PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2008

Physics

1. Nickel shows ferromagnetic property at room temperature. If the temperature is

increased beyond curie temperature, then it will show

A. Paramagnetism

B. anti-ferromagnetism

C. no magnetic property

D. diamagnetism

Answer: A

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2. In radioactive decay process, the negatively changed emitted $\beta -$ particle are

A. the electrons present inside the nucleus

B. the electrons produced as a result of the decay of neutrons inside the nucleus

C. the electrons produced as a result of collision between atoms

D. the electrons orbiting around the nucleus

Answer: B

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3. What is the value of inductance L for which the current is a maximum in series LCR circuit with $C = 10\mu F$ and $\omega = 1000\frac{rad}{s}$?

A. 100 mH

B. 1 mH

C. Cannot be calculated unless R is unknow

D. 10 mH

Answer: A

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4. The resistance of an ammeter is 13Ω and its scale is graduated for a current upto $100A$. After an additional shunt has been connected to this ammeter it becomes possible to measure currents upto $750A$ by this meter. The value of shunt resistance is

A. 20Ω

B. 2Ω

C. 0.2Ω

D. $2k\Omega$

Answer: B

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5. Under the influence of a unifrom magnetic field a charged particle is moving on a circle of radius R with Constnant speed v. The time period of the motion

A. depends on v and not on R

B. depends on both R and v

C. is independent of both R and v

D. depends on R and not on v

Answer: C

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6. A transformer is used to light a $100W$ and $110V$ lamp from a $220V$ mains. If the main

current is $0.5A$, the Efficiency of the transformer is approximately:

A. $30\ \%$

B. $50\ \%$

C. $90\ \%$

D. $10\ \%$

Answer: C

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7. In mass spectrometer used for measuring the masses of ions, the ions are initaily accerlerated by an electric potential V and then made to describe semicircular paths of radius R using a magnetic field B.if V and B are kept constant, the ratio $\left(\frac{\text{charge on the ion}}{\text{mass of the ion}}\right)$ will be propertional to:

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

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

C. R^2

D. R

Answer: B

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8. Two satellites of earth S_1 and S_2 are moving in the same orbit. The mass of S_1 is four times the mass of S_2. Which one of the following statements is true?

A. The time period of S_1 is four times that of S_2

B. The potential energies of earth and satellite in the two cases are equal

C. S_1 and S_2 are moving with the same speed

D. The kinetic energies of the two satellites are equal

Answer: C

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9. The length of a magnet is large compared to its width and breadth. The time period of its oscillation in a vibration magnetometer is $2s$. The magnet is cut along its length into three equal parts and these parts are then placed on each other with their like poles together . The time period of this combination will be

A. 2s

B. 2/3 s

C. $2\sqrt{3}s$

D. $2/\sqrt{3}s$

Answer: B

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10. When an unpolarized light of intensity I_0 is incident on a polarizing sheet, the intensity of the light which does not get transmitted is

A. $\frac{1}{2}I_o$

B. $\frac{1}{4}I_0$

C. zero

D. I_0

Answer: A

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11. An observer moves towards a stationary source of sound, with a velocity one-fifth of the velocity of sound. What is the percentage increase in the apparent frequency?

A. Zero

B. $0.5\ \%$

C. $5\ \%$

D. $20\ \%$

Answer: D

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12. If M_o is the mass of an oxygen isotope $._8O^{17}$, M_p and M_N are the masses of a

proton and neutron respectively, the nuclear binding energy of the isotope is:

A. $(M_o - 8M_p)c^2$

B. $(M_o - 8M_p - 9M_n)c^2$

C. $M_o c^2$

D. $(M_o - 17M_n)c^2$

Answer: B

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13. A frame made of metalic wire enclosing a surface area A is covered with a soap film. If the area of the frame of metallic wire is reduced by $50\,\%$ the energy of the soap film will be changed by:

A. $100\,\%$

B. $75\,\%$

C. $50\,\%$

D. $25\,\%$

Answer: C

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14. The potential energy of molecule on the surface of a liquid as compared to in side the liquid is

A. zero

B. lesser

C. equal

D. greater

Answer: D

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15. The energy required to charge a parallel plate condenser of plate separtion d and plate area of cross-section A such that the unifom field between the plates is E is

