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PHYSICS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

TS EAMCET 2019 (3 MAY SHIFT 2)

Physics

1. Which of the following represents fundamental forces of nature ?

A. Gravitational force , coulomb's force, strong surface tension force , weak van der waal's force

B. Gravitational force, Electromagnetic force, strong viscous force weak nuclear force.

C. Gravitational force, magnetostatic force, strong nuclear force, weak frictional force.

D. Gravitational force, Electromagnetic force, strong nuclear force, weak nuclear force.

Answer: D

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2. Match the physical quantities given in list - I with dimension in list - II

	List I	List II
A.	Gravitational potential	(i) $[M^0L^2T^{-2}K^{-1}]$
B.	Stefan's constant	(ii) $[M^{-1}L^3T^{-2}]$
C.	Permittivity	(iii) $[ML^0T^{-3}K^{-4}]$
D.	Specific heat capacity	(iv) $[M^{-1}L^{-3}T^4I^2]$

(The dimension of mass, length time, temperature and current are M,L ,T K and I, respectively). The correct match is

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

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

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

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

Answer: D

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3. Consider a car initially at rest, starts to move along a straight road first with acceleration $5m/s^2$, then with uniform velocity and finally, decelerating at $5m/s^2$, before coming to a stop . Total time taken from starts to end is t= 25 s . If the average velocity during that time is 72 km/ hr , the car moved with uniform velocity for a time of

A. 15 s

B. 30 s

C. 155 s

D. 2 s

Answer: A

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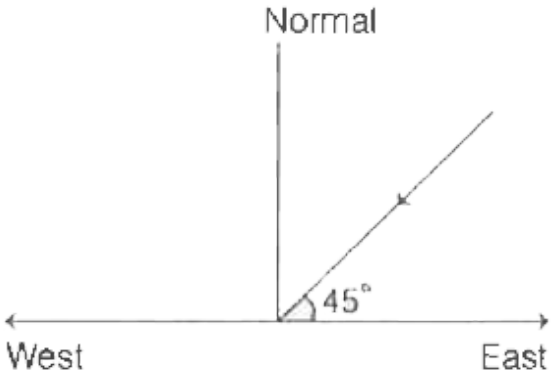
4. A boy runs on a horizontal road with a speed of 4 m/s while it is raining.

He sees that the rain is making an angle θ with

the vertical while running from west to east.

However , when he runs from east to west, the angle is α.

The rain is pouring down at an angle 45° with the vertical normal and at a speed of 8 m/s as shown in the figure. the ratio $\frac{\tan\theta}{\tan\alpha}$ is



A. $\left(1-\sqrt{2}\right)^2$

B. $\left(1+\sqrt{2}\right)^2$

C. $\left(1+\sqrt{2}\right)$

D. $\left(\sqrt{2}-1\right)$

Answer: B

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5. A ball is projected vertically up from ground. Boy A standing at the window of first floor of a nearly building observes that the time interval between tha ball crossing him while going up and the ball crossing him while going down is

2s. Another boy B standing on the second floor notices that time interaval between the ball passing him twice, during up motion and down motion is 1 s. Calculate the difference between the vertical positions of boy B and boy A (Assume , acceleration due to gravity , $g = 10m/s^2$)

A. 8.45 m

B. 3.75 m

C. 4.25 m

D. 2.50 m

Answer: B

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6. A bar of mass m resting on a smooth horizontal plane starts moving due to force $|F| = \frac{mg}{9}$. The magnitude of force remains constant with time. The force vector makes an angle θ with the horizontal which varies with the distance covered as $\theta = Cx$. if the constant , $C = 10\left(\frac{\text{degree}}{\text{meter}}\right)$, then the speed of

the bar , when θ becomes equal to 30° for the first time is, (Take , $g = 10m/s^2$)

A. 0.33 m/s

B. 0.50 m/s

C. 1.0 m/s

D. 0.8 m/s

Answer: A

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7. A particle of mass m is moving along a circle of radius R such that its tangential acceleration a_t varies with distance covered x as $a_t = ax^2$ where α is a constant.

the kinetic energy , K of the particle varies with the distance as $K = \beta x^c$, where β and c are constants. The values of β and c are

A. $\beta = \frac{m\alpha}{3}, c = 3$

B. $\beta = \frac{m\alpha}{4}, c = 4$

C. $\beta = \frac{m\alpha}{2}, c = 4$

D. $\beta = \frac{m\alpha}{2}, c = 3$

Answer: A

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8. A mass of 2 kg initially at a height of 1.2 m above an uncompressed spring with spring constant 2×10^4 N/m , is released from rest to fall on the spring.

