CET – PHYSICS – 2014

VERSION CODE: B – 1

1. A person is driving a vehicle at uniform speed of 5 ms^{-1} on a level curved track of radius 5 m. The coefficient of static friction between tyres and road is 0.1. Will the person slip while taking the turn with the same speed? Take g = 10 ms^{-2}.

   (1) A person will slip if $v^2 = 5m^2s^{-2}$ (2) A person will slip if $v^2 > 5m^2s^{-2}$

   (3) A person will slip if $v^2 < 5m^2s^{-2}$ (4) A person will not slip if $v^2 > 5m^2s^{-2}$

Ans: (2)

$v_{max} = \sqrt{\mu rg}$

$v_{max} = \sqrt{0.1\times5\times10} = \sqrt{5}$

or $v_{max}^2 = 5\ m^2/s^2$

$\therefore$ Person or vehicle will slip if the velocity is more than $\sqrt{5}$ m/s

2. A stone is thrown vertically at a speed of 30 ms^{-1} taking an angle of 45° with the horizontal. What is the maximum height reached by the stone? Take g = 10 ms^{-2}.

   (1) 30 m (2) 22.5 m (3) 15 m (4) 10 m

Ans: (2)

$$H = \frac{v^2\sin^2\theta}{2g}$$

$$H = \frac{30^2\sin^2(45)}{2\times10}$$

$$H = 22.5m$$

3. A force $\vec{F} = 5\hat{i} + 2\hat{j} - 5\hat{k}$ acts on a particle whose position vector is $\vec{r} = \hat{i} - 2\hat{j} + \hat{k}$. What is the torque about the origin?

   (1) $8\hat{i} + 10\hat{j} + 12\hat{k}$ (2) $8\hat{i} + 10\hat{j} - 12\hat{k}$ (3) $8\hat{i} - 10\hat{j} - 8\hat{k}$ (4) $10\hat{i} - 10\hat{j} - \hat{k}$

Ans: (1)

$$\vec{\tau} = \vec{r}\times\vec{F} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -2 & 1 \\ 5 & 2 & -5 \end{vmatrix} = \hat{i}(10-2) - \hat{j}(-5-5) + \hat{k}(2+10) = 8\hat{i} + 10\hat{j} + 12\hat{k}$$

4. What is a period of revolution of earth satellite? Ignore the height of satellite above the surface of earth.

   Given: (1) The value of gravitational acceleration g = 10 ms^{-2}.

   (2) Radius of earth R_E = 6400 km. Take π = 3.14.

   (1) 85 minutes (2) 156 minutes (3) 87.73 minutes (4) 90 minutes

Ans: (3)

$$T = 2\pi\sqrt{\frac{R}{g}} = 2\pi\sqrt{\frac{6400\times10^3}{10}}$$

T = 5024 s = 83.73 min

5. A period of geostationary satellite is

(1) 24 h (2) 12 h (3)30 h (4) 48 h

Ans: (1)

6. What is the source temperature of the Carnot engine required to get 70% efficiency? Given sink temperature = 27°C.

(1) 1000 °C (2) 90 °C (3) 270 °C (4) 727 °C

Ans: (4)

$$\eta = 1 - \frac{T_2}{T_1}$$

$$0.7 = 1 - \frac{273+27}{T_1} = 1 - \frac{300}{T_1}$$

$$\frac{300}{T_1} = 0.3$$

$$T_1 = 1000\,K = 727\,^0C$$

7. A 10 kg metal block is attached to a spring of spring constant 1000 Nm^{-1}. A block is displaced from equilibrium position by 10 cm and released. The maximum acceleration of the block is

(1) 10 ms^{-2} (2) 100 ms^{-2} (3) 200 ms^{-2} (4) 0.1 ms^{-2}

Ans: (1)

$$\omega = \sqrt{\frac{k}{m}} = \sqrt{\frac{1000}{10}} = 10\,rad/s$$

$$a_{\max} = -\omega^2 A = -10^2 \times 0.1$$

$$a_{\max} = -10 m/s^2$$

8. A metallic wire of 1 m length has a mass of 10 x 10^{-3} kg. If a tension of 100 N is applied to a wire, what is the speed of transverse wave?

