PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 08

Paper 1 Objective Type

1. The physical quantity which isnot a unit of energy is

A. Volt-Coulomb

B. MeV-s

C. Henry$(\mathrm{ampere})^2$

D. Farad-$(\mathrm{volt})^2$

Answer: B

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2. A particle of mass m is moving in a circular path of constant radius r such that its centripetal acceleration a_c is varying with the

time t as

$$a_c = k^2 r^3 t^4$$

where k is a constant. The power delivered to

the particle by the forces acting on it is

A. $\dfrac{1}{3}mk^2r^4t^5$

B. mk^2r^2t

C. $2mk^2r^4t^3$

D. zero

Answer: C

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3. Find ratio of acceleration due to gravity g at depth d and at height h where $d = 2h$

A. $1:1$

B. $1:2$

C. $2:1$

D. $1:4$

Answer: A

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4. If error in radius is 3% whast is error in volume of sphere?

A. 0.03

B. 0.27

C. 0.09

D. 0.06

Answer: C

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5. A body rolls without slipping. The radius of gyration of the body about an axis passing through its centre of mass is K. The radius of the body is R. The ratio of rotational kinetic energy to translational kinetic energy is.

A. $\dfrac{K^2}{R^2}$

B. $\dfrac{R^2}{K^2 + R^2}$

C. $\dfrac{K^2}{K^2 + R^2}$

D. $\left(K^2 + R^2\right)$

Answer: A

6. The square of resultant of two equal forces is three times their product. Angle between the force is

A. π

B. $\dfrac{\pi}{2}$

C. $\dfrac{\pi}{4}$

D. $\dfrac{\pi}{3}$

Answer: D

7. A mass of 1 kg is suspended from a spring. Its time period of oscillation on the earth is T. What will be its time periods at the centre of the earth?
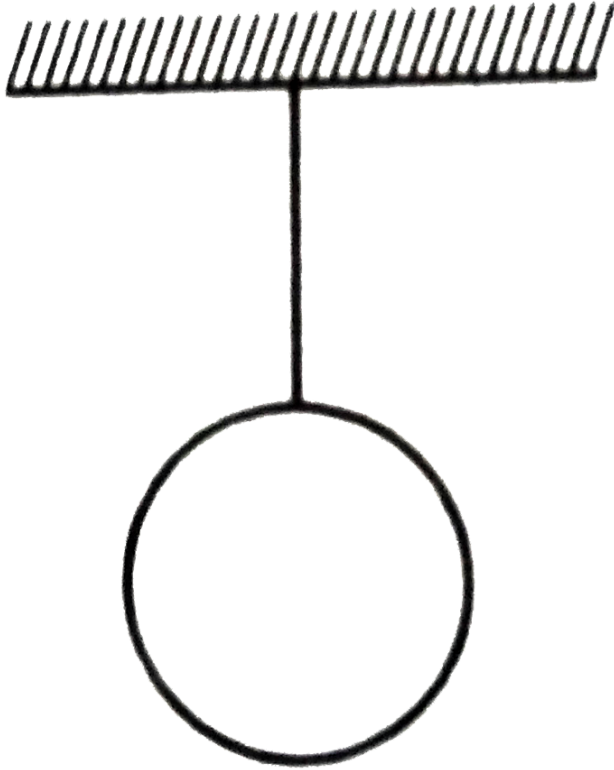
A. Zero