Taking the acceleration due to gravity as

$10m/s^2$ and neglecting the air resistance , the compression of the spring in mm is

A. 20

B. 40

C. 50

D. 60

Answer: C

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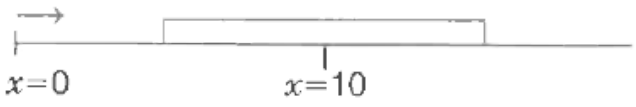
9. A bullet to mass 1 kg fired with a speed $2mn^{-1}$ from x=0 passes through a block of wood whose centre is kept at a distance of 10 m from the origin as shown in the figure.

The retarding force F_r on the bullet within the wooden block is -0.5 /x.

The minimum length of the block (upto one decimal digit) required to completely stop the bullet is (Assume , $e^4 = 55$)



A. 10.1 m

B. 9.2 m

C. 9.7 m

D. 19.3 m

Answer:

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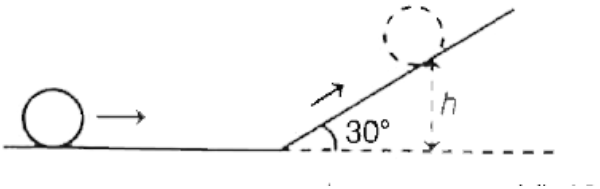
10. A solid spherical ball rolls on a horizontal surface at 10 m/s and continues to roll up on an inclined surface as shown in the figure.

If the mass of the ball is 11 kg and frictional

losses are negligible, the value of h where the ball stop and starts rolling down the inclination is (Assume $g = 10m/s^2$)



A. 8 m

B. 6 m

C. 7 m

D. 10 m

Answer: C

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11. A long cylinderical rod is welded to a thin circular disc of diameter 0.5 m at a point on its circumference.

The rod is in the same plane as that of the disc and forms a tangent to the disc.

The radius of gyration of the disc about the rod (in m) is

A. $\frac{1}{4}$

B. $\sqrt{\frac{5}{8}}$

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

D. $2\sqrt{2}$

Answer: B

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12. A particle of mass 0.1 kg is executing simple harmonic motion of amplitude 0.1 m. When the particle passes through the mean position, its kinetic energy is $8 \times 10^{-3} J$.

If the initial phase is 45° , the equation of its

motion is (Assume, x(t) as the position of the particle at time t .)

A. $x(t) = 0.1\sin\left(4t + \frac{\pi}{4}\right)$

B. $x(t) = 0.1\sin\left(16t + \frac{\pi}{4}\right)$

C. $x(t) = 0.1\sin\left(2\left(t + \frac{\pi}{4}\right)\right)$

D. $x(t) = 0.1\sin\left(2t + \frac{\pi}{4}\right)$

Answer: A

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13. If a satellite has to orbit the earth in a circular path every 6 hrs, at what distance from the surface of the earth should be satellite placed (radius of earth , $R_e = 6400km$) (Assume , $\frac{GM}{4\pi^2} = 8.0 \times 10^{12} N/m^2/kg$

Where ,G and M are gravitational constant and mass of earth and $10^{1/3}$ = 2.1.

A. 15100 km

B. 8720 km

C. 20600 km

D. 5560 km

Answer: B

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14. A copper wire of cross -sectional area 0.01 cm^2 is under a tension of 22N. Find the percentage change in the cross- sectional area.

(Young's modulus of copper

$= 1.1 \times 10^{11} N/m^2$ and Poisson's ratio = 0.32

)

A. 12.6×10^{-3}

B. 8.6×10^{-3}

C. 6.4×10^{-3}

D. 2.8×10^{-3}

Answer: A

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15. A cylindrical tank with a large diameter is filled with water. Water drains out through a hole at a bottom of the tank . If the cross - sectional area of the hole is $6cm^2$ then the drainge rate (in m^3/s) when the depth of the water is 0.2 m is

A. 1.0×10^{-3}

B. 8.2×10^{-2}

C. 22×10^{-3}

D. 1.2×10^{-3}

Answer: D

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16. The surface tension of the soap water solution is $\frac{1}{10\pi}$ N/m . The free energy of the surface layer of a soap bubble of diameter 5 mm will be

A. $2.5 \times 10^{-6} J$

B. $1 \times 10^{-7} J$

C. $8 \times 10^{6} J$

D. $5 \times 10^{-6} J$

Answer: D

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17. Statement A convection involves flow of matter within a fluid due to unequal temperatures of its parts.

Statements B A hot bar placed under a running tap water loses heat due to effect of convection with in water.

Statement C Heat transfer always involves temperature different between two systems.

Identify the correct option.

