PHYSICS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

TS EAMCET 2019 (6 MAY SHIFT 1)

Physics

1. Match the following table.

	List-I		List-II
A.	Michelson-Morley experiment	I.	The existence of anti-matter
B.	Stern-Gerlach experiment	II.	The existence of de-Broglie matter waves
C.	Davisson-Germer experiment	III.	Electrons have spins
D.	Anderson discovery of positron	IV.	The non-existence of ether

A. $\begin{matrix} A & B & C & D \\ IV & II & I & II \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ II & III & IV & I \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ I & II & IV & III \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ IV & III & II & I \end{matrix}$

Answer: D

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2. Consider a spongy block of mass m floating on a flowing river. The maximum mass of the block is related to the speed of the river flow v, acceleration due to gravity g and the density of the block ρ such that $m_{\max} = kv^x g^y rhz^z$ (k is constant). The values of x, y and z should then respectively be (Mass of the spongy block

is assumed to vary due to absorption of water by it)

A. 6, 3,2

B. 6, -3, 1

C. 3, 6, 1

D. 6, 1, 3

Answer: B

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3. A ball is thrown vertically upward from the ground at time t=0 s. It passes the top of a tower at t=3 s and 2 s later it reaches and its maximum height. The height of the tower is (Acceleration due to gravity, $g = 10m/s^2$)

A. 105 m

B. 125 m

C. 85 m

D. 65 m

Answer: D

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4. Rain is falling vertically with a speed of 30 m/s. from East to West direction. At what the angle with the vertical, he sees the rain falling?

A. $\tan^{-1}\left(\frac{1}{3}\right)$ towards West

B. $\tan^{-1}(3)$ towards West

C. $\tan^{-1}\left(\frac{1}{3}\right)$ toward East

D. $\tan^{-1}(3)$ towards East

Answer: A

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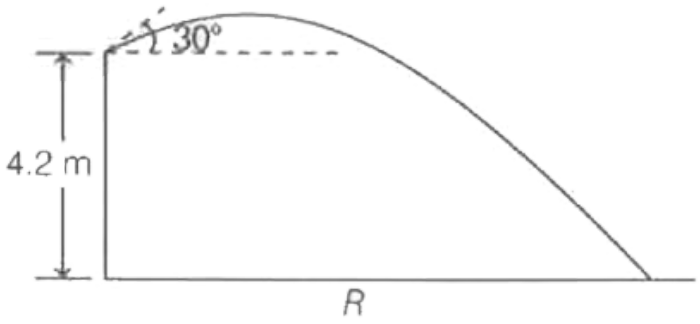
5. An archer shoots an arrow from a height 4.2 m above the ground with a speed 40 m/s and at angle 30° as shown in the figure. Determine the horizontal distance R covered by the arrow, when it hits the ground, (Take $g = 10m/s^2$)



A. $\frac{185}{\sqrt{3}}m$

B. $84\sqrt{3}m$

C. $68\sqrt{3}m$

D. $\frac{95}{\sqrt{3}}m$

Answer: B

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6. A bullet enters a wooden block with velocity 120 m/s. The bullet travels 1.5 s in the block before its velocity reduces to zero due to resistance force which is proportional to the

square root of the velocity. The distance travelled by the bullet in the wooden block is

A. 10 m

B. 60 m

C. 25 m

D. 90 m

Answer:

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7. A bouncing ball of mass 200 g falls from the height of 5m on a horizontal ground. After every impact with the ground, the velocity of the ball decreases by $\frac{1}{2}$ times. The total momentum the ball imparts on to the ground after 3 impacts is (Let $g = 10m/s^2$)

A. $\frac{14}{4} kgm/s$

B. $\frac{20}{6} kgm/s$

C. $\frac{26}{12} kgm/s$

D. $\frac{21}{4} kgm/s$

Answer: D

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8. A block of mass 100 g is suspended vertically from a massless spring system of spring constant, k=1 N/m each. The block is hit from above to impart an impulse of 2 Ns. Calculate the maximum displacement from the Equilibrium position of the block. (Take, $g = 10m/s^2$)

A. 2m

B. 4 m

C. 5m

D. 9 m

Answer: B

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9. A metal chain of mass 2 kg and length 90 cm over hangs a table with 60 cm on the table. How much work needs to be done to put the

hanging part of the chain back on the table?

