



# PHYSICS

## BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

### MHTCET 2009

#### Physics

1. A long wire carries a steady current . It is bent into a circle of one turn and the magnetic field

at the centre of the coil is  $B$ . It is then bent into a circular loop of  $n$  turns. The magnetic field at the centre of the coil will be

A.  $nB$

B.  $n^2 B$

C.  $2nB$

D.  $2n^2 B$

**Answer: B**



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2. Three capacitor of capacitance  $C(\mu F)$  are connected in parallel to which a capacitor of capacitance  $C$  is connected in series. Effective capacitance is 3.75. then capacity off each capacitor is

A.  $4\mu F$

B.  $4\mu F$

C.  $6\mu F$

D.  $8\mu F$

**Answer: B**



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3. In single slit diffraction pattern :

A. central fringe has negligible width than others

B. all fringes are of same width

C. central fringes do not exists

D. None of the above

**Answer: D**



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4. On applying an external magnetic field , to a ferromagnetic substance domains

A. align in the direction of magnetic field

B. align in the direction opposite to magnetic field

C. remain unaffected

D. None of the above

**Answer: A**



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5. A particle performing SHM has time period  $\frac{2\pi}{\sqrt{3}}$  and path length 4 cm. The displacement from mean position at which acceleration is equal to velocity is

A. 0 cm

B. 0.5 cm

C. 1 cm

D. 1.5 cm

**Answer: C**



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6. In a good conductor the energy gap between the conduction band and the valence band is

A. 0

B.  $4\text{\AA}$

C.  $10\text{\AA}$

D.  $100\text{\AA}$

**Answer: A**



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7. Beats are produced by two waves given by

$y_1 = a \sin 2000\pi t$  and  $y_2 = a \sin 2008\pi t$ . The

number of beats heard per second is

A. zero

B. one

C. four

D. eight



**Answer: C**



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8. A 2 volt battery, a  $15\Omega$  resistor and a potentiometer of  $100\text{cm}$  length, all are connected in series. If the resistance of potentiometer wire is  $5\Omega$ , then the potential gradient of the potentiometer wire is

A.  $0.05\text{Vm}^{-1}$

B.  $0.5Vm^{-1}$

C.  $0.01Vm^{-1}$

D.  $0.1Vm^{-1}$

**Answer: C**



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**9.** The temperature at which thermal electric power of a thermo couple becomes zero is called

- A. temperature of inversion
- B. temperature of cold junction
- C. neutral temperature
- D. None of the above

**Answer: A**



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**10.** The temperature at which the *rms* speed of air molecules is double of that at *STP* is

A.  $819^{\circ} C$

B.  $719^{\circ} C$

C.  $909^{\circ} C$

D. None of these

**Answer: A**



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**11.** In a resonance pipe the first and second resonance are obtained at depths 22.7 cm and

70.2 respectively. What will be the end correction?

A. 1.05 cm

B. 115.5 cm

C. 92.5 cm

D. 113.5 cm

**Answer: A**



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12. Find the magnitude of the electric field at a point 4 cm away from a line charge of density  $2 \times 10^{-6} \text{ C m}^{-1}$ .

A.  $4 \times 10^5 \text{ NC}^{-1}$

B.  $2 \times 10^6 \text{ NC}^{-1}$

C.  $8 \times 10^7 \text{ NC}^{-1}$

D.  $12 \times 10^7 \text{ NC}^{-1}$

**Answer: B**



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13. A ray of light is incident on a medium boundary at polarising angle such that its deviation is  $24^\circ$ , then angle of incidence is :

A.  $24^\circ$

B.  $57^\circ$

C.  $66^\circ$

D.  $90^\circ$

**Answer: B**



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14. At a certain instant a stationary transverse wave is found to have maximum kinetic energy.

The appearance of string at that instant is

A. sinusoidal shape with amplitude  $A/3$

B. sinusoidal shape with amplitude  $A/2$

C. sinusoidal shape with amplitude  $A$

D. Straight line .

**Answer: D**



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15. If angle of incidence is twice the angle of refraction in a medium of refractive index  $\mu$  , then angle of incidence is

A.  $2 \cos^{-1} \frac{\mu}{2}$

B.  $2 \sin^{-1} \frac{\mu}{2}$

C.  $2 \cos^{-1} \mu$

D.  $2 \sin^{-1} \mu$

**Answer: A**



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16. The moments of inertia of two rotating bodies A and B are  $I_A$  and  $I_B$ . ( $I_A > I_B$ ) and their angular momenta are equal. Which one has greater  $K. E.$  ?