B. T

C. $2T$

D. Infinite

Answer: B

8. A bob of pendulum was filled with Hg and entire Hg is drained out, then the time period

of pendulum

A. remains unchanged

B. decreases

C. increases

D. increases then decreases

Answer: D

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9. A motorboat covers a given distance in $6h$ moving downstream on a river. It covers the same distance in $10h$ moving upstream. The time it takes to cover the same distance in still water is
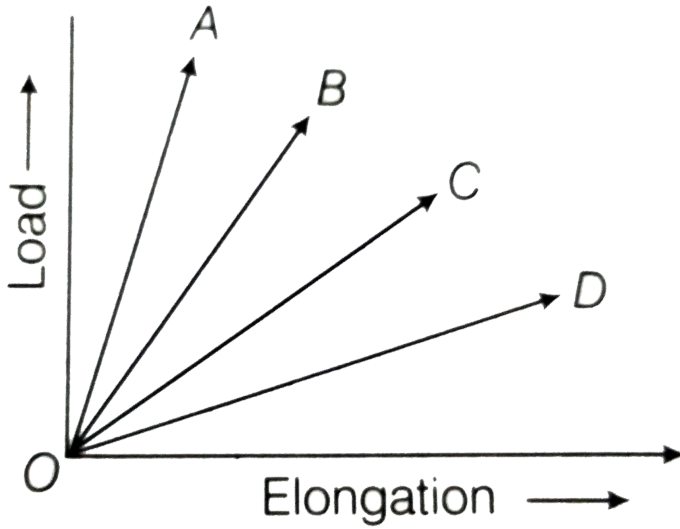
A. $9h$

B. $7.5h$

C. $6.5h$

D. $8h$

Answer: B

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10. The load versus elongation graph of four wires of same length and the same material as shown in the figure. The thinest wire is

represented by the line

A. OD

B. OB

C. OC

D. OA

Answer: A

11. A thin metal disc of radius r floats on water surface and bends the surface downwards along the perimeter making an angle θ with vertical edge of the disc. If the disc displaces a weight of water W and surface tension of water is T, then the weight of metal disc is :

A. $2\pi rT \cos \theta$

B. $2\pi rT$

C. $2\pi rT \cos \theta + w$

D. $2\pi r T \cos \theta - ww$

Answer: C

12. A soap bubble of radius r is placed on another bubble of radius $2r$. The radius of the surface common to both the bubbles is

    A. $2r$ concave towards P

    B. $2r$ concave towards Q

C. $3r$ concave towards P

D. $3r$ concave towards Q

Answer: A

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13. When both the listener and source are moving towards each other, then which of the following is true regarding frequency and wavelength of wave obserseved by the observer?

A. More frequency, less wavelength

B. More frequency, more wavelength

C. Less frequency , less wavelength

D. More frequency, constant wavelength

Answer: A

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14. The neck and bottom of a bottle are 3 cm and 15 cm in radius respectively. If the cork is pressed with a force 12 N in the neck of the

bottle, then force exerted on the bottom of the bottle is :-

A. $30N$

B. $150N$

C. $300N$

D. $600N$

Answer: C

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15. A wave of length $2m$ is superimposed on its reflected wave to form a stationary wave. A node is located at $x = 3m$, the next node will be located at x equals to

    A. 3.25 m

    B. 3.50 m

    C. 3.75 m

    D. 4m

Answer: D

16. Two gases A and B having the same temperature T, same pressure P and same volume V are mixed. If the mixture is at the same temperature and occupies a volume V. The pressure of the mixture is

A. $p/2$

B. p

C. $2p$

D. $4p$

Answer: C

17. A liquid of density $800 kgm^{-3}$ is filled in a tank open at the top. The pressure of the liquid at the bottom of the tank is 6.4 atm. The velocity of efflux through a hole at the bottom is (1 atm $= 10^4 Nm^{-2}$)

    A. $10ms^{-1}$

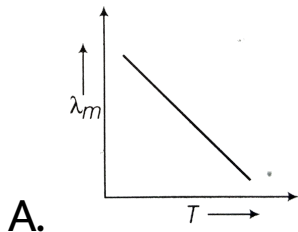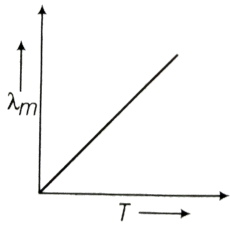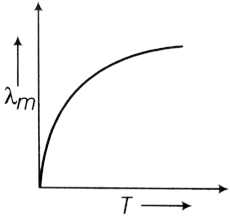   B. $20ms^{-1}$

C. $30ms^{-1}$

D. $40ms^{-1}$

Answer: D

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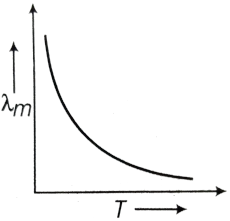**18.** Which of the following is the $\lambda_m - T$ graph for a perfectly blask body?