(Let $g = 10m / s^2$)

A. 2 J

B. 10 J

C. 1 J

D. 3 J

Answer: C

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10. A thin circular disc of mass 12 kg and radius 0.5 m rotates with an angular velocity of 100 rad/s. The rotational kinetic energy of the disc is

A. 12.2 kJ

B. 5.5 kJ

C. 9. 2 kJ

D. 7.5 kJ

Answer: D

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11. The distance between Sum and Earth is 1.6×10^{11} m and the radius of Earth is 6.4×10^{6}m. The ratio of the angular momentum of Earth around the Sum to the angular momentum around its own axis is approximately (Assume Earth as a solid sphere with uniform mass density and rotates around the Sum in a circular path.)

A. 2.0×10^{2}

B. 5.1×10^{8}

C. 4.3×10^6

D. 8.7×10^{12}

Answer: C

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12. A uniform rod of length 1.8 m suspended by an end is made to undergo small oscillations. Find the length of the simple pendulum having the mass and time period equal to that of the rod.

A. 3.6 m

B. 1.2 m

C. 2.4 m

D. 4.2 m

Answer: B

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13. A planet of mass m moves around the Sum along an elliptical path with a period of revolution T. During the motion, the planet's

maximum and minimum distance from Sum is R and $\frac{R}{3}$ respectively. If $T^2 = \alpha R^3$, then the magnitude of constant α will be

A. $\frac{10}{9} \cdot \frac{\pi}{Gm}$

B. $\frac{20}{27} \cdot \frac{\pi^2}{Gm}$

C. $\frac{32}{27} \cdot \frac{\pi^2}{Gm}$

D. $\frac{1}{18} \cdot \frac{\pi^2}{Gm}$

Answer: C

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14. A copper wire and an aluminium wire have lengths in the ratio 5:2 diameters in the ratio 4:3 and forces applied in the ratio 4:5. Find the ratio of increase in length of the copper wire to that aluminium wier. (Let $Y_{Cu} = 1.1 \times 10^{11} Nm^{-2}, Y_{Al} = 0.7 \times 10^{11} Nm^{-2}$)

A. $\frac{178}{63}$

B. $\frac{63}{88}$

C. $\frac{189}{11}$

D. $\frac{33}{89}$

Answer: B

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15. Consider a water droplet of diameter 0.2 mm where the outside pressure is $1.5N/cm^2$ at $25^\circ C$. The pressure inside the droplet, when the surface tension at $25^\circ C$ is 0.08 N/m is

A. $0.32N/cm^2$

B. $1.18N/cm^2$

C. $1.82N/cm^2$

D. $1.66N/cm^2$

Answer: D

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16. A hydrophilic surface is characterised by the contact angle at the water soled interface. The value of contact angle should be

A. $> 90^\circ$

B. $< 90^\circ$

C. $= 90^\circ$

D. $= 180^\circ$

Answer: B

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17. The temperature of body is increased from $T_1 = 127^\circ C$ to $T_2 = 227^\circ C$. The ambient temperature is 27° C. The energies emitted per

second by the body at T_1 and T_2 are E_1 and E_2 respectively. The ratio of $\frac{E_2}{E_1}$ is

A. 1.8

B. 2.7

C. 3.1

D. 4.3

Answer:

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18. Two thin metallic spherical shells of radii 20 cm and 30 cm, respectively are placed with their centres coinciding. A material of thermal conductivity α is filled in the space between the shells. The inner shell is maintained at 300 K and the outer shell at 310 K. If the rate at which heat flows radially through the material is 40 W, find the value of α (in units of $Js^{-1}m^{-1}K^{-1}$).

