PHYSICS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

TS EAMCET 2018 (7 MAY SHIFT 1)

Physics

1. A tokamak fusion test reactor works on

A. bombardment of thermal neutrons with uranium-235

B. magnetic confinement of plasma

C. electric discharge under high voltage bias

D. acceleration of charged particles in electromagnetic fields

Answer: B

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2. Dimension of the quantity $\frac{p}{\varepsilon_0 \mu_0}$, where p is the pressure, ε_0 is electric permitivity of face space and μ_0 is permebility of free space, will be

A. $\left[MLT^{-4}\right]$

B. $\left[ML^2T^{-2}\right]$

C. $\left[ML^3T^{-3}\right]$

D. $\left[ML^2T^{-4}\right]$

Answer: A

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3. Consider a vechicle moving with a velocity 54 km/h. At a distance of 400 m, from the trafic light brakes are applied.The acceleration of the vehicle, after the application of brakes is $-0.3m/s^2$. The vehicle's position relative to the traffic light is

A. 25m

B. 375m

C. 425m

D. 30m

Answer: A

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4. Two trains A and B travel in two parallel rain tracks in opposite direction with speed v_1 and v_2 respectively. They take 4 s to pass each other at this speed. If thte speed of train A is increased by $50\,\%$ then they take 3 s to pass each other. The ratio of v_1 / v_2 is

A. 0.5

B. 1.5

C. 2.1

D. 2.5

Answer: C

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5. A small ball is thrown at an angle 45° to the horizontal with an initial velocity of $2\sqrt{2}m/s$. The magnitude of mean velocity averaged over

the first 2 s is [take, acceleration due to gravity, $g = 10m/s^2$]

A. $7.0m/s$

B. $8.2m/s$

C. $7.8m/s$

D. $9m/s$

Answer: B

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6. The position vector of a particle moving in a plane is given by $r = a\cos\omega t\hat{i} + b\sin\omega I\hat{j}$, where $\hat{i}$ and $\hat{j}$ are the unit vectors along the rectangular axes C and Y : a,b, and ω are constants and t is time. The acceleration of the particle is directed along the vector

A. $-a\hat{i} + b\hat{j}$

B. $b\hat{i} + a\hat{j}$

C. $-r$

D. $\frac{dr}{dt}$

Answer: C

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7. A child is on a merry-go-round, standing at a distacne 2 m from the centre. The coefficient of static friction between the child and the surface of merry-go-round is 0.8. At what maximum angular velocity can the merry-go-round be rotated before and child slips? (Take, $g = 10m/s^2$)

A. $0.5rad/s$

B. $1rad/s$

C. $2rad/s$

D. $4rad/s$

Answer: C

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8. A ball of mass $0.2kg$ is thrown from a height of 1m and with an initial velocity of $\sqrt{10}m/s$ at an angle of 45° with the horizontal.

Assuming, acceleration due to gravity $g = 10m/s^2$, ten modulus of momentum increment during the total time of motion in kg m/s is

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

B. $\frac{1+\sqrt{10}}{\sqrt{5}}$

C. $\frac{1+\sqrt{5}}{\sqrt{5}}$

D. $\frac{\sqrt{5}-1}{\sqrt{5}}$

Answer: C

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9. A small body of mass 500 g moves on a rough horizontal surface before finally stops. The initial velocity of the body is 2 m/s and coefficient of frictin is 0.3 Then, find absolute vlaue of the average pwoeer develped by the frictional force during the time of motion. (Take $g = 10m/s^2$)

A. 1W

B. $1.5W$

C. $2W$

D. $2.5W$

Answer: B

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10. A 1.5 kg ball is shot upward at an angle of 34° to the horizontal with an initial speed of $2mm/s,$ then maximum height of the ball reaches is (use $\cos 34^\circ = 0.83$ or $\sin 34^\circ = 0.56$)

A. $6.3m$

B. $9.4m$

C. $13.8m$

D. $11.2m$

Answer: A

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11. If a disc of mass m and radius R totates with an angular acceleration a, of the torque acting on the disc is

A. MR^2a

B. $\frac{MR^2a}{2}$

C. $\frac{2MR^2a}{5}$

D. $\frac{MR^2a}{12}$

Answer: B

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12. Consider a sphere of mass M and radius R centered at origin. The density of material of the sphere is $\rho = Ar^{\alpha}$, where r is the radial

distance, α and A are constants. If the moment of inertia of the sphere about the axis passing through centre is $\frac{6}{7}MR^2$, then the value of α is

A. 3

B. 6

C. 9

D. 12

Answer: A

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13. The position of a particle axecuting simple harmonic motion is given by $x(t) = 2\cos\left(\frac{\pi}{15}t - \frac{\pi}{2}\right)$, where x is in centimetre and t is in seconds. The time period of the kinetic energy of the particle in second is

A. π

B. $\frac{\pi}{15}$

C. 15

D. 30

Answer: C

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14. An artificial satellite of mass m revolves around the earth at a height h with a speed v. How much power (energy per second) will it tequire to keep itself moving with constant speed in the orbit of radius r ?