(1) 100 ms^{-1} (2) 10 ms^{-1} (3) 200 ms^{-1} (4) 0.1 ms^{-1}

Ans: (1)

Linear density $m = \frac{mass}{length} = \frac{10\times10^{-3}}{1} = 10\times10^{-3} kg/m$

$$v = \sqrt{\frac{T}{m}} = \sqrt{\frac{100}{10\times10^{-3}}} = 100\,m/s$$

9. A train is approaching towards a platform with a speed of 10 ms^{-1} while blowing a whistle of frequency 340 Hz. What is the frequency of whistle heard by s stationary observer on the platform? Given speed of sound = 340 ms^{-1}.

(1) 330 Hz (2) 350 Hz (3) 340 Hz (4) 360 Hz

Ans: (2)

$$f' = \left(\frac{V}{V - V_s}\right) f = \left(\frac{340}{340-10}\right) 340 = 350.3\,Hz$$

10. A rotating wheel changes angular speed from 1800 rpm to 3000 rpm in 20 s. What is the angular acceleration assuming to be uniform?

(1) 60 π rad s^{-2} (2) 90 π rad s^{-2} (3) 2 π rad s^{-2} (4) 40 π rad s^{-2}

Ans: (3)

$$\omega_1 = 2\pi f_1 = 2\pi\left(\frac{1800}{60}\right) = 60\pi\, rad/s$$

$$\omega_2 = 2\pi f_2 = 2\pi\left(\frac{3000}{60}\right) = 100\pi\, rad/s$$

$$t = 20s$$

$$\alpha = \frac{\omega_2 - \omega_1}{t} = \frac{100\pi - 60\pi}{20} = \frac{40\pi}{20} = 2\pi\, rad/s^2$$

11. A flow of liquid is streamline if the Reynold number is

(1) less than 1000 (2) greater than 1000

(3) between 2000 to 3000 (4) between 4000 to 5000

Ans: (1)

12. A pipe of 30 cm long and open at both the ends produces harmonics. Which harmonic mode of pipe resonates a 1.1 kHz source? Given speed of sound in air = 330 ms^{-1}.

(1) Fifth harmonic (2) Fourth harmonic (3) Third harmonic (4) Second harmonic

Ans: (4)

$$f_n = n \times f_1$$

$$f_n = n \times \left(\frac{v}{2\ell}\right)$$

$$1{,}100 = n \times \frac{330}{2 \times 0.30}$$

$$n = 2$$

13. In anomalous expansion of water, at what temperature, the density of water is maximum?

(1) 4^oC (2) $< 4^oC$ (3) $> 4^oC$ (4) 10^oC

Ans: (1)

14. An aeroplane executes a horizontal loop at a speed of 720 kmph with its wings banked at 45^o. What is the radius of the loop? Take g = 10 ms^{-2}.

(1) 4 km (2) 4.5 km (3) 7.2 km (4) 2 km

Ans: (1)

v = 720 km/hr = 200 m/s

$\tan\theta = \frac{v^2}{rg}$ or $r = \frac{v^2}{g \times \tan\theta} = \frac{200^2}{10 \times 1} = 4km$.

15. A body having a moment of inertia about its axis of rotation equal to 3 kg m^2 is rotating with angular velocity of 3 rad s^{-1}. Kinetic energy of this rotating body is same as that of a body of mass 27 kg moving with a velocity v. The value of v is

(1) 1 ms^{-1} (2) 0.5 ms^{-1} (3) 2 ms^{-1} (4) 1.5 ms^{-1}

Ans: (1)

$$\frac{1}{2}mv^2 = \frac{1}{2}I\omega^2$$

$$\frac{1}{2} \times 27 \times v^2 = \frac{1}{2} \times 3 \times 3^2$$

$$v = 1m/s$$

16. A cycle tyre bursts suddenly. What is the type of this process?

(1) Isothermal (2) Adiabatic (3) Isochoric (4) Isobaric

Ans: (2)

17. An object is placed at 20 cm in front of a concave mirror produces three times magnified real image. What is the focal length of the concave mirror?

