PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MOCK TEST 2

Mcqs

1. Two bodies of mass $10kg$ and $5kg$ moving in concentric orbits of radii R and r such that

their periods are the same. Then the ratio between their centipetal acceleration is

A. $\frac{R}{r}$

B. $\frac{r}{R}$

C. $\frac{R^2}{r^2}$

D. $\frac{r^2}{R^2}$

Answer: A

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2. The escape velocity on the surface of the earth is 11.2 kms^{-1}. If mass and radius of a planet is 4 and 2 tims respectively than that of the earth, what is the escape velocity from the planet?

A. 11.2kms^{-1}

B. $1.112kms^{-1}$

C. $15.8kms^{-1}$

D. $22.4kms^{-1}$

Answer: C

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3. A ring of mass m and radius r rotates about an axis passing through its centre and perpendicular to its plane with angular velocity ω. Its kinetic energy is

A. $\frac{1}{2}mr^2\omega^2$

B. $mr\omega^2$

C. $mr^2\omega^2$

D. $\frac{1}{3}mr\omega^2$

Answer: A

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4. If the length of second's pendulum is decreased by 2%, how many seconds it will lose per day

A. 3927

B. 3722

C. 3427

D. 863

Answer: D

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5. If a body is executing simple harmonic motion, then

A. at extreme positions, the total energy is zero

B. at equilibrium position, the total energy is in the form of potential energy

C. at equilibrium position, the total energy is in the form of kinetic energy

D. at extreme position, the total energy is infinite

Answer: C

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6. A metal rod $\left(Y + 2 \times 10^{12} \text{dyne}(cm)^{-2}\right)$ of coefficient of linear expansion 1.6×10^{-5} per $.^{=} C$ has its temperature raised by $20^{\circ} C$. The

linear compressive stress to prevent the expansion of the rod is

A. $2.4 \times 10^8 \text{dyne}/(cm)^{-2}$

B. $3.2 \times 10^8 \text{dyne}/(cm)^{-2}$

C. $6.4 \times 10^8 \text{dyne}(cm)^{-2}$

D. $4.6 \times 10^8 \text{dyne}/(cm)^{-2}$

Answer: C

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7. Two wires A and B are of the same material. Their lengths are in the ratio 1 : 2 and the diameter are in the ratio 2 : 1. If they are pulled by the same force, then increase in length will be in the ratio

A. $2:1$

B. $1:4$

C. $1:8$

D. $8:1$

Answer: C

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8. Two springs of equal lengths and equal cross-sectional area are made of materials whose Young's moduli are in the ratio of $2:3$. They are suspended and loaded with the same mass. When stretched and released they oscillate. Find the ratio of the time period of oscillation.

A. $\sqrt{3}:\sqrt{2}$

B. $3:2$

C. $3\sqrt{3}:2\sqrt{2}$

D. $9:4$

Answer: A

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9. The excess pressure inside one soap bubble is three times that inside a second bubble. The ratio of the volume of first bubble to that of the second

A. $1:3$

B. $1:9$

C. $1:27$

D. $3:1$

Answer: C

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10. Two simple harmonic motions are represented by the equations $y_1 = 10\sin\left(3\pi t + \frac{\pi}{4}\right)$

and $y_2 = 5\left(3\sin 3\pi t + \sqrt{3}\cos 3\pi t\right)$. Their amplitudes are in the ratio of

A. $\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

C. 2

D. $\frac{1}{6}$

Answer: B

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11. Wave of frequency 500 Hz has a phase velocity $360m/s$. The phase difference between two displacement at a certain point at time $10^{-3}s$ apart will be

A. (π) rad

B. $\left(\frac{\pi}{2}\right)$ rad

C. $\left(\frac{\pi}{4}\right)$ rad

D. (2π) rad

Answer: A

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12. If A=B+C and the values of A,B and C are 13,12 and 5 respectively, then the angle between A and C will be