A. $\frac{mv^3}{r}$

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

C. $\frac{6mM_e}{(R_e+h)}$

D. 0

Answer: D

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15. Consider an air bubble of radius 2 mm in a liquid at a depth of 5 cm below the free surface. The density of the liquid is $1000kg/m^3$ and the surface tension is $0.1N/m$. Then, find the pressure inside the

air bubble is greater than the pressure at the free surface of the liquid. (Take ,$h = 10m / s^2$)

A. 500 Pa

B. 600 Pa

C. 700 Pa

D. 800 Pa

Answer: B

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16. A cylindrical vessel is filled with water upto the height 1 m from the base. A small orifice is opened at some height in the cylinder and the water level is reduced to height of orifice in 20 s. If the base area of the cylinder is 100 times the area of orifice, then the height of orifice from the base is (take, $g = 10m/s^2$)

A. 80 cm

B. 60 cm

C. 40 cm

D. 20 cm

Answer: A

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17. A vessel of volume V contains a mixture of ideal gases at temperature T. The gas mixture contains n_1, n_2 and n_3 moles of three gases. Assuming ideal gas system, the pressure of the mixture is

A. $\frac{(n_1 + n_2 + n_3)RT}{V}$

B. $\frac{(n_1 n_2 n_3)RT}{V}$

C. $\frac{RT}{(n_1 + n_2 + n_3)V}$

D. $\frac{RT}{V(n_1 n_2 n_3)}$

Answer: A

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18. The resistance of a thermometer is 100Ω at the triple point of water $(273K)$and is 300Ω at the melting point of gold $(\sim 873K)$. The

temperature at which the resistance of the thermometer is 200Ω is

A. 273 K

B. 373 K

C. 473 K

D. 573 K

Answer: D

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19. A diesel engine has a compression ratio of $20:1$. If the initial pressure is 1×10^5 Pa and the initial volume of the cylinder is $1 \times 10^{-3} m^2$, then how much work does the gas do during the compression ?

(Assume the process as adiabatic)

$\left(C_v = 20.8 J/molK, Y_{ari} = 1.4, (20)^{1.4} = 66.3\right)$

A. $-880J$

B. $-579J$

C. $220J$

D. $485J$

Answer: B

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20. A polyatomic gas has f virational degrees of freedom, then the ratio of the specific heat at constant pressure to that at constant volume will be

A. $\frac{4+f}{3+f}$

B. $\frac{4-f}{3-f}$

C. $\frac{3+f}{4+f}$

D. $\frac{3-f}{4-f}$

Answer: A

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21. The speed of sound in air at temperature T and pressure p is v. When the temperature is increased to 2T and the pressure is reduced to $\frac{p}{2}$, then the speed is changed to

A. 2v

B. v

C. $\sqrt{2}v$

D. $\frac{v}{\sqrt{2}}$

Answer: C

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22. A printed page is kept pressed by a transparent cube of edge t. The refractive index of the cube varies us $\mu(z) = 1 + \frac{z}{t}$,

where x is the vertical distance from bottom of the cube. If viewed from top, then the printed letters appear to be shifted by an amount

A. $(1 - \ln 2)t$

B. $(2\ln 2 - 1)t$

C. $\frac{t}{2\ln 2}$

D. $\frac{2t}{3\ln 2}$

Answer: A

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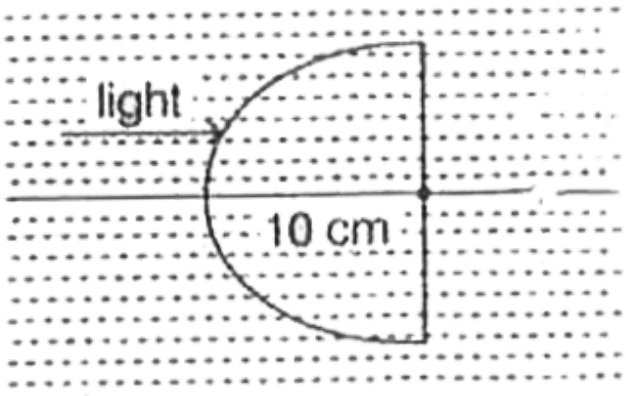
23. A half spherical glass lens with refractive index 1.5 is placed in a liquid with refractive index of 1.3 (see following figure). The radius of the half spherical lens is 10 cm. A parallel beam of light travelling in the liquid is refreacted by the glass lens. Then the absolute value of the position of the image from the centre of the glass lens will be



A. 10 cm

B. 65 cm

C. 5 cm

D. 11.5 cm

Answer: B

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24. A light beam of wavelength 800 nm passes through a single slit and projected on a screen kept at 5m away from the slit. What should be

the slit width for the ray optics approximation to be valid ?