(1) 15 cm (2) 6.6 cm (3) 10 cm (4) 7.5 cm

Ans: (1)

$m = \frac{f}{f-u} \Rightarrow -3 = \frac{f}{f-(-20)}$ ($\because$ all real images are inverted)

$-3f + 60 = f$

$f = -15cm$

Since mirror is concave $f = 15cm$

18. A focal length of a lens is 10 cm. What is power of a lens in dioptre?

(1) 0.1 D (2) 10 D (3) 15 D (4) D

Ans: (2)

$P = \frac{1}{f} = \frac{1}{0.1} = 10D$

19. A microscope is having objective of focal length 1 cm and eyepiece of focal length 6 cm. If tube length is 30 cm and image is formed at the least distance of distinct vision, what is the magnification produced by the microscope? Take D = 25 cm.

(1) 6 (2) 150 (3) 25 (4) 125

Ans: (2)

$M = \frac{L}{f_0}\left(1 + \frac{D}{f_e}\right)$

$= \frac{30}{1}\left(1 + \frac{25}{6}\right) = 155 \approx 150$

20. A fringe width of a certain interference pattern is β = 0.002 cm. What is the distance of 5th dark fringe from centre?

(1) 1 x 10^{-2} cm (2) 11 x 10^{-2} cm (3) 1.1 x 10^{-2} cm (4) 3.28 x 10^{6} cm

Ans: (None of the above answers are correct)

$x_n = (2n+1)\frac{\lambda D}{2d} = (2n+1)\frac{\beta}{2}$

For 5th dark fringe, n = 4

$x_5 = \frac{9}{2}\beta = \frac{9}{2} \times 2 \times 10^{-3}$

$= 9 \times 10^{-3} cm$

β = 0.002 cm
= 2 x 10^{-3} cm

21. Diameter of the objective of a telescope is 200 cm. What is the resolving power of a telescope? Take wavelength of light = 5000 $\overset{0}{A}$.

(1) 6.56 x 10^{6} (2) 3.28 x 10^{5} (3) 1 x 10^{6} (4) 3.28 x 10^{6}

Ans: (4)

RP = $\frac{D}{1.22\lambda} = \frac{2}{1.22 \times 0.5 \times 10^{-6}} = \frac{4}{1.22} \times 10^{6} = 3.28 \times 10^{6}$

22. A polarized light of intensity I_0 is passed through another polarizer whose pass axis makes an angle of 60^o with the pass axis of the former. What is the intensity of emergent polarized light from second polarizer?

(1) $I = I_0$ (2) $I = I_0/6$ (3) $I = I_0/5$ (4) $I_0/4$

Ans: (4)

$$I = I_0 \cos^2\theta = I_0 \cos^2 60 = \frac{I_0}{4}$$

23. What is the de Broglie wavelength of the electron accelerated through a potential difference of 100 volt?

(1) 12.27 $\overset{0}{A}$ (2) 1.227 $\overset{0}{A}$ (3) 0.1227 $\overset{0}{A}$ (4) 0.001227 $\overset{0}{A}$

Ans: (2)

$$\lambda = \frac{12.27}{\sqrt{V}} = \frac{12.27}{\sqrt{100}} = 1.227\,\overset{0}{A}$$

24. The maximum kinetic energy of the photoelectrons depends only on

(1) potential (2) frequency (3) incident angle (4) pressure

Ans: (2)

25. Which of the following spectral series of hydrogen atom is lying in visible range of electromagnetic wave?

(1) Paschen series (2) Pfund series (3) Lyman series (4) Balmer series

Ans: (4)

26. What is the energy of the electron revolving in third orbit expressed in eV?

(1) 1.51 eV (2) 3.4 eV (3) 4.53 eV (4) 4 eV

Ans: (1)

$$E_n = -\frac{13.6}{n^2} = -\frac{13.6}{(3)^2} = -1.51eV$$

27. The relation between half life (T) and decay constant (λ) is

(1) $\lambda T = 1$ (2) $\lambda T = \frac{1}{2}$ (3) $\lambda T = \log_e 2$ (4) $\lambda = \log 2T$