A. $\cos^{-1}(5/13)$

B. $\cos^{-1}(13/12)$

C. $\pi/2$

D. $\sin^{-1}(5/12)$

Answer: A

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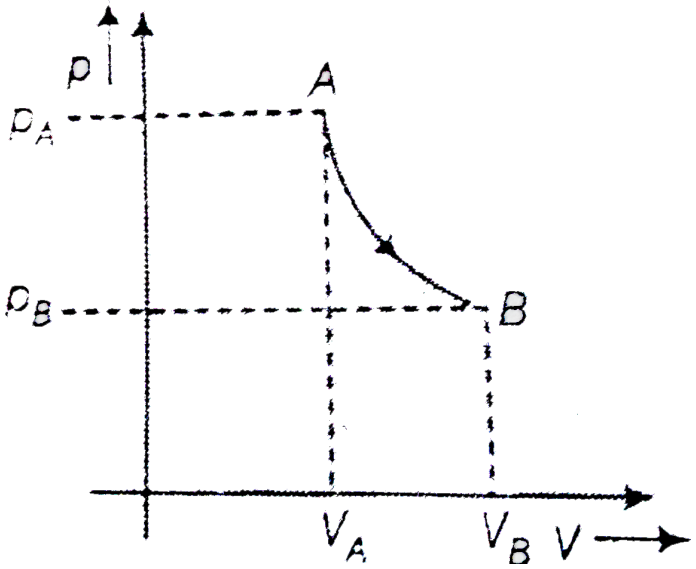
13. Calculates the work done (W_{AB}) by the gas, if 5 moles of an ideal gas is carried by a quasi state isothermal process at 500K to twice its volume.



A. 1500 J

B. 143857 J

C. 13380 J

D. 14890 J

Answer: B

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14. Light of wavelenth 6000 Å falls on a single slit of width 0.1 mm. the second minimum will be formed for the angle of diffraction of

A. 0.06 rad

B. 0.05 rad

C. 0.12 rad

D. 0.012 rad

Answer: D

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15. A dimensionless body having a phsical quantity varies as $1/r^2$, where r is distance from the body. This physical quantity may be

A. gravitational potential

B. electric field

C. gravitational field

D. none of these

Answer: B

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16. Two capacitors A and B having capacitances $10\mu f$ and $20\mu F$ are connected in series with a

12 V battery. The ratio of the charge on A and B is

A. $0.5:1$

B. $1:1$

C. $2:1$

D. $2:4$

Answer: B

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17. Three equal resistors connected in series across a source of emf together dissipate 10W of power. What would be the power dissipated if te same resistors are connected in parallel across the same source of emf?

A. $10W$

B. $30W$

C. $90W$

D. $\left(\frac{10}{3}\right)W$

Answer: C

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18. Two similar equal poles magnetic when separated by a distance of 1m, they repel with a force of $10^{-3}N$. The pole strength is

A. 10 A-m

B. 20 A-m

C. 50 A-m

D. 100 A-m

Answer: D

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19. An Ac source of volatage V=100 sin $100\pi t$ is connected to a resistor of ressistance 20ΩThe rsm value of current through resistor is

A. $10A$

B. $\frac{10}{\sqrt{2}}A$

C. $\frac{5}{\sqrt{2}}A$

D. none of these

Answer: C

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20. The difference in angular momentum associated with electron in two successive orbits of hydrogen atom is:

A. $\frac{h}{2\pi}$

B. $\frac{h}{\pi}$

C. $(n-1)\frac{h}{2\pi}$

D. $\frac{h}{2}$

Answer: A

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21. The base current in common emitter mode of the transistor changes by $10\mu(A)$. If the current gain of the transistor is 50, then change in collector current is

A. $50\mu A$

B. $0.5mA$

C. $2mA$

D. $2\mu A$

Answer: B

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22. The acceleration of a point on the rim of a flywheel 1 m in diameter, if it makes 1200 rpm is

A. $8\pi r^2 ms^{-2}$

B. $80\pi^2 ms^{-2}$

C. $800\pi^2 ms^{-2}$

D. none of these

Answer: C

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23. The ratio of the radii of the planets P_1 and P_2 is k. the ratio of the accelerationn due to gravity is r. the ratio of the escape velocities from them will be