A.

B.

C.

D.

Answer: D

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19. The momentum of photon of electromagnetic radiation is $3.3 \times 10^{-29} kgms^{-1}$. What is the frequency and wavelength of the waves associated with it ? $h = 6.6 \times 10^{-34} Js$.

A. $7.5 \times 10^{12} Hz$

B. $1.5 \times 10^{13} Hz$

C. $6 \times 10^{10} Hz$

D. $3 \times 10^{-2} Hz$

Answer: B

20. The refractive index of water is 4 / 3 and that of glass is 5/3. What will be the critical angle for the ray of light entering water from the glass

A. $\sin^{-1}\left(\dfrac{3}{4}\right)$

B. $\sin^{-1}\left(\dfrac{3}{5}\right)$

C. $\sin^{-1}\left(\dfrac{4}{5}\right)$

D. Data given is insufficient

Answer: C

21. In Young's double slits experiment, light of wavelength 4000Å is used to produced bright fringes of width 0.6 mm, at a distance of $2m$. If the whole apparatus is dipped in a liquid of refractive index 1.5, then the fringe width will be

A. $0.2mm$

B. $0.3mm$

C. $0.4mm$

D. $1.2mm$

Answer: C

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22. The resolving power of a telescope whose lens has a diameter of 1.22 m for a wavelength of 5000Å is

A. 2×10^5

B. 2×10^6

C. 2×10^2

D. 2×10^4

Answer: B

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23. A meter bridge is balanced by putting 20π resistance in the left gap and 40π in the right, gap, if 40π resistance is now shunted with 40π

resistance the shift in the null point towards right is nearly

A. 16.67 cm

B. 50 cm

C. 25 cm

D. 70.67 cm

Answer: A

24. An air capacitor of capacity $C = 10\mu F$ is connected to a constant voltage battery of $12V$. Now the space between the plates is filled with a liquid of dielectirc constant 5. The charge that flows now from battery to the capacitor is

A. $40\mu C$

B. $480\mu C$

C. $600\mu C$

D. $120\mu C$

Answer: B

25. Calculate amount of charge flow, when a conducting sphere of radius R and carrying a charge Q, is joined to an uncharged conducting sphere of radius 2R.

A. $\dfrac{q}{4}$

B. $\dfrac{q}{3}$

C. $\dfrac{q}{2}$

D. $\dfrac{2q}{3}$

Answer: D

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26. The inward and outward electric flux for a closed surface unit of $N - m^2/C$ are respectively 8×10^3 and 4×10^3. Then the total charge inside the surface is [where $\varepsilon_0 = $ permittivity constant]

A. $\dfrac{-4 \times 10^3}{\varepsilon_0} C$

B. $-4 \times 10^3 \varepsilon_0 C$

C. $-4 \times 10^3 C$

D. $\dfrac{12 \times 10^3}{\varepsilon_0} C$

Answer: B

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27. A cell in the secondary circuit gives null deflection for 2.5 m length of a potentiometer having 10m length of wire. If the length of the potentiometer wire is increased by 1m without

changing the cell in the primary, the position

of the null point wil be

A. 3.5m

B. 3m

C. 2.75m

D. 2.0m

Answer: C

28. A galvanometer having a reisstance 12Ω gives a full scale deflection for a current f $2.5mA$. It is converted into a voltmeter of range $10V$, what is the net resistasnce of the galvanometer?

    A. 3898Ω

    B. 4000Ω

    C. 4Ω

    D. 0.25Ω

Answer: B

29. A person is sitting in a lift acceleration upwards, Measured weight of person will be

    A. less than actual weight

    B. equal to actual weight

    C. more than actual weight

    D. None of the above

Answer: C

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30. A proton is moving in uniform magnetic field B in a circular path of radius a in a direction perpendicular to Z-axis along which field B exists. Calculate the angular momentum, if the radius is a charge on proton is e