A. $0.5mm$

B. $2mm$

C. $1.5mm$

D. $0.25mm$

Answer: B

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25. Choose the incorrect statement from the following.

A. The electric field in electrostatics obey principle of superposition

B. The electric field inside a perfect conductor is zero

C. The electric dipole will try to orient in a direction opposite to the external electric field

D. The electric flux passing through any closed surface enclosing the changes remains constant

Answer: C

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26. Consider a parallel plate capacitor with plates in the spape of square and in XY-plane. The gap between the plates is filled with dielectric material. The dielectric constant k

varies with X-axis as $k(x) = \left[1 + \left(\frac{x}{L}\right)^{\alpha}\right]$, where α is a constant. Let D_d and C_a are capacitance in the presence of dielectric and air, respectively. If the ratio $\frac{C_d}{C_a} = \frac{7}{6}$, then the value of α must be

A. 3

B. 5

C. 7

D. 9

Answer: B

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27. The emfs of three cells connected in parallel are $E_1 = 5V, E_2 = 8V$ and $E_3 = 10V$ and their internal resistances are $R_1 = 1\Omega, R_2 = 2\Omega$ and $R_3 = 3\Omega$, respectively. By changing E_3 to E_{3N}, the equivalent emf is doubled, then E_{3N} in V is

A. 12

B. 34

C. 47

D. 82

Answer: C

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28. A cell of emf 10 V and internal resistance 3Ω is connected in parallel with another cell of emf 7V and internal resistance $\frac{3}{5}\Omega$, such that their positive terminals are joined together and so there are negative terminals. Their

positive terminals are joined with the negative terminal and their negative terminal is joined with the positive terminal of a third cell of emf 20 V with internal resistance 2Ω. The combination can be replaced by a battery of emf E and internal resistance r, then the values of E and R are respectively

A. $E = 2V, r = 2.5\Omega$

B. $E = 2V, r = 0.4\Omega 1$

C. $E = 5V, r = 0.4\Omega$

D. $E = 5V, r = 2.5\Omega$

Answer: B

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29. A square loop of length L is placed with its edges parallel to the XY-axies. The loop is carrying the current I. If the magnetic field in the region varies as $B = B_0\left(1 + \frac{xy}{L^2}\right)\hat{k}$, then the magnitude of the force on the loop willl be

A. lB_0L

B. $\frac{lB_0L}{2}$

C. $\frac{lB_0L}{\sqrt{2}}$

D. $\sqrt{2}lB_0L$

Answer:

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30. A non0conducting disk of radius R has surface charge density which varies with distance from the centre as $\sigma(r) = \sigma_0\left[1 + \sqrt{\frac{r}{R}}\right]$, where σ_0 is a

constant. The disc rotates about its axis with angular velocity ω. If B is the magnitude of magnetic induction at the centre, then $\frac{B}{\mu_0 \sigma_o \omega R}$ will be

A. $\frac{3}{4}$

B. $\frac{4}{5}$

C. $\frac{5}{6}$

D. $\frac{6}{7}$

Answer: C

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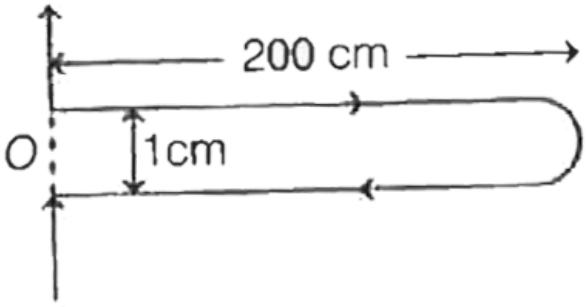
31. For a wire, as shown in the figure, carrying a current of 10 A, then the magnetic induction field at the point O is [take, $\mu_0 = 4\pi \times 10^{-7} H/m$]



A. $2 \times 10^{-4} T$

B. $4 \times 10^{-4} T$

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

D. $4\pi \times 10^{-4}T$

Answer: B

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32. A solenoid of radius R has n turns per unit length, then the self-inductance of the solenoid per unit length is