A. kr

B. $\sqrt{kr}$

C. $\sqrt{\frac{k}{r}}$

D. $\sqrt{\frac{r}{k}}$

Answer: B

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24. The displacement of a particle of mass $3g$ executing simple harmonic motion is given by $x = 3\sin(0.2t)$ in SI units. The kinetic energy of the particle at a point which is at a displacement equal to $1/3$ of its amplitude from its mean position is

A. $12 \times 10^3 J$

B. $25 \times 10^{-3} J$

C. $0.48 \times 10^{-3} J$

D. $0.24 \times 10^{-3} J$

Answer: C

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25. Diameter of a plano-convex lens is 6cm and thickness at the centre is 3mm. If speed of

light in material of lens is $2 \times 10^8 \frac{m}{s}$, The focal length of the lens is

A. 15 cm

B. 20 cm

C. 30 cm

D. 10 cm

Answer: C

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26. Two bars A and B of circular cross section, same volume and made of the same material, are subjected to tension. If the diameter of A is half that of B and if the force applied to both the rod is the same and it is in the elastic limit, the ratio of extension of A to that of B will be

A. 16

B. 15

C. 8

D. 24

Answer: C

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27. The surface of soap solution is $25 \times 10^{-3} Nm^{-1}$. The excess pressure inside a soap bubble of diameter 1 cm is

A. 10 Pa

B. 20 Pa

C. 5 Pa

D. none of these

Answer: A

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28. A sinusoidal wave travelling in the same direction have amplitudes of 3 cm and 4 cm and difference in phase by $\pi/2$. The resultant amplitude of the superimposed wave is

A. $7cm$

B. $5cm$

C. $2cm$

D. $0.5cm$

Answer: B

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29. If a string fixed at both ends vibrates in four loops. The wavelength is 10 cm. The length of string is

A. 5 cm

B. 20 cm

C. 30 cm

D. none of these

Answer: B

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30. For a wave y = 0.02 sin $\left[2\pi\left(110t - \frac{x}{3}\right) + \frac{\pi}{3}\right]$ is travelling in a medium. Find energy per unit

volume being transferred by wave if density of medium is $1.5kg/m^3$.

A. $14 \times 10^{-4} Jm^{-3}$

B. $143.2 \times 10^{-4} Jm^{-3}$

C. $14.3 \times 10^{-4} Jm^{-3}$

D. $1.43 \times 10^{-4} Jm^{-3}$.

Answer: B

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31. A beaker contains water up to a height h_1 and kerosene of height h_2 above water so that the total height of (water + kerosene) is $(h_1 + h_2)$. Refractive index of water is μ_1 and that of kerosene is μ_2 . The apparent shift in the position of the bottom of the beaker when viewed from above is :-

A. $\left(1 - \frac{1}{\mu_1}\right)h_2 + \left(1 - \frac{1}{\mu_2}\right)h_1$

B. $\left(1 + \frac{1}{\mu_1}\right)h_1 + \left(1 + \frac{1}{\mu_2}\right)h_2$

C. $\left(1 - \frac{1}{\mu_1}\right)h_1 + \left(1 - \frac{1}{\mu_2}\right)h_2$

D. $\left(1+\frac{1}{\mu_1}\right)h_2-\left(1+\frac{1}{\mu_2}\right)h_1.$

Answer: C

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32. The Young's double slit experiment is carried out with light of wavelength 5000Å. The distance between the slits is $0.2mm$ and the screen is at $200cm$ from the slits. The central maximum is at $y=0$. The third maximum will be at y equal to

A. 1.67 cm

B. 1.5 cm

C. 0.5 cm

D. 5.0 cm

Answer: B

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33. At a point on the right bisector of a magnetic dipole the magnetic potential

A. potential varies as $\frac{1}{r_2}$

B. potential is zero at all points on the right bisector

C. field varies as r^2

D. field is perpendicular to the axis of dipole

Answer: A

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34. The angular width of the central maximum of the diffraction patternn in a single slit (of width a) experiment, with λ as the wavelenth of light, is

A. $\frac{3\lambda}{2a}$

B. $\frac{\lambda}{2a}$

C. $\frac{2\lambda}{a}$

D. $\frac{\lambda}{a}$

Answer: C

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35. In fog, photographs of the objects taken with infrared radiations are more clear than those obtained during visible light because