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

B. $\frac{4\pi}{3}$

C. $\frac{5}{3\pi}$

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

Answer: C

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19. Pressure at the Earth's surface is $p_a = 10^5 Pa$ and the density of air at Earth's surface is $\rho_0 = 1.4kg/m^3$. At height h from the surface of Earth the density of air is reduced to $\frac{\rho_0}{2}$ the value of h is (Assume that

the temperature is constant through out the earth's atmosphere and let In (2)=0.7)

A. 10,500 m

B. 5,000m

C. 1,500 m

D. 2,800 m

Answer:

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20. Consider an ideal gas at pressure p, volume V and temperature T. The mean free path for molecules of the gas is L. If the radius of gas molecules, as well as pressure, volume and temperature of the gas are doubled, then the mean free path will be

A. $\frac{5L}{2}$

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

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

D. 2L

Answer: B

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21. Two identical sinusoidal waves are moving in the same direction along a stretched string, interfere with each other. The phase difference between them is `120^(@). The amplitudes of both the waves are same. If the amplitude of the resultant wave due to interfernce is 2mm, the amplitude of each wave is

A. 1mm

B. 2mm

C. $\sqrt{3}mm$

D. $2\sqrt{3}mm$

Answer: B

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22. A whistle of frequency 660 Hz moves in a circle of radius 1 m at an angular speed of 10 rad/s. The highest frequecny heard by a

listener at a long distance and at rest with respect to the center of the circle is (Let speed of sound =340 m//s.)

A. 700 Hz

B. 640 Hz

C. 720 Hz

D. 680 Hz

Answer: D

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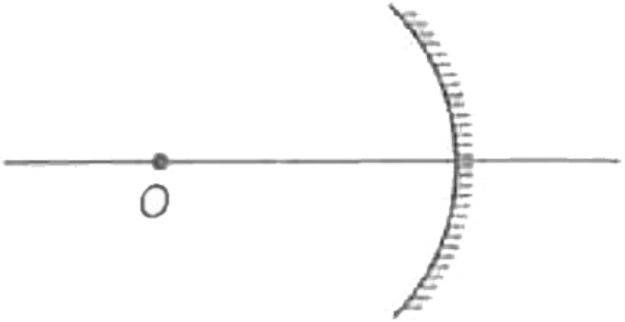
23. An object O is placed at 7 cm to the left of a concave mirror of raidus of curvature 12 cm as shown in the figure. The position of the image will be at a distance of



A. 20 cm from the mirror to the left.

B. 30 cm from the mirror to the right.

C. 42 cm from the mirror to the left.

D. 42 cm from the mirror to the right.

Answer: C

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24. Light consisting of a plane waves of wavelength,

$\lambda_1 = 8 \times 10^{-5} cm$ and $\lambda_2 = 6 \times 10^{-5} cm$ generates an interference pattern in Young's double slit experiment. If n_1 denotes the n_1 th dark fringe due to light of wavelength λ_1

which coincides with n_2 th bright fringe due to light of wavelength λ_2, then

A. $n_1 = 3, n_2 = 1$

B. $n_1 = 4, n_2 = 5$

C. $n_1 = 1, n_2 = 2$

D. $n_1 = 3, n_2 = 2$

Answer: C

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25. A spherical valume contains a unifromly distributed charge of density $1.0 \times 10^{-6} C/m^3$. Find the electrical field (in N/C) at a point inside the volume at a distance 1 mm from the centre. $\left(\text{Let } \frac{1}{4\pi \in_0} = 9 \times 10^9 Nm^2 C^{-2}\right)$

A. $\frac{8}{\pi}$

B. 6π

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

D. 12π

Answer: D

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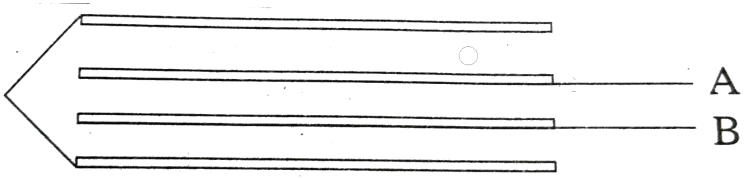
26. Four identical metal plates each of area A are separated mutually by a distance d and are connected as shown. Find the capacity of the system between the terminals A and B.