A.  $K_A = K_B$

B.  $K_A \neq K_B$

C.  $K_A < K_B$

D.  $K_A = 2K_B$

**Answer: C**



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17. In a satellite if the time of revolution is  $T$ , then kinetic energy is proportional to

A.  $\frac{1}{T}$

B.  $\frac{1}{T^2}$

C.  $\frac{1}{T^3}$

D.  $T^{-2/3}$

**Answer: D**



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18. Moment of inertia of big drop is  $I$ . If 8 droplets are formed from big drop, then moment of inertia of small droplet is

A.  $\frac{I}{32}$

B.  $\frac{I}{16}$

C.  $\frac{I}{8}$

D.  $\frac{I}{4}$

**Answer: A**



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19. Moment of inertia of a rod of mass  $M$  and length  $L$  about an axis passing through a point midway between centre and end is

A.  $\frac{ML^2}{6}$

B.  $\frac{ML^2}{12}$

C.  $\frac{7ML^2}{24}$

D.  $\frac{7ML^2}{48}$

**Answer: D**



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20. Ratio of kinetic energy at mean position to potential energy at  $A/2$  of a particle performing SHM

A. 2:1

B. 4:1

C. 8:1

D. 1:1

**Answer: B**



21. A long solenoid of length  $L$  has a mean diameter  $D$ . It has  $n$  layers of windings of  $N$  turns each. If it carries a current ' $i$ ' the magnetic field at its centre will be

- A. proportional to  $D$
- B. inversely proportional to  $D$
- C. independent of  $D$
- D. proportional to  $L$

**Answer: C**



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**22.** To what temperature should the hydrogen at  $327^{\circ}C$  be cooled at constant pressure, so that the root mean square velocity of its molecules become half of its previous value?

A.  $-123^{\circ}C$

B.  $123^{\circ}C$

C.  $-100^{\circ}C$



D.  $0^\circ C$

**Answer: A**



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**23.** The change in energy when a big drop is split into small  $n$  droplets is

A.  $4R^2 \left( n^{2/3} - 1 \right) T$

B.  $4\pi R^2 \left( n^{1/3} - 1 \right) T$

C.  $4\pi R^2 \left( n^{-1/3} - 1 \right) T$

$$D. 4\pi R^2 \left[ n^{-2/3} - 1 \right] T$$

**Answer: B**



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**24.** If dielectric is inserted in charged capacitor ( battery removed ), then quantity that remains constant is

A. capacitance

B. potential

C. intensity

D. charge

**Answer: D**



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**25.** In an interference experiment, third bright fringe is obtained at a point on the screen with a light of 700 nm . What should be the wavelength of the light source in order to obtain 5th bright fringe at the same point

A. 500 m

B. 630 nm

C. 750 nm

D. 420 nm

**Answer: D**



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**26.** The ratio of angular speeds of minute hand and hour hand of a watch is

A. 1 : 12

B. 6 : 1

C. 12 : 1

D. 1 : 6

**Answer: C**



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**27.** Fundamental frequency of pipe is 100 Hz and other two frequencies are 300 Hz and 500 Hz then

A. pipe is open at both the ends

B. pipe and closed at both the ends

C. one end is open and another end is closed

D. None of the above

**Answer: C**



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28. The radius of hydrogen atom in its ground state is  $5.3 \times 10^{-11}m$ . After collision with an electron it is found to have a radius of  $21.2 \times 10^{-11}m$ . The principal quantum number of the final state of the atom is.

A.  $n=4$

B.  $n=4$

C.  $n=16$

D.  $n=3$

**Answer: B**



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**29.** The length of an elastic string is a metre when the longitudinal tension is 4 N and  $b$  metre when the longitudinal tension is 5 N. The length of the string in metre when the longitudinal tension is 9 N is

A.  $a - b$

B.  $5b - 4a$

C.  $2b - \frac{1}{4}a$



$$D. 4a - 3b$$

**Answer: B**



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**30.** In photoelectric effect if the intensity of light is doubled then maximum kinetic energy of photoelectrons will become

A. double

B. half

C. four times

D. no change

**Answer: D**



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**31.** In LED visible light is produced by

A. gallium phosphide

B. gallium arsenide

C. germanium phosphide

D. silicon phosphide

**Answer: B**



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**32.** The waves which are reflected back to the earth by ionosphere is

A. ground wave

B. sky wave

C. space wave

D. All of them

**Answer: B**



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**33.** From a disc of radius  $R$ , a concentric circular portion of radius  $r$  is cut out so as to leave an annular disc of mass  $M$ . The moment of inertia of this annular disc about the axis perpendicular to its plane and passing through its centre of gravity is

A.  $\frac{1}{2}M(R^2 + r^2)$

B.  $\frac{1}{2}M(R^2 - r^2)$

C.  $\frac{1}{2}M(R^4 + r^4)$

D.  $\frac{1}{2}M(R^4 - r^4)$

**Answer: A**



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**34.** A 5 m long aluminium wire

$\left( Y = 7 \times 10^{10} \frac{N}{m^2} \right)$  of diameter 3 mm

supprts a 40 kg mass. In order to have the same elongation in a copper wire  $\left( Y = 12 \times 10^{10} \frac{N}{m^2} \right)$  of the same length under the same weight, the diameter should now, in mm

A. 1.75

B. 1.5

C. 2.5

D. 5.0

**Answer: C**



**35.** For a given material, Young's modulus is 2.4 times that of rigidity modulus. Its Poisson's ratio is

A. 2.4

B. 1.2

C. 0.4

D. 0.2

**Answer: D**



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**36.** If you set up the seven overtone on a string fixed at both ends, how many nodes and antinodes are set up in it ?