A. $\frac{1}{2}\varepsilon_0 E^2 / Ad$

B. $\varepsilon_0 E^2 / Ad$

C. $\varepsilon_0 E^2 Ad$

D. $\frac{1}{2}\varepsilon_0 E^2 Ad$

Answer: C

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16. A roller coaster is designed such that riders experience "weightlessness" as they go round the top of a hill whose radius of curvature is $20m$. The speed of the car at the top of the hill is between

A. 14 m/s and 15 m/s

B. 15 m/s and 16 m/s

C. 16m/s and 17m/s

D. 13 m/s and 14m/s

Answer: A

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17. The groud state energy of hydrogen atom is $-13.6eV$. When its electron is in first excited state, its exciation energy is

A. 3.4 eV

B. 6.8 eV

C. 10.2 eV

D. zero

Answer: C

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18. A $p-n$ photodiode is made of a material with a band gap of $2.0eV$. The minimum frequency of the radiation that can be absorbed by the material is nearly

A. $10 \times 100^{14} Hz$

B. $5 \times 10^{14} Hz$

C. $1 \times 10^{14} Hz$

D. $20 \times 10^{14} Hz$

Answer: B

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19. Two simple harmonic motions of angular frequency $100 rads^{-1}$ and $1000 rads^{-1}$ have

the same displacement amplitude. The ratio of their maximum accelerations is

A. $1:10$

B. $1:10^2$

C. $1:10^3$

D. $1:10^4$

Answer: B

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20. A cell can be balanced against $110cm$ and $100cm$ of potentiometer wire, respectively with and without being short circuited through a resistance of 10Ω. Its internal resistance is

A. 1.0Ωq

B. 0.5Ω

C. 2.0Ω

D. zero

Answer: A

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21. Two periodic waves of intensities I_1 and I_2 pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities is:

A. $I_1 + I_2$

B. $\left(\sqrt{I_1} + \sqrt{I_2}\right)^2$

C. $\left(\sqrt{I_1} - \sqrt{I_2}\right)^2$

D. $2(I_1 - I_2)$

Answer: D

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22. The velocity of electromagnetic radiatior in a medium of permittivity ε_0 and permeability μ_0 is given by

A. $\sqrt{\frac{\varepsilon_0}{\mu_0}}$

B. $\sqrt{\mu_0 \varepsilon_0}$

C. $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$

D. $\sqrt{\frac{\mu_0}{\varepsilon_0}}$

Answer: C

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23. In any AC circuit the emf (e) and the current (i) at any instant are given respectively by $e = E_0 \sin \omega t$

$i = I_0 \sin(\omega t - \phi)$

The average power in the circuit over one cycle of AC is

A. $\frac{E_0 I_0}{2}$

B. $\frac{E_0 I_0}{2} \sin \phi$

C. $\frac{E_0 I_0}{2} \cos \phi$

D. $E_0 I_0$

Answer: C

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24. A particle of mass m is projected with velocity making an angle of 45° with the horizontal When the particle lands on the

level ground the magnitude of the change in its momentum will be .

A. 2 mv

B. $mv/\sqrt{2}$

C. $mv\sqrt{2}$

D. zero

Answer: C

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25. Two nuclei have their mass numbers in the ratio of $1:3$. The ratio of their nuclear densities would be

A. $1:3$

B. $3:1$

C. $(3)^{1/3}:1$

D. $1:1$

Answer: D

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26. A galvanometer of resistance 50Ω is connected to a battery of $3V$ along with resistance of 2950Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 20 division the above series resistance should be

A. 5050Ω

B. 5550Ω

C. 6050Ω

D. 4450Ω

Answer: D

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27. Two spheres of equal masses, one of which is a thin spheical shelll and the other a solid, have the same moment of inertia about their respective diameters. The ratio of their radii well be

A. $5:7$

B. $3:5$

C. $\sqrt{3}:\sqrt{5}$

D. $\sqrt{3}:\sqrt{7}$

Answer: C

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28. If g is the acceleration due to gravity on the earth's surface, the gain in the potential energy of an object of mass m raised from

surface of the earth to a height equal to radius R of the earth is - [M = mass of earth]

A. 2mgR

B. mgR

C. $\frac{1}{2}$ mgR

D. $\frac{1}{4}$ mgR

Answer: C

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29. A travelling wave in a stretched string is described by the equation $y = A\sin(kx - \omega t)$ the maximum particle velocity is