A. $\mu_0 n R^2$

B. $\mu_0 n R^2$

C. $\mu_0 nR^2$

D. $\mu_0 n^2 \pi R^2$

Answer: D

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33. A distribution transformeer with an efficiency of $90\,\%$ supplies to a colony of 10 homes have electrical oven running at the same time, that draw 20 A current from 220 V

lines. The power dissipated as heat in the transformer is

A. $12.2kW$

B. $4.9kW$

C. $8.4kW$

D. $9.9kW$

Answer: B

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34. The law not described by any four of the Maxwell's equations is

A. Gauss' law for electricity

B. Le-Chatelier's law of equilibrium

C. Guss' law for magnetism

D. Faraday's law of induction

Answer: B

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35. Let E_0 and B_0 denote the amplitude of electric and magnetic filed of a plane electromagnetic wave in air. The magnitude of the average momentum transferred per unit area and per unit time to a totally abosorbing surface is

A. $\frac{1}{2}\varepsilon_0 E_0^2$

B. $\frac{1}{2}\mu_0 B_0$

C. $\varepsilon_0 E_0^2$

D. $\frac{B_0^2}{\mu_0}$

Answer: A

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36. In a hydrogen sample, if the atoms are excited to states with principal, quantum number 20, then the number of different wavelengths which may be observed in the spectrum is

A. 100

B. 140

C. 190

D. 230

Answer: C

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37. Consider a radioactive nuclide which follow decay rate given by $A(t) = A_0 2^{-(l/t_0)}$, where A (f) is the fraction of radioactive material remaining after time t from the initial A_0 at zero time. Let A_1 be the fraction of

orginal activity which remains after 120 hours.

likewise A_2 is the fraction of 200 hours. If $\frac{A_1}{A_2} = 1.6,$ then the half-life (t_0) will be

A. 10 hours

B. 20 hours

C. 40 hours

D. 60 hours

Answer: B

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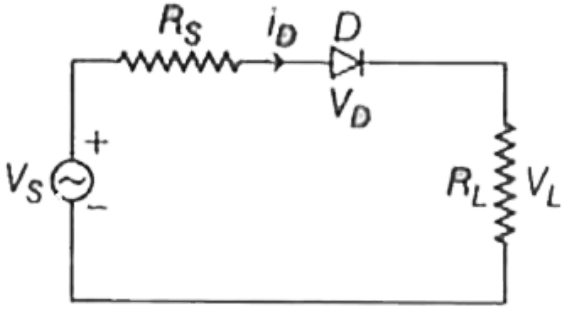
38. In the diode-based rectifier circuit given below, if $V_s = V_m \sin \omega t$ and the diode is ideal, then the average value of V_L is



A. $\dfrac{R_L}{(R_L + R_S)} \dfrac{V_m}{\pi}$

B. $R_L V_m \sin \omega t$

C. $\dfrac{R_L}{(R_L + R_S)} V_m$

D. $\dfrac{R_L}{(R_L + R_S)} V_m \sin \omega t$

Answer: A

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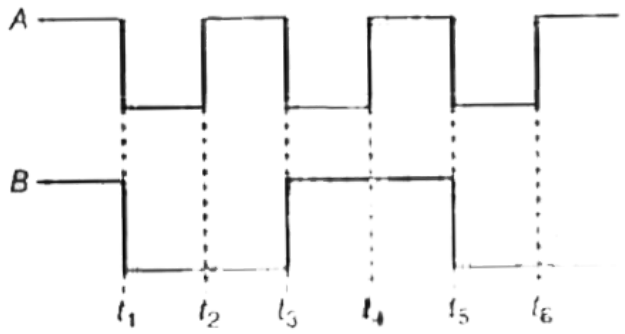
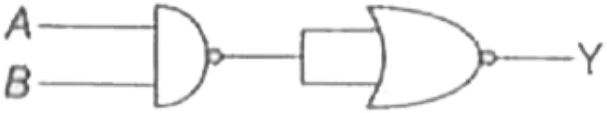
39. Consider the circuit given below

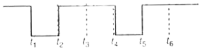


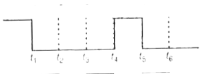
Chose the sketch depicting the output Y of this circuit having inputs A and B as given

below



A. 

B. 

C. 

D. 

Answer: C

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40. For a television network, 5×10^5 channels are granted. If the central frequency of the microwave link is 25 GHz and the alloted bandwidth for each channel is 2 KHz, then how much percentage of the link is used for the network ?

A. $4\ \%$

B. $10\ \%$

C. $25\ \%$

D. $5\ \%$

Answer: A

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