A. 6,5

B. 5,4

C. 4,3

D. 3,2

**Answer: C**





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37. A car is moving with speed  $30m/sec$  on a circular path of radius  $500\text{ m}$  . Its speed is increasing at the rate of ,  $2m/sec^2$ , What is the acceleration of the car

A.  $2ms^{-2}$

B.  $2.7ms^{-2}$

C.  $1.82ms^{-2}$

D.  $9.82ms^{-2}$

**Answer: B**



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**38.** A particle of mass  $m$  is rotating in a plane in circular path of radius  $r$ . Its angular momentum is  $L$ . The centripetal force acting on the particle is

A.  $\frac{L^2}{mr}$

B.  $\frac{L^2 m}{r}$

C.  $\frac{L^2}{m^2 r^2}$

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

**Answer: D**



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**39.** The unit of Wien 's constant  $b$  is

A.  $Wm^{-2}K^{-4}$

B.  $m^{-1}K^{-1}$

C.  $Wm^2$

D.  $m - K$

**Answer: D**



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**40.** If  $\rho$  is the density of the planet , the time period of nearby satellite is given by

A.  $\sqrt{\frac{4\pi}{3G\rho}}$

B.  $\sqrt{\frac{4\pi}{G\rho}}$

C.  $\sqrt{\frac{3\pi}{G\rho}}$

D.  $\sqrt{\frac{\pi}{G\rho}}$

**Answer: C**



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**41.** If fringe width is 0.4 mm, the distance between fifth bright and third dark band on same side is

A. 1 mm

B. 2 mm

C. 3 mm

D. 4 mm

**Answer: A**



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**42.** If 150 J of energy is incident on area  $2m^2$  . If  $Q_r = 15J$ , coefficient of absorption is 0.6 , then amount of energy transmitted is

A. 50 J

B. 45 J

C. 40 J

D. 30 J

**Answer: B**



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**43.** If an electron is revolving around the hydrogen nucleus at a distance of 0.1 nm, what should be its speed?

A.  $2.188 \times 10^6 \text{ m s}^{-1}$

B.  $1.094 \times 10^6 \text{ m s}^{-1}$

C.  $4.376 \times 10^6 \text{ m s}^{-1}$

D.  $1.529 \times 10^6 \text{ m s}^{-1}$

**Answer: D**



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**44.** If a simple pendulum oscillates with an amplitude of 50 mm and time period of 2 sec, then its maximum velocity is

A.  $0.10ms^{-1}$

B.  $0.15ms^{-1}$

C.  $0.8ms^{-1}$

D.  $0.26ms^{-1}$



**Answer: B**



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**45.** In hydrogen atom, the electron is making  $6.6 \times 10^{15} \text{ rev/sec}$  around the nucleus in an orbit of radius  $0.528 \text{ \AA}$ . The magnetic moment  $(\text{A}\cdot\text{m}^2)$  will be

A.  $1 \times 10^{-15}$

B.  $1 \times 10^{-10}$

C.  $1 \times 10^{-23}$

D.  $1 \times 10^{-27}$

**Answer: C**



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**46.** Same current is flowing in two alternating circuits. The first circuit contains only inductances and the other contains only a capacitor, if the frequency of the e.m.f of AC is increased, the effect on the value of the current will be

- A. increased in the first circuit and  
decreases in the other
- B. increases in both the circuits
- C. decreases in both the circuits
- D. decreases in the first circuit and  
increases in the other

**Answer: D**



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47. In an  $AC$  circuit, the instantaneous values of e.m.f and current are  $e = 200 \sin 314t$  volt and  $i = \sin\left(314t + \frac{\pi}{3}\right)$  ampere. The average power consumed in watt is

A. 200

B. 100

C. 50

D. 25

**Answer: C**



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48. The periodic time of a particle doing simple harmonic motion is 4 second . The time taken by it to go from its mean position to half the maximum displacement (amplitude) is

A.  $2s$

B.  $1s$

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

D.  $\frac{1}{3}s$

**Answer: D**



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**49.** For the Bohr's first orbit of circumference  $2\pi r$ , the de - Broglie wavelength of revolving electron will be

A.  $2\pi r$

B.  $\pi r$

C.  $\frac{1}{2\pi r}$

D.  $\frac{1}{4\pi r}$

**Answer: A**



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**50.** An alternating voltage

$E = 200\sqrt{2}\sin(100t)$  is connected to a 1 microfarad capacitor through an AC ammeter.

The reading of the ammeter shall be

A. 10 mA

B. 20 mA

C. 40 mA

D. 80 mA

**Answer: B**



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