A. $\frac{\varepsilon_0 S}{d}$

B. $\frac{3}{2}\frac{\varepsilon_0 S}{d}$

C. $\frac{1}{2}\frac{\varepsilon_0 S}{d}$

D. $\frac{2}{3}\frac{\varepsilon_0 S}{d}$

Answer: B

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27. The resistance of a device component decreases as the current through it increases and it is described by the relation, $R = \frac{0.2I}{I-4}$

, where I is the current. Determined the minimum power deliver. (Assume, $I > 4$)

A. 22.4 W

B. 18.6 W

C. 19. 8 W

D. 21. 6W

Answer: D

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28. A 100 W tungsten light bulb has a resistance of 250Ω when it as turned ON and 25Ω when turned OFF. The ambient room temperture is $25^\circ C$. Find the temperature of the filament when the bulb is turned ON, (Let $\alpha_{\text{tungsten}} = 4.5 \times 10^{-3}/^\circ C$)

A. $2600^\circ C$

B. $2025^\circ C$

C. $2500^\circ C$

D. $2625^\circ C$

Answer: B

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29. Two paraticles carrying equal charges move parallel to each other with the speed 150 km/s. If F_1 and F_2 are magnetic and electric forces between two charged particles then, $\frac{|F_1|}{|F_2|}$ is $\left(\text{Let } \mu_0\varepsilon_0 = \frac{1}{9\times10^{16}} S^2/m^2\right)$

A. 1.0×10^{-6}

B. 1.5×10^{-7}

C. 3.0×10^{-6}

D. 2.5×10^{-7}

Answer: D

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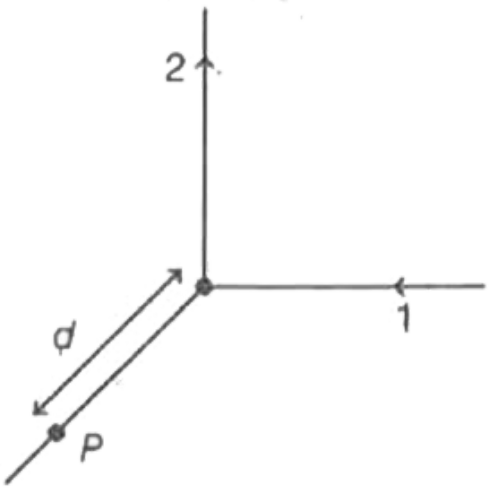
30. A very long wire carrying a current $4\sqrt{2}$ A is bent at a right angles. The magnitude of magnetic field $(|B|)$ at a point P lying on a line perpendicular to the bent wire at a distance, d=20 cm from the point of the bending will be

(Let $\mu_0 = 4\pi \times 10^{-7} H/m$)



A. $1\mu T$

B. $0.8\mu T$

C. $2\mu T$

D. $4\mu T$

Answer: D

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31. Identify the incorrect statement from the following.

A. The susceptibility of a diamagnetic material is a positive quantity.

B. Paramagnetic materials obey Curis's law.

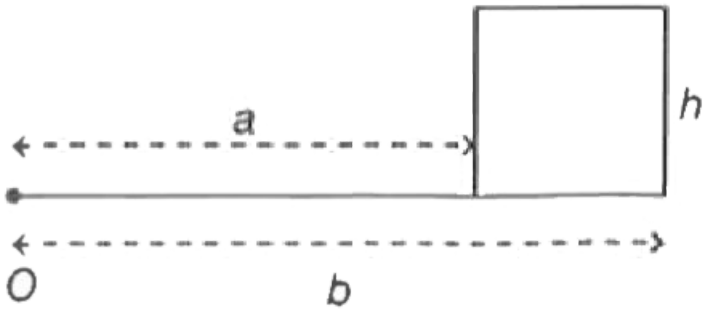
C. Ferromagnetic materials have permanent magnetic domains.

