

## **TS EAMCET Physics Previous Questions with Key – Test 5**

81)A tokamak fusion test reactor works on:

1)Bombardment of thermal neutrons with Uranium -235

2)Magnetic confinement of plasma

3)Electric discharge under high voltage bias

4)Acceleration of charged particles in electromagnetic fields

82)Dimensions of the quantity  $\frac{P}{\epsilon_0 \mu_0}$ , where P is the pressure  $\epsilon_0$  is electric permittivity of

free space,  $\mu_0$  is permeability of free space, will be

1)MLT<sup>-4</sup>

 $2)ML^{2}T^{-2}$ 

 $3)ML^{3}T^{-3}$ 

 $4)ML^{2}T^{-4}$ 

83)Consider a vehicle moving with a velocity 54 km/h. At a Distance of 400 m form the traffic light brakes are applied. The acceleration of the vehicle, after the application of brakes is  $-0.3 \text{ m/s}^2$ . The vehicle's position relative to the traffic light is

1)25m 2)375m 3)425m

4)30m



84)Two trains A and B ravel in two parallel rail tracks in opposite direction with speed  $v_1$  and  $v_2$ , respectively. They take 4 sec to pass each other at this speed. If the speed for train A is increased by 50%, then they take 3 sec to pass each other. The ratio  $v_1/v_2$  is

- 1)0.5
- 2)1.5
- 3)2.0
- 4)2.5

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

[Assume acceleration due to gravity,  $g = 10m/s^2$ ]

- 1)7.0 ms/
- 2)8.2 m/s
- 3)7.8 m/s
- 4)9 m/s

86)The position vector of a particle moving in a plane is given by  $\vec{r} - a\cos\omega\hat{i} + b\sin\omega\hat{j}$  where  $\hat{i}$  and  $\hat{j}$  are the unit vectors along the rectangular axes X and Y; a, b and  $\omega$  are constants ant t is the time. The acceleration of the particle is directed along the vector

1)  $-a\hat{i} + b\hat{j}$  2)  $b\hat{j} + a\hat{j}$  3)  $-\vec{r}$  4)  $\frac{d\vec{r}}{dt}$ 



87)A child is on a merry-go-round, standing at a distance 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 the child slips? (Assume  $g = 10 \text{ m/s}^2$ )

1)0.5 rad/s

2)1 rad/s

3)2 rad/s

4)4 rad/s

88)A ball of mass 0.2 kg is thrown from a height of 1 m and with an initial velocity of  $\sqrt{10}$  m/sec at an angle of 45° with the horizontal. Assuming acceleration due to gravity g = 10 m/sec<sup>2</sup>+, the modulus of momentum increment during the total time of motion in kg m/sec, is



89)A small body of mass 500 g moves on a rough horizontal surface before finally stops, The initial velocity of the body is 2m/sec and coefficient of friction is 0.3. The absolute value of the average power developed by the frictional force during the time of motion will be (take  $g = 10 \text{ ms/sec}^2$ )

1)1 W 2)1.5 W 3)2 W 4)2.5 W www.sakshieducation.com



90)A 1.5 kg ball is shot upward at an angle of  $34^{\circ}$  to the horizontal with an initial speed of 20 m/s. The maximum height the ball reaches is (use  $\cos 34^{\circ} = 0.83$  or  $\sin 34^{\circ} = 0.56$ )

- 1)6.3 2)9.4
- 3)13.8
- 4)11.2 m

91)If a disc of mass M and radius R rotates with an angular acceleration 'a', the torque acting on the disc

1) $MR^2a$	
$2) \frac{MR^2a}{2}$	
$3)\frac{2MR^2a}{5}$	
$4)\frac{2MR^2a}{12}$	XSI

92)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,  $\alpha$  and A are constants. If the moment of inertia of the sphere about the axis passing through centers is  $\frac{6}{7}MR^2$ , the value of  $\alpha$  is