A. A,B ,C are true

B. Only A and C are true

C. Only A and B are true

D. Only B and C are true

Answer: B

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18. A body cools from $70^\circ C \text{to} 40^\circ C$ in 5 min. Calculate the time it takes to cool from $60^\circ C \text{to} 30^\circ \text{C}$. The temperature of the surroundings is $20^\circ C$.

A. 1 min

B. 7 min

C. 6 min

D. 15 min

Answer: B

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19. One mole of ideal gas goes through a process pV^3 = Constant , where p and V are pressure and volume, respectively. Let W be the work done by the gas as its temperature is increased by ΔT.

The value of |W| is (R is the universal gas constant.)

A. $R\Delta T$

B. $\frac{1}{3}R\Delta T$

C. $R^3\Delta T$

D. $\frac{R}{2}\Delta T$

Answer: D

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20. An ideal gas is placed in a tank at $27^\circ C$. The pressure is initially 600 kPa. One fourth of the gas is then released from tha tank and thermal equilibrium is established. What will be the pressure if the temperature is $327^\circ C$?

A. 900 kPa

B. 1000 kPa

C. 1050 kPa

D. 1250 kPa

Answer: A

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21. Which of the following equation represents a simple harmonic motion ? (ω is angular frequency, A is amplitude of oscillation and $I = \sqrt{-1}$

A. $\frac{dx}{dt} = i\omega\sqrt{x^2 - A^2}$

B. $\frac{d^2x^2}{dt^2} = \omega^2 x$

C. $\frac{d^2x}{dt^2} = i\omega\sqrt{x^2 - A^2}$

D. $\frac{d^2x}{dt^2} = \omega x^2$

Answer: A

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22. A musician on a moving vehicle plays a tone at 880 Hz note. When the vehicle was approaching a listener, he receives it as 888 Hz

tone.

The speed of the vehicle is (Assume the velocity of sound is 333 m/s.)

A. 6 m/s

B. 5 m/s

C. 3 m/s

D. 1 m/s

Answer: C

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23. Three lenses of forcal lengths +10 , -10 cm and +30 cm are placed at distance of 30 cm , 35 cm and 45 cm respectively from an object. The distance between the object and the image formed is

A. 100 cm

B. 75 cm

C. 30 cm

D. 45 cm

Answer: B

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24. In a Young's double slit experiment ,a thin sheet of refractive index 1.6 is used to cover one slit while a thin the sheet of refractive index 1.3 is used to cover the second slit.

The thickness of both the sheets are same and the wavelength of light used is 600 nm.

If the central point on the screen in now occupied by what had been the 10th bring fringe (m=10) , then the thickness of covering sheets is

A. $50\mu m$

B. $8\mu m$

C. $20\mu m$

D. $40\mu m$

Answer: C

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25. An infinite line of charge with uniform line charge density of 1 C/m is palced along the y - axis. A charge of 1C is placed on the x-axis at a

distance of d= 3m from the origin .

At what distance r from the origin on the x-axis , the total electric field is zero.

(Assume , $0 < r < d$)

A. 1 m

B. 2 m

C. 2.5 m

D. 1.75 m

Answer: B

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26. A capacitor of capacitance $4\mu F$ is charged to a potential difference of 6 V with a battery . The battery is remvoed and in its place another capacitor of capacitance is $8\mu F$ introduced and the circuit is closed. The potential difference attained by each of the capacitors in V is

A. 2

B. 4

C. 6

D. 8

Answer: A

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27. Estimate the magnitude of currect that passes through a wire , if 0.1 mol of electrons flow through it in 40 min. (Assume , Avagadro's number $= 6.0 \times 10^{23}$)

A. $4A$

B. $9A$

C. $12A$

D. $14A$

Answer: A

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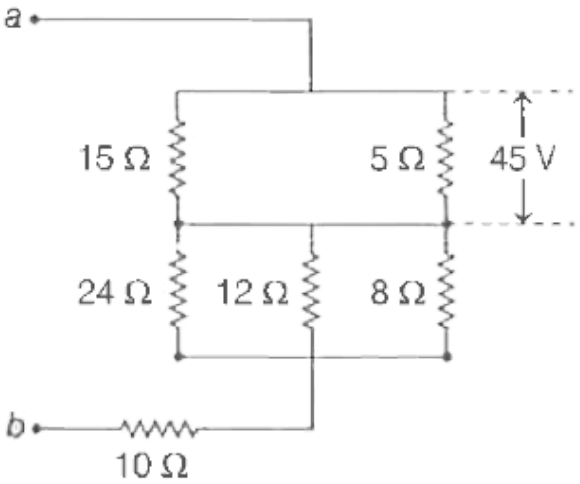
28. Find the potential difference between a and b as shown in the below circuit,



A. 165 V

B. 198 V

C. 213 V

D. 224 V

Answer: C

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29. A metal disc of radius , a =10 cm rotates with a constant angular speed of $\omega = 200 rad/s$ about its axis.

