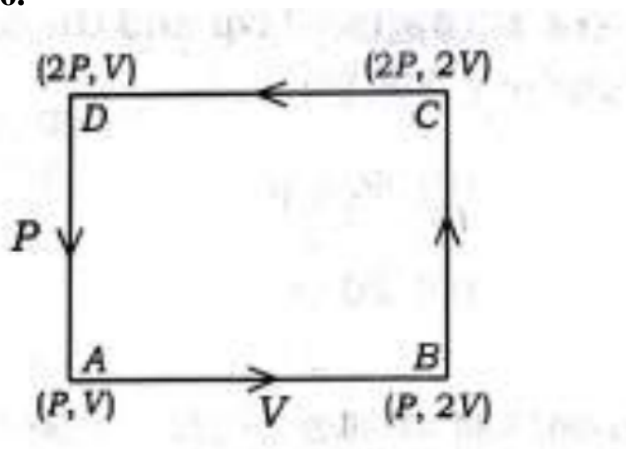
(A) 300 K

(B) 600 K

(C) 900 K

(D) 1200 K

26.



An ideal monatomic gas follows the ABCDA path in the adjoining P-V diagram. The work done by the gas will be

(A) $\frac{1}{2}PV$

(B) PV

(C) $2PV$

(D) $4PV$

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27. Two plane mirrors kept at some angle with each other produce 5 images of any object kept between them. If the angle is decreased by 30°, then the number of images will be

(A) 9

(B) 10

(C) 11

(D) 12

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28. The radius of curvature of a convex mirror is 40 cm and the object size is double that of image size. The image distance will be

(A) 60 cm

(B) 40 cm

(C) 30 cm

(D) 20 cm

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29. If the refractive index of the material of an equilateral prism is $\sqrt{3}$, the minimum angle of deviation will be

(A) 15°

(B) 30°

(C) 45°

(D) 60°

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30. Both sides of a convex lens have radius of curvature 40 cm and the refractive index of its glass is 1.5. The focal length of the lens is

(A) 50 cm

(B) 40 cm

(C) 30 cm

(D) -30 cm