A. $\dfrac{Be}{a^2}$

B. eB^2a

C. a^2eB

D. aeB

Answer: C

31. A bullet of mass 10 g moving with $300m/s$ hits a block of ice of mass 5 kg and drops dead. The velocity of ice is

A. $50cm/s$

B. $60cm/s$

C. $40cm/s$

D. $200cm/s$

Answer: B

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32. A North pole of $40A - m$ is palced 20 cm apart from a South pole of $80A - m$. Calculate the distance of a point from the Sourth pole on the line joining the two poles

where the resultant field due to these poles is

zero

A. 8.2 cm towards Northh pole

B. 8.2 cm away from North pole

C. 48.2 cm towards North pole

D. 48.2 cm away from North pole

Answer: C

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33. Wires A and B are made from the same material. A has twice the diameter and three times the length of B. If the elastic limits are not reached, when each is stretched by the same tension, the ratio of energy stored in A to that in B is

A. $2:3$

B. $3:4$

C. $3:2$

D. $6:1$

Answer: B

34. A point source of light is placed 4 m below the surface of water of refractive index $5/3$. The minimum diameter of a disc, which should be placed over the source, on the surface of water to cut-off all light coming out of water is
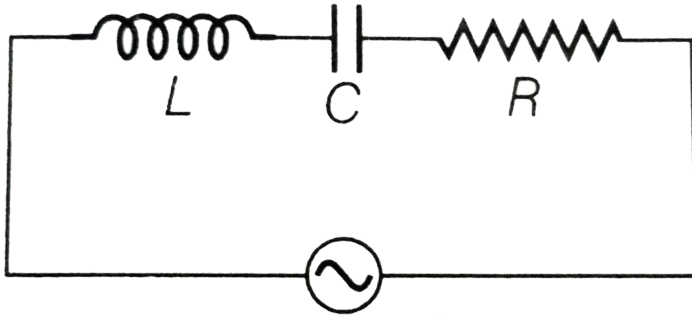
A. infinite

B. 6m

C. 4m

D. 3m

Answer: B

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35. A $100V$, aC source of frequency of $500Hz$ is

connected to an L-C-LR circuit with

$L = 8.1mH, C = 12.5\mu F, R = 10\Omega$ all

connected in series as shown in figure. What is

the quality factor of circuit?

A. 2.02

B. 2.5434

C. 20.54

D. 200.54

Answer: B

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36. In an ideal transformer, the voltage and current in the primary are $200V$ and 2 A respectively and voltage in secondary is $2000V$. The value of the current in secondary is

A. $0.2A$

B. $10A$

C. $1A$

D. $20A$

Answer: A

37. The energy difference between the first two levels of hydrogen atom is $10.2 eV$. For another element of atomic number 10 and mass number 20, this will be

A. 1020eV

B. 2040eV

C. 0.51eV

D. 0.102eV

Answer: A

38. A steel wire 0.5 m long has a total mass of 0.02 kg and is stretched with a tension of $800N$. The frequency when it vibrates in its fundamental mode is

  A. $2Hz$

  B. $141Hz$

  C. $100Hz$

D. $200 Hz$

Answer: B

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39. Energy E of a hydrogen atom with principle quantum number n is given by $E = \dfrac{-13.6}{n^2} eV$. The energy of a photon ejected when the electron jumps from $n = 3$ state to $n = 2$ state of hydrogen is approximately

A. $1.5eV$

B. $0.85eV$

C. $3.3eV$

D. $1.9eV$

Answer: D

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40. A convex lens has its radi of curvature equal. The focal length of the lens is f. It is is dividded vertically into two identical plano-

convex lenses by cutting it, then the focal length of the plane -convex lens is ($\mu =$ the refractive index of the material of the lens)

A. f

B. $\dfrac{f}{2}$

C. $2f$

D. $(\mu - 1)f$

Answer: C

41. An organ pipe closed at one end has fundamental frequency of $1500 hz$. The maximum number of overtones generated by the pipe which is normal person can hear is