D. In soft ferromagnetic material, the magnetisation disappear on removeal of the external field.

Answer: A

32. Consider a toroid with rectangular cross section, of inner radius a, outer radius be and height h, carrying n number of turns. Then the self-inductance of the toroidal coil when

current I passing through the toroid is



A. $\frac{\mu_0 n^2 h}{2\pi} In\left(\frac{b}{a}\right)$

B. $\frac{\mu_0 nh}{2\pi} In\left(\frac{b}{a}\right)$

C. $\frac{\mu_0 n^2 h}{2\pi} In\left(\frac{a}{b}\right)$

D. $\frac{\mu_0 nh}{2\pi} In\left(\frac{a}{b}\right)$

Answer: A

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33. A coil is connected to an AC source with peak emf, 8 V and frequency $\frac{30}{\pi}$ Hz. The coil has resistance of 8Ω. If the average power dissipated by the coil is 0.4 W, then the inductance of the coil is

A. 0.8 H

B. 2.0 H

C. 1.4 H

D. 0.4 H

Answer: D

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34. A flashlight of intensity 9 W/cm^2 illuminates a perfectly reflective surface of area $300cm^2$. The average force exerted on the surface due to the incident light photons is

A. 0N

B. $14\mu N$

C. $18\mu N$

D. $12\mu N$

Answer: C

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35. A parallel beam of monochromatic light of frequency v is indcident on a surface. The intensity of the beam is I and area of the surface is A. Find the force exerted by light of beam on the surface is perfectly reflecting and the light beam is incident at an angle of

incidence θ. (The speed of light is denoted as c.)

A. $\frac{2lA\sin^2\theta}{\pi c}$

B. $\frac{lA\cos^2\theta}{c}$

C. $\frac{2lA\cos^2\theta}{c}$

D. $\frac{lA\cos^2\theta}{\sqrt{2}c}$

Answer: C

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36. Monochromatic radiation is incident on hydrogen (H) sample which is in ground state. If the hydrogen atoms emit radiation of ten different wavelengths after absorbing the incident radiation, then the wavlength of the incident radiation is (Let $hc = 1242eV - nm$)

A. 84.4 nm

B. 102.6 nm

C. 72.5 nm

D. 95.1 nm

Answer: D

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37. Two radioactive materials R_1 and R_2 have deacy constants 6λ and λ respectively. The half life of R_2 is 1.4×10^{17} s. Initially they contain some number of nuclei.

The time at which the ratio of the remaining nuclei of R_2 to that of R_1 will be e is (Let In 2=0.7)

A. $2 \times 10^{16} s$

B. $4 \times 10^{16} s$

C. $3 \times 10^{16} s$

D. $5 \times 10^{16} s$

Answer: B

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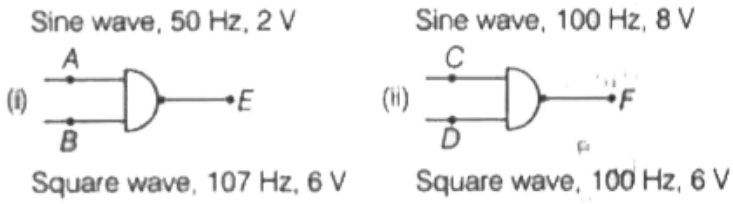
38. A person applies a sine wave and square wave to an AND gate as shown in the figure (i) and (ii). Assuming that both the voltages are

applied in phase, the person observes the output at E and F on (i) and (ii), respectively. [Assume minimun voltage of 5 V is equivalent to logic (i)]



A. Square wave at 50 Hz and square wave at 100 Hz.

B. Sine wave at 50 Hz and square wave at 100 Hz

C. No output and sine wave at 100 Hz.

D. No output and pulsed wave at 100 Hz.

Answer: D

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39. Consider an amplifier circuit in which a transistor is used in common-emitter mode. The load resistance $3k\Omega$. When, a signal of 30 mV is added to base emitter voltage, the base current is changed by $30\mu A$ and the collector

current is changed by 3 mA. the power gain in this circuit will be

A. 10000

B. 20000

C. 30000

D. 40000

Answer: C

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40. A message signal is used to modulated a carrier signal of frequency 5 MHz and peak side-bands are produced seperated by 40 kHz. If the modulation index is 0.75 then the peak voltage and frequency of the messages singal, respectively are

A. 60 V, 10kHz

B. 60 V, 20 kHz

C. 30 V, 10 kHz

D. 30 V, 20 kHz

Answer: D

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