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

energy of the particle in seconds is

- 2)  $\frac{\pi}{15}$
- 3)15
- 4)30

94)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 require to keep itself moving with constant speed in the orbit of radius r?

$$1)\frac{mv^{3}}{r}$$

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

$$3)\frac{6mM_{e}}{(R_{e}+h)}$$

$$4)0$$

95)Consider an air bubble of radius 2 mm in a liquid at a depth of 5cm below the free surface. The density of the liquid is 1000 kg/m<sup>3</sup> and the surface tension is 0.1 N/m. The pressure inside the air bubble is greater than the pressure at the free surface of the liquid by  $(take g = 10 \text{ m/sec}^2)$ 

1)500 Pa 2)600 Pa 3)700 Pa 4)800 Pa



96)A cylindrical vessel is filled with water upto the height 1 m form 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 sec. If the base area of the cylinder is 100 times the area of orfice, then the height of orifice form the base is

(Take  $g = 10 \text{ m/sec}^2$ )

1)80 cm

2)60 cm

3)40 cm

4)20 cm

97)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



98)The resistance of a thermometers is 100 $\Omega$  at the triple point of water (273 K) and is 300  $\Omega$  at the melting point of gold (~ 873K). The temperature at which the resistance of the thermometer is 200  $\Omega$  is

1)273 K 2)373 K 3)473 K 4)573 k



99)A diesel engine has a compression ratio 20 : 1. If the initial pressure is  $1 \times 10^5$  Pa and the initial volume of the cylinder is  $1 \times 10^{-3}$  m<sup>3</sup>, how much work does the gas do during the compression? (Assume the process as adiabatic)

 $(C_v = 20.8 \text{ J/mol K}. \gamma_{air} = 1.4. (20)^{1.4} = 66.3)$ 

- 1)-880 J
- 2)-579 J
- 3)220 J
- 4)485 J

100)A polyatomic gas has f vibrational degrees of freedom. The ratio of the specific heat at constant pressure to that at constant volume will be

1) 
$$\frac{4+f}{3+f}$$
  
2)  $\frac{4-f}{3-f}$   
3)  $\frac{3+f}{4+f}$   
4)  $\frac{3-f}{4-f}$ 

101)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 p/2, then the speed is changed to\_\_\_\_\_

$$4)\frac{v}{\sqrt{2}}$$



102)A printed pages is kept pressed by a transparent cube of edge t. The refractive index of the cube varies as  $\mu(z) = 1 + \frac{z}{t}$ , where z is the vertical distance form bottom of the cube. If viewed top the printed top the printed letters appear to be shifted by an amount

1)(1-ln 2)t 2)2 ln 2-1)t 3)  $\frac{t}{2 \ln 2}$ 4)  $\frac{2t}{3 \ln 2}$ 

103)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 cms. A parallel beam of light traveling in the liquid is refracted by the glass lens. The absolute value of the position of the image form the centre of the glass lens will be





104)A light beam of wavelength 800nm 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

1)0.5 mm

2)2 mm

3)1.5 mm

4)0.25 mm

105)Choose the incorrect statement from the following

1)The electric filed in electrostatics obey principle of superposition

2)The electric filed inside a perfect conductor is zero

3)The electric dipole will try to orient in a direction opposite to the external electric field

4)The electric flux passing through any closed surface enclosing the charges remains constant

106)Consider a parallel capacitor with plates in the shape of square and X-Y plane. The gap between the plates is filled with dielectric material. The dielectric constant k varies

 $k(x) = \left| 1 + \left(\frac{x}{L}\right)^{\alpha} \right|$  where  $\alpha$  is a constant. Let  $C_d$  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  $\alpha$  must be

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



107)The emfs of three cells connected in parallel  $E_1 = 5V$ ,  $E_2 = 8V$  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