A. 4

B. 12

C. 6

D. 9
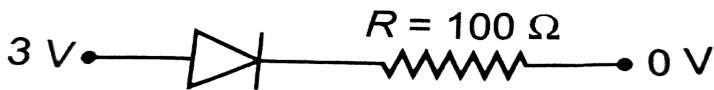
Answer: C

42. Assuming that the silicon diode (having negligible resistance) the current through the diode is (knee voltage of silicon diode is $0.7V$)
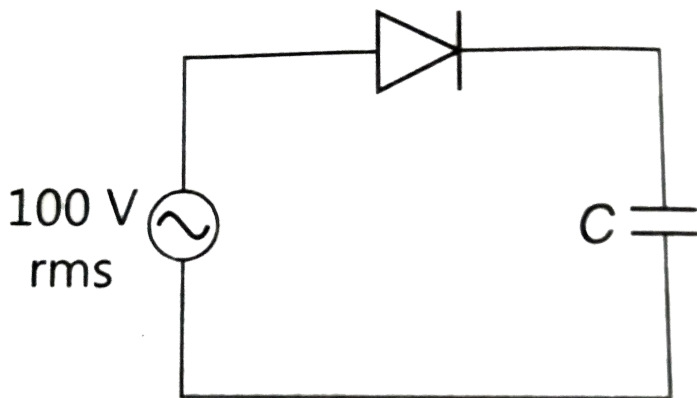
$$3 \text{ V} \longrightarrow\!\!\!\triangleright\!\!\!\mid\!\!\!-\!\!\!\overset{R = 100\ \Omega}{\text{\small www}}\!\!\!- 0 \text{ V}$$

A. zero

B. $7mA$

C. $2.3mA$

D. $23mA$

Answer: D

43. A sinusoidal voltage of rms value $100V$ is connected to an ideal function diode as shown in figure. The final potential difference across the capacitor will be

100 V rms

A. $100V$

B. $100\sqrt{2}V$

C. $50\sqrt{2}V$

D. Zero

Answer: C

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44. A stationary wave $y = 0.4\sin\dfrac{2\pi}{40}\cos 100\pi t$

is produced in string fixced of both ends. The

minimum possible length of the string is given by

A. $10m$

B. $20\sqrt{2}m$

C. $20m$

D. $28m$

Answer: C

45. A sonometer wire resonates with a given tuning fork forming a standing wave with five antinodes between the two bridges when a mass of $9kg$ is suspended from the wire. When this mass is replaced by a mass 'M' kg, the wire resonates with the same tuning fork forming three antinodes for the same positions of the bridges. Find the value of M.

A. $25kg$

B. $5kg$

C. $12.5kg$

D. $\dfrac{1}{25}kg$

Answer: A

46. If a ladder weighting $250N$ is placed against a smooth vertical wall having coefficient of friction between it and floor 0.3, then what is the maximum force of friction available at the point of contact between the ladder and the floor?

A. $75m$

B. $50m$

C. $35m$

D. $25M$

Answer: A

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47. Four waves A, B, C, D of frequencies 6 MHz.

8 MHz, 10 MHz and 4 MHz respectively are

beamed in the same direction, communicate

via sky waves. Which one of these is likely travel the longest distance in the ionosphere before suffering total internal reflection ?

A. A

B. B

C. C

D. D

Answer: C

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48. Two identical capacitors, have the same capacitance C. One of them is charged to potential V_1 and the other V_2. The negative ends of the capacitors are connected together. When the poistive ends are also connected, the decrease in energy of the combined system is

A. $\dfrac{1}{4}C(V_1^2 - V_2^2)$

B. $\dfrac{1}{4}C(V_1^2 + V_2^2)$

C. $\dfrac{1}{4}C(V_1 - V_2)^2$

D. $\dfrac{1}{4}C(V_1 + V_2)^2$

Answer: C

49. For a certain metal, incident frequency v is five times of threshold frequency v_0 and the maximum velocity of coming out photoelectrons is $8 \times 10^6 \frac{m}{s}$. If the maximum velocity of photoelectrons will be

    A. $4 \times 10^6 m/s$

    B. $6 \times 10^6 m/s$

C. $8 \times 10^6 m/s$

D. $1 \times 10^6 m/s$

Answer: A

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50. A simple pendulum is set into vibrations. The bob of the pendulum comes to rest after sometime due to

A. air friction

B. moment of inertia

C. weight of the bob

D. combination of all the above

Answer: A

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