

# **TS EAMCET Physics Previous Questions with Key – Test 4**

81) A nucleus of Deuteron or Deuterium is abound atomic system best described by

1)Composed of a proton and a neutron

2)Spherical shaped

3)Contains more than two nucleons

4)Proton and neutron are bound by electrostatic forces

82)A wooden cubical block of mass m = 20 kg is measured within an error of 10 g. Its side length 1 = 100 cm is measured within an error of 1 mm. Then the relative error in the measurement of its density is

- 1)1.8 ×10<sup>-2</sup>
- 2)2.6  $\times 10^{-2}$
- 3)3.5×10<sup>-3</sup>
- 4)4.8×10-3

83)A vehicle starts moving in a straight line with an acceleration,  $a = 4m/s^2$ , with initial velocity equal to zero. After accelerating form time  $t_1$  the vehicle then moves uniformly  $t_2$  and the finally decelerates for time  $t_1$  eventually coming to a stop. The total time taken during the motion is 10 s and the average velocity during the motion is 5.1 m/s. The time taken by the vehicle during acceleration is

1)2s 2)2.5s 3)1.5s 4)1.8s



84)A body travels in a straight line from point A to point B with an initial velocity zero and uniform acceleration, covering 1 m during the first second and 39 m during the last second. The distance between A and B in m is

1)50

2)100

3)390

4)400

85)A cricket player can throw a ball with an initial speed of 30 m/s. What is the maximum range the player can throw the ball? (neglect air resistance. Take  $g = 10 \text{ m/s}^2$ )

1)100 m

2)90 m

3)90 m

4)90√2 m

86)A particle moves in X-Y plane with x and y varying with time t as x(t) = 5t,  $y(t) = 5t(27-t^2)$  At what time in seconds the direction of velocity and acceleration will be perpendicular to each other

$$1)5\sqrt{\frac{27}{2}}$$
  
2)5  
3)5 $\sqrt{12}$ 

4)3



87)A bullet enters in a piece of wood with velocity  $v_0$ . The resistive force acting on the bullet in the wood is proportional to  $v^{\frac{1}{3}}$ . If the total distance travelled by the bullet is proportional to  $(v_0)^{\beta}$ , then the value of  $\beta$  is



88)A mechanical system consists two springs of stiffness coefficients  $k_1$  and  $k_2$  connected in series. The minimum work to be performed on the system to stretch it by  $\Delta l$  is

$$1)\frac{1}{2}\left(\frac{k_{1}k_{2}}{k_{1}+k_{2}}\right)\Delta l^{2}$$
$$2)k_{1}k_{2}\Delta l^{2}$$
$$3)\left(\frac{k_{1}k_{2}}{k_{1}+k_{2}}\right)\Delta l^{2}$$
$$4)\left(\frac{k_{1}k_{2}}{k_{1}+k_{2}}\right)\Delta l$$



89)A block of mass 5 kg is pulled by a force F as shown in the figure. If the coefficient of friction is 0.1, then the force needed to accelerate the block to  $3 \text{ m/s}^2$  to the right is close to



90)A particle of mass 'm' kg moves along the X-axis with its velocity varying with the distance travelled as  $v = kx^{\beta}$ , where k is positive constant. The total work done by all the forces during displacement of the particle form x = 0 to x = d is close to

$$1)\frac{mk^{2}}{2}$$

$$2)\frac{mk^{2}}{2}d^{2}\beta$$

$$3)\frac{mk^{2}}{2\beta}$$

$$4)\frac{mk^{2}d}{2\beta}$$



91)The masses and positions (in rectangular coordinates) of four particles are as follows: 1 kg at (a, a), 2k at (-, a), 3 kg at(-a, -a) and 4 kg at (a, -a). The position vector of the centre of mass of the system of four particles is

92)A solid sphere is rolling without slipping on a semi-circular track of radius 10m as shown in the figure. The radius of solid sphere is much smaller than the radius of semicircular track. At the lowest point, it has a velocity 10 m/sec. To what maximum angle  $\theta$  from the vertical will the sphere travel before it comes back down? Neglect the rolling friction between the sphere and the track. (Take g = 10 m/sec<sup>2</sup>)





93)A block of mass (10  $\alpha$ )g, where  $\alpha$  is a constant, is moving with velocity 3 m/sec to the right collides inelastically with the block on the right with mass 10 g and sticks to it. The right block is connected to three spring as shown in the figure. The spring constant of each spring 2N/m. If the amplitude of the resulting simple harmonic motion is  $\frac{1}{2\sqrt{2}}$  m, then the value of  $\alpha$  is



k

94)The mass density inside a solid sphere of radius R varies as  $\rho(r) = \rho_0 \left(\frac{r}{R}\right)^{\beta}$ , where  $\rho_0$  and  $\beta$  are constants and r is the distance from the centre. Let  $E_1$  and  $E_2$  be gravitational fields due to sphere  $\frac{R}{2}$  and 2R from the centre of sphere. If  $\frac{E_2}{E_1} = 4$ , the value of  $\beta$  is 1)2