The potential difference between the centre and the rim of the disc under a uniform magnetic field, B= 5 mT directed perpendicular to the disc, is

A. 2 mV

B. 5 mV

C. 10 mV

D. 15 mV

Answer: B

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30. A proton accelerated by a potential difference 500 kV flies through a uniform transverse magnetic field 0.1 T.

The field is spread on a region of 1.0 cm thickness. The angle through which the proton gets deviated from its original direction is ,

(mass of proton $= 1.6 \times 10^{-27}$ kg and charge of proton $= 1.6 \times 10^{19} C$)

A. 0.01 rad

B. 0.1 rad

C. 0.05 rad

D. 0.08 rad

Answer: A

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31. A toroid has an iron core with an internal magnetic field of $10\pi mT$, when the current in the winding of 1500 turns per meter is 10 A. Determing the field due to magnetisation $(\mu = 4\pi \times 10^{-7} Hm^{-1})$

A. $(4\pi)mT$

B. $(10\pi)mT$

C. $\left(\frac{8}{\pi}\right)mT$

D. $\left(\frac{\pi}{4}\right)mT$

Answer: A

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32. A conducting wire bent but in the shape of semicircle has length L and mvoes in its plane with constant velocity V. A uniform magnetic field B exists in the direction perpendicular to the plane of the wire.

The velocity makes an angles 45° to diameter joining free ends. and the emf induced between the ends of the wire is $\Phi = \alpha(BvL)$.

The value of constant α is

A. $\sqrt{2}$

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

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

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

Answer: D

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33. A sinusoidal voltage with a frequency of 50 Hz is applied to a series LCR circuit with a resistance of 5Ω , inductance of 20 mH and a

capacitance of $500\mu F$.

The magnitude of impedance of the circuit is closed to

A. 19.2Ω

B. 14.4Ω

C. 9.6Ω

D. 5Ω

Answer: D

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34. The concept of displacement currect solves an ambiguity in

A. Gauss's law

B. Faraday's law

C. Ampere's law

D. Coulomb's law

Answer: C

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35. A photodiode sensor is used to measure the output of a 300 W lamp kept 10 m away. The sensor has an opening of 2 cm in diameter.

How many photons enter the sensor if the wavelength of the light is 660 nm and the exposure time is 100 ms. (Assume that all the energy of the lamp is given off as light and $h = 6.6 \times 10^{-34} Js$)

A. 3.6×10^{13}

B. 2.8×10^{13}

C. 2.5×10^{13}

D. 1.8×10^{13}

Answer: C

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36. To excite the spectral line of wavelength 4960 Å of an atom, an excitation energy of 7.7 eV is required. The ground state energy of the atom is 10.5 eV.

The energies of two levels involved in the

emission of 4960 Å line are :(Assume hc = 1240 eV -nm , where h is planck's constant and c is speed of light .)

A. 14.2 eV, 16.1 eV

B. 12.2 eV, 18.2 eV

C. 15.7 eV,20.5 eV

D. 15.7 eV, 18.2 eV

Answer: D

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37. In one averge life - time of a radioactive nuclei,

A. more than half the active nuclei decay.

B. half the active nuclei decay

C. less than half the active nuclei decay

D. all the nuclei decay

Answer: A

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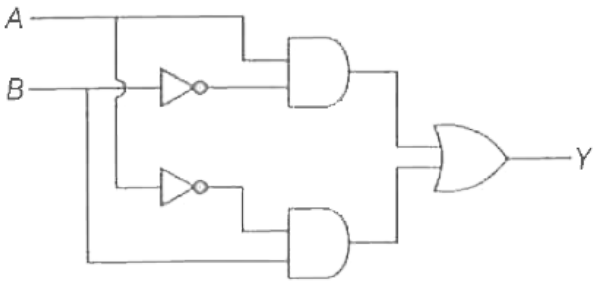
38. The truth table for the given logic circuit is



A.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

B.

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

C.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

D.

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

Answer: A

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39. In a transister circuit, the collector current is changed by 8.9 mA, if the emitter current is changed to 9.0 mA. The value of current amplification factor β is

A. 89

B. 92

C. 84

D. 96

Answer: A

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40. The transmitting antenna placed at the top of a tower has a height of 45 m from the ground. The distance between receiving and transmitting antennas is 40 km and the radius of earth is 6400 km .

The minimum height (in m) at which the

receiving antenna is to be placed for satisfactory communication in LOS made, is

A. 5

B. 15

C. 20

D. 25

Answer: C

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