A. I-R radiation has lesser wavelenth that visible radiation

B. scattering of I-R light is more than visible light

C. the intensity of I-R light from the object is less

D. scattering of I-R light is less than visible light.

Answer: D

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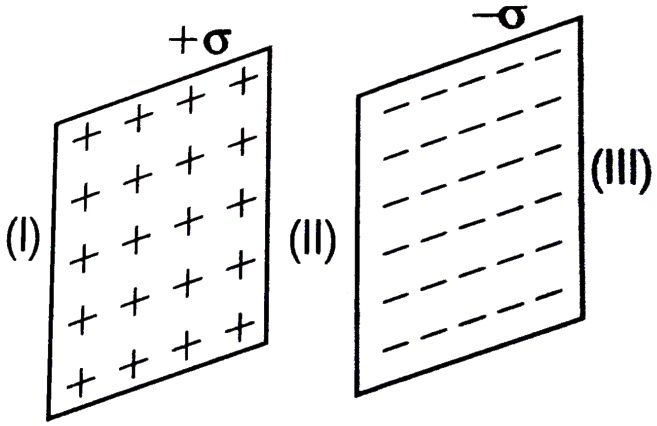
36. Find the electric field in region II as in figure shown.



A. zero

B. $\frac{\sigma}{4\pi\varepsilon_0}$

C. $\frac{\sigma}{\varepsilon_0}$

D. infinite

Answer: C

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37. A wire of 50 cm long, $1mm^2$ in cross-section carries a current of 4 A, when connected to a 2 V battery, the resistivity of wire is

A. $2 \times 10^7 \Omega - m$

B. $5 \times 10^{-7} \Omega - m$

C. $4 \times 10^{-6} \Omega - m$

D. $1.6 \times 10^7 \Omega - m$

Answer: D

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38. A γ-ray photon is passing near a nucleus and breaks into an electron and positron. The region contains a uniform magnetic field B perpendicular to the plane of motion. Find the time after which they again converted into γ-ray. The force of electrostatic interaction and gravitational interaction may be neglected

A. $\frac{2\pi m}{eB}$

B. $\frac{\pi m}{2eB}$

C. $\frac{4\pi m}{eB}$

D. none of these

Answer: A

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39. The frequency f of vibrations of a mass m suspended from a spring of spring constant k is given by $f = Cm^x k^y$, where C is a dimensionnless constant. The values of x and y are, respectively,

A. $1/2, 1/2$

B. $-1/2, 1/2$

C. $1/2, \ -1/2$

D. $-1/2, \ -1/2$

Answer: B

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40. The magnetic flux ϕ (in weber) in a closed circuit of resistance 10Ω varies with time t (in secnod) according to equation

$\phi = 6t^2 - 5t + 1$. The magnitude of induced current at $t = 0.25$ s is

A. 1.2

B. 0.8 A

C. 0.6 A

D. 0.2 A

Answer: D

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41. The enegy of photon corresponding to a radiatio of wavelength 600 nm is $3.32 \times 10^{-19} J$. The energy of a photon corresponding to a wavelength of 400 nm is

A. $2.22 \times 10^{-19} J$

B. $4.44 \times 10^{-19} J$

C. $1.11 \times 10^{-19} J$

D. $4.98 \times 10^{-19} J$

Answer: D

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42. Calculate the angular momentum of the electron in third orbit of hydrogen atom,if the angular momentum in the second orbit of hydrogen atom is L.

A. L

B. 3L

C. $\frac{3}{2}L$

D. $\frac{2}{3}L$

Answer: C

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43. The half-life of a radioactive substance is 10 days. The time taken for the $\left(\frac{7}{8}\right)$th of the sample of disintegrates is

A. 20 days

B. 30 days

C. 40 days

D. 80 days

Answer: B

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44. The current amplificationn factor for a transistor in its common emitter mode is 50. the current amplication factor in the common base mode of the transistor is

A. 0.99

B. 0.98

C. 1.02

D. 10

Answer: B

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