- 2)2.5
- 3)3
- 4)4



95)The pressure to be applied to the ends of a steel cylinder to keep its length constant upon raising its temperature by 100 °C is

(Thermal expansion coefficient,  $\alpha = 11 \times 10^{-6}$ /K, Young's Modulus = 200 GPa)

1)0.22 ×10<sup>9</sup> Pa
 2)5.5 ×10<sup>-6</sup> Pa
 3)0.22 Pa
 4)55 Pa

96)The root mean square (rms) velocity of an ideal gas at a temperature T is v. If the temperature is increased to 4 T, The rms velocity of the gas is

1)√3 v

2)√2 v

3)2v

4)3 v

97)A glass beaker contain 200 gm of carbonated water initially at 20 °C. How much ice should be added to obtain the final temperature of 0 °C with all ice melted, if the initial temperature of ice is -10°C. Neglect heat capacity of glass

[Use:  $C_{water} = 4190 \text{ J/kg} \circ \text{C}$ ,  $C_{ice} = 2100 \text{ J/kg} \circ \text{C}$ ,  $L_F 3.34 \times 10^5 \text{ J/kg}$ ]

1)47 gm 2)76 gm 3)200 gm 4)22 gm



98)Heat loss takes place form a body maintained at a temperature of 400 °C to the surrounding air at 30 °C by convection and to the surrounding surfaces at 30 °C by radiation. The Newton's cooling coefficient is 20 W/m<sup>2</sup> K and the Stefan-Boltzmann constant is  $5.67 \times 10^{-8}$  W/m<sup>2</sup>K<sup>4</sup>.If the rate of heat loss by convection is equal to the rate of heat loss by radiation, the emissivity of the body surface is

- 1)0.35
- 2)0.46
- 3)0.55
- 4)0.66

99)A Carnot engine absorbs heat form a reservoir maintained at temperature 1000 K. The engine rejects heat to a reservoir whose temperature is T. If the magnitude of absorbed heat is 400 J and work performed is 300 J, then the value of T is

1)250K

2)500K

- 3)750K
- 4)1750K

100)The mean kinetic energy of monatomic gas molecules under standard conditions is  $\langle E_1 \rangle$ . If the gas is compressed adiabatically 8 times to its initial volume, the mean kinetic energy of gas molecules changes to  $\langle E_2 \rangle$ . The ratio  $\frac{\langle E_2 \rangle}{\langle E_1 \rangle}$  is

1)2 2)4 3)6 4)8



101)The speed of a transverse wave on a strings is 160 m/sec. If the three resonant frequencies of this string respectively are 160 Hz, 240Hz and 400 Hz, the length of the string is

1)80 cm

2)100 cm

3)160 cm

4)200 cm

102)Consider a concave mirror of 10 cm focal length illuminated by an object kept at a distance of 25 cm. The distance at which the image is formed and its magnification respectively are

1)16.7 cm and -0.67

2)71 cm and 0.29

3)-16.7 cm and 0.67

4)7.1 cm and -0.29

103)Two P and Q are placed at 10 cm and 30 cm in front of a convex lens of local length 20 cm. The correct option for the image of P and Q is

1)P-Virtual and inverted; Q-real and upright

2)P-virtual and upright; Q-real and inverted

3)P-real and inverted; Q-virtual and upright

4)P-real and upright; Q-virtual and inverted



104)Calculate the minimum thickness of a soap film (n = 1.33) that results in constructive interference in reflected light, if the film is illuminated with light whose wavelength in free space is 532 nm.

1)113 nm

2)100 nm

3)200 nm

4)226 nm

105)A think spherical shell encloses a concentric solid sphere. The radius of the shell is  $(0.06)^{\frac{1}{2}}$  m and its surface charge density is  $-10^{-6}$  C/m<sup>2</sup>. The radius of the solid sphere is  $(0.01)^{\frac{1}{3}}$  m and its volumetric charge density is  $3 \times 10^{-5}$  C/m<sup>3</sup>.  $\in_0$  is the permittivity of free space in C<sup>2</sup>/ Nm<sup>2</sup>. The electric flux through a spherical surface concentric with the spherical shell and of radius greater than that of the shell, in Vm. is





106)A conducting sphere  $S_1$  of radius  $r_1$  is connected by a conducting wire to another conducting sphere  $S_2$  of radius  $r_2$  where  $r_1 = 3$  cm and  $r_2 = 2$  cm. Before they are connected,  $S_1$  carries charge of 10 units. The electric potential at the point which is at a distance 4 cm from the centre of  $S_1$  and a distance 3 cm from the centre of  $S_2$  is

$1)\frac{1}{4\pi\epsilon_0}\frac{17}{6}$
$2)\frac{1}{4\pi\epsilon_0}\frac{3}{2}$
$3) \frac{1}{4\pi\epsilon_0} \frac{1}{6}$
$4)\frac{1}{4\pi\epsilon_0}\frac{17}{12}$