A. $A\omega$

B. ω / k

C. $d\omega / dk$

D. x / l

Answer: A

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30. In p-type semiconductor, the major charge carriers are:

A. electrons only

B. holes only

C. holes in large numbers and electrons in smaller numbers

D. holes and electrons in equal numbers

Answer: C

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31. For a simple pendulum the graph between length and time period will be

A. straight line q

B. curve

C. ellipse

D. parabola

Answer: D

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32. A 20 μF capacitor is connected to 45 V battery through a circuit whose resistance is 2000 Ω. What is the final charge on the capacitor ?

A. $9 \times 10^{-4} C$

B. $9.154 \times 10^{-4} C$

C. $9.8 \times 10^{-4} C$

D. None of these

Answer: A

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33. A particle having almost zero mass and exactly zero charge is

A. positron

B. electron

C. neutron

D. neutrino

Answer: D

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34. A long elastic spring is stretched by $2cm$ and its potential energy is U. If the spring is stretched by $10cm$, the PE will be

A. U/5

B. U/25

C. 5 U

D. 25 U

Answer: D

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35. A charge of 8.0 mA in the emitter current brings a charge of 7.9 mA in the collector current. The values of α and β are

A. $0.99, 90$

B. $0.96, 79$

C. $0.97, 99$

D. $0.99, 79$

Answer: D

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36. In an interference experiment, the spacing between successive maxima or minima is (Where the symbols have their usual meanings)

A. $\lambda d / D$

B. $\lambda D / d$

C. dD / λ

D. $\lambda d / 4D$

Answer: B

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37. A hollow sphere filled with water through a small body in it is then hung by a long theard and made to oscilation As the water slowly force end of the hole at the bottom the period of oscilation will

A. continuously decrease

B. continuously increase

C. first decrease then increase

D. first increase then decrease

Answer: C

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38. When a celling fan is switched off, its angular velocity falls to half while it makes 36 rotations. How many more rotations will it make before coming to rest ?

A. 24

B. 36

C. 18

D. 12

Answer: D

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39. Which of the following is not the property of the photons ?

A. Momentum

B. Energy

C. Charge

D. Velocity

Answer: C

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40. What is an ideal gas ? Explain its main characteristics.

A. One that consists of molecules

B. A gas satisfying the assumptions of kinetic theory

C. A gas having Maxwellian distribution of speed

D. A gas consisting of massless particles

Answer: B

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41. Which of the following while in motion cannot be deflected by magnetic field?

A. Protons

B. Cathode rays

C. Alpha particles

D. Neutrons

Answer: D

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42. The angle between particle velocity and wave velocity in transverse wave is

A. zero

B. $\pi/4$

C. $\pi/2$

D. π

Answer: C

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43. When the two inoputs of a NAND gate are shorted, the resulting gats is

A. NOR

B. OR

C. NOT

D. AND

Answer: C

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44. The driver of a car travelling at velocity v suddenly see a broad wall in front of him at a distance d. He should

A. brake sharply

B. turn sharply

C. Both a and b

D. None of these

Answer: A

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45. Which of the following statements is true/correct?

A. During clear nights, the temperature rises steadily upward near the ground level

B. Newton's law of colling, an approximate form of Stefan's law, is valid only for natural converction

C. The total energy emitted by a black body per unit time pr unit area is proportional

to the square of its temperature in the Kelivin scale

D. Two spheres of the same material have radii 1m and temperatures 4000 K and 2000 K respectively. The energy radiated per second by the first sphere is greater than that radiated per second by the second sphere

Answer: B

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46. Absorption co-efficient of an open window is...

A. zero

B. 0.5

C. 1

D. 0.25

Answer: C

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47. If the temperature of cold junction of thermocouple is lowered, then the neutral temperature

A. increases

B. approaches inversion temperature

C. decreases

D. remains the same

Answer: D

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48. Advantage of optical fibre

A. high band width and EM interference

B. low bnad width and EM interference

C. high band width low transmission capacity and no EM interference

D. high band width, high data transmission capacity and no. EM interference

Answer: D

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49. A solid reflects incident light and its electrical conductivity decreases with temperature. The binding in this solids

A. ionic

B. covalent

C. metallic

D. molecular

Answer: C

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