- 1)12
- 2)34
- 3)47
- 4)82

108)A cell of emf 10V and internal resistance  $3\Omega$  is connected in parallel with another cell of 7 V and internal resistance  $\frac{3}{5}\Omega$  such that their positive terminals are joined together and so are their 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 2  $\Omega$ . The combination can be replaced by a battery of emf E and internal resistance r, then the values of E and r are respectively

- 1)E = 2V, r = 2.5  $\Omega$
- 2)E = 2 V, r =  $0.4\Omega$
- 3)E = 5V, r =  $0.4 \Omega$

109)A square loop of length L is placed with its edges parallel to the X-Y axes. The loop is carrying the current I. If the magnetic filed in the region varies as  $\vec{B} = B_0 \left(1 + \frac{xy}{L^2}\right) \hat{k}$ , the magnitude of the force on the loop will be:

1)IB<sub>0</sub>L 2)
$$\frac{IB_0L}{2}$$
 3) $\frac{IB_0L}{\sqrt{2}}$  4) $\sqrt{2}$  IB<sub>0</sub> L

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110)A non conducting disc 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  $\sigma_0$  is a constant. The disc rotates about its axis with angular velocity  $\omega$ . If B is the magnitude of magnetic induction at the centre then  $\frac{B}{\mu_0 \sigma_0 \omega R}$  will be

- $1)^{3/4}$  $2)\frac{4}{5}$  $3)\frac{5}{6}$
- $4)\frac{6}{7}$

111)For a wire, as shown in the figure, carrying a current of 10 A, the magnetic induction filed at the point '0' is: [use  $\mu_0 = 4\pi \times 10^{-7}$  H/m]





112)A solenoid of radius R has 'n' turns per unit length. The self-inductance of the solenoid per unit length is

1) $\mu_0 n \pi R^2$ 2) $\mu_0 n R^2$ 3) $\mu_0 n^2 R^2$ 

 $4)\mu_0 n^2 \pi R^2$ 

113)A distribution transformer with an efficiency of 90% supplies to a colony of 10 homes. All the 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

1)12.2 kW

2)4.9 kW

3)8.4 kW

4)9.9 kW

114)The law not described by any four of the Maxwell's equation is

1)Gauss' law for electricity

2)Le-Chatelier's law of equilibrium

3) Gauss' law for magnetism

4)Faraday's law of induction



115)Let  $\vec{E}_0$  and  $\vec{B}_0$  denote the amplitude of electric and magnetic field of a plane electromagnetic wave in air. The magnitude of the average momentum transferred per unit area and per unit time to a totally absorbing surface is

1) 
$$\frac{1}{2} \epsilon_0 E_0^2$$
  
2)  $\frac{1}{2} \mu_0 B_0$   
3) $\epsilon_0 E_0^2$   
4)  $2 \frac{B_0^2}{\mu_0}$ 

116)In a hydrogen sample. If the atoms are excited to sates with principal quantum number 20, the number of different wavelengths which may be observed in the spectrum is

1)100	
2)140	
3)190	
4)230	C

117)Consider a radioactive nuclide which follow decay rate given by  $A(t) = A_0^{-(t/t_0)}$ , where A(t) is the fraction of radioactive material remaining after time 't' form the initial  $A_0$  form the initial  $A_0$  at zero time. Let  $A_1$  be the fraction of original activity which remains after 10 hours. Likewise  $A_2$  is the fraction of original activity remaining after 200 hours. If  $\frac{A_1}{A_2} = 16$ , then the half-life (t<sub>0</sub>)will be

1)10 hours 2)20 hours 3)40 hours 4)60 hours

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





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120)For a television network,  $5 \times 10^5$  channels are granted. If the central frequency of the microwave link is 25 GHz and the allotted bandwidth for each channel is 2 kHz, how much percentage of the link is used form the network?

1)4% 2)10% 3)25% 4)5%

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	Date: 07-05-2018 FN (Shift 1)		
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