107)A 500  $\Omega$  resistor connected to an external battery is placed inside a thermally insulated cylinder fitted with a frictionless piston. The cylinder contains an ideal gas. A current I of 200 mA flows through the resistors as shown in the figure. The mass of the piston is 10 kg. Assuming g= 10 m/s<sup>2</sup> the speed at which the piston will move upward, due to heat dissipated by the resistor, so that the temperature of the gas remains unchanged is



1)10 cm/s

2)15 cm/s

3)20 cm/s

4)30 cm/s



108)A cylindrical shape resistance is connected to a battery with emf 5V. the resistance per unit length varies as  $\rho(x) = \rho_0 \left(\frac{x}{L}\right)^{\alpha}$  where  $\rho_0$  and  $\alpha$  are constants and x is the distance from one end of the resistor. The magnitude of product  $\rho_0 L$  is 10 $\Omega$ , where L is the length of the resistor. If the thermal power generated by the resistor is 20 W, then the value of  $\alpha$  is

1)3
 2)5
 3)7
 4)9

109)Consider a current carrying wire shown in the figure. If the radius of the curved part of the wire is R and the line at parts are assumed to be very long, the magnetic induction of the field at the point 'O' is





110)A charged particle moves with some initial velocity along the direction of external magnetic filed B. Now if we apply uniform electric filed perpendicular to the magnetic field, the trajectory of the charged particle will be

1)circle

2)helix

3)cycloid

4)straight line

111)A magnetic dipole the influence of two orthogonal magnetic fields,  $B_1 = 0.5 \times 10^{-3}$  T and  $B_2 = 0.866 \times 10^{-3}$  T. If the dipole comes to stable equilibrium at an angle  $\theta$  with respect to  $B_2$  field, the value of  $\theta$  is

1)45° 2)30° 3)60° 4)90°

112)A wheel with radial metals spokes 1 m in length is rotated in a magnetic field of  $0.5 \times 10^{-4}$  T normal to the plane of the wheel. If the emf induced between the rim and axle is  $\pi/3000$  V, the rotational speed of the wheel in revolutions per minute is

1)400 2)500 3)600 4)700



113)An initially charged undriven LCR circuit having inductance L, capacitance C and resistance R will

1)Oscillate with frequency  $\frac{1}{\sqrt{LC}}$ 

2)Oscillate without damping if  $R^2 < \frac{4L}{C}$ 

3)Oscillate with damping if  $R^2 > \frac{4L}{C}$ 

4)Oscillate with damping if  $R^2 < \frac{4L}{C}$ 

114)An electromagnetic wave having frequency  $4 \times 10^{14}$  Hz is passing through a small volume. The energy contained in this volume oscillates with frequency

1)0Hz

2)4  $\times 10^{14}$  Hz

3)8  $\times 10^{14}$  Hz

4) $2 \times 10^{10}$ 14 Hz

115)Light of frequency  $4 \times 10^{14}$  Hz is incident on a metal surface of work function 2.14 eV, resulting in photoemission of electrons. The maximum kinetic energy of the emitted electrons is  $[h = 6.63 \times 10^{-34} \text{ Js}]$ 

1)0.35 eV 2)0.14 eV 3)2.14 eV 4)0 eV



116)If a proton is accelerated through a potential difference of 1000 V, its deBroglie wave lenth is (given  $m_p = 1.67 \times 10^{-27}$  kg,  $h = 6.63 \times 10^{-34}$  Js)

1)9.1×10<sup>-13</sup> m 2)9.1×10<sup>+13</sup> m 3)1.09×10<sup>-15</sup>m 4)1.09×10<sup>+15</sup>m

117)In uranium radioactive series, initial nucleus  $^{238}U_{92}$  decays to final nucleus  $^{206}U_{82}$ . In this process the number of  $\alpha$ -particles and  $\beta$ -particles emitted are

1)8 and 3 2)16 and 6 3)16 and 3 4)8 and 6

118)Determine  $V_{CE}$  in the following Silicon-based transistor circuit





119)The voltage-current characteristic of a diode during forward bias is given by  $I = 7.8 \times 10^{-5} e^{69.VD}$ , where I is the current in mA and V<sub>D</sub> is the diode voltage in V. The dynamic resistance of the diode in  $\Omega$ , when the current is 4 mA, is

1)18.6

2)21.7

3)28.2

4)36.2

120)The height of a transmission antenna is 49 m and that of the receiving antenna is 64 m. What should be the maximum distance between them for line of sight transmission?

1)50.1 km

2)54.6 km

3)43.6 km

4)65.2 km

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	TS EAMCET 2018 Engineering Stream		
	Final Key		
	Date: 05-05-2018 AN (Shift 2)		
	81	1	
	82	3	
	83	3	
	84	4	
	85	2	
	86	4	
	87	2	
	88	1	
	89	2	
	90	2	
	91	4	
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	102	1	
	103	2	
	104	2	
	105	4	
	106	1	
	107	3	
	108	3	
	109	1	
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	111	2	
4	112	1	
	113	4	
	114	3	
	115	4	
	116	1	
	117	4	
	118	4	
	119	4	
	120	2	