Ans: (3)

$$T = \frac{0.693}{\lambda} \Rightarrow \lambda T = 0.693 \Rightarrow \lambda T = \log_e 2$$

28. A force between two protons is same as the force between proton and neutron. The nature of the force is

(1) Weak nuclear force (2) Strong nuclear force

(3) Electrical force (4) Gravitational force

Ans: (2)

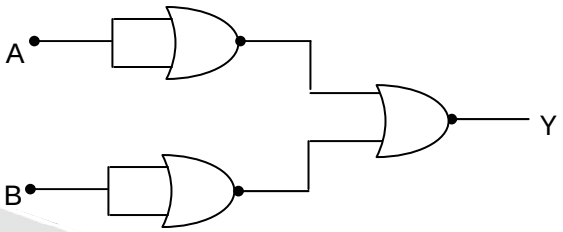
29. In n type semiconductor, electrons are majority charge carriers but it does not show any negative charge. The reason is

(1) electrons are stationary (2) electrons neutralize with holes

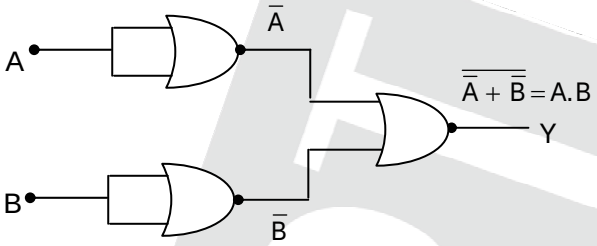
(3) mobility of electrons is extremely small (4) atom is electrically neutral

Ans: (4)

30. For the given digital circuit, write the truth table and identify the logic gate it represents:
    (1) OR-Gate
    (2) NOR-Gate
    (3) NAND-Gate
    (4) AND-Gate



Ans: (4)



31. If α-current gain of a transistor is 0.98. What is the value of β-current gain of the transistor?
    (1) 0.49 (2) 49 (3) 4.9 (4) 5

Ans: (2)

$$\beta=\frac{\alpha}{1-\alpha}=\frac{0.98}{0.02}=49$$

32. A tuned amplifier circuit is used to generate a carrier frequency of 2 MHz for the amplitude modulation. The value of $\sqrt{LC}$ is

    (1) $\frac{1}{2\pi\times10^6}$ (2) $\frac{1}{2\times10^6}$ (3) $\frac{1}{3\pi\times10^6}$ (4) $\frac{1}{4\pi\times10^6}$

Ans: (4)

$$f=\frac{1}{2\pi\sqrt{LC}}\Rightarrow\sqrt{LC}=\frac{1}{2\pi f}=\frac{1}{2\pi\times2\times10^6}=\frac{1}{4\pi\times10^6}$$

33. If a charge on the body is 1 nC, then how many electrons are present on the body?
    (1) 1.6×10^{19} (2) 6.25×10^{9} (3) 6.25×10^{27} (4) 6.25×10^{28}

Ans: (2)

$$q=ne\Rightarrow n=\frac{q}{e}=\frac{1\times10^{-9}}{1.6\times10^{9}}=6.25\times10^{+9}$$

34. Two equal and opposite charges of masses m_1 and m_2 are accelerated in an uniform electric field through the same distance. What is the ratio of their accelerations if their ratio of masses is $\frac{m_1}{m_2}$ = 0.5?

    (1) $\frac{a_1}{a_2}=0.5$ (2) $\frac{a_1}{a_2}=1$ (3) $\frac{a_1}{a_2}=2$ (4) $\frac{a_1}{a_2}=3$

Ans: (3)

Force is same in magnitude for both

$$\frac{a_1}{a_2}=\frac{F/m_1}{F/m_2}=\frac{m_2}{m_1}=2$$

35. What is the nature of Gaussian surface involved in Gauss law of electrostatic?

(1) Scalar (2) Electrical (3) Magnetic (4) Vector

Ans: (4)

Area vector

36. What is the electric potential at a distance of 9 cm from 3 nC?

(1) 270 V (2) 3 V (3) 300 V (4) 30 V

Ans: (3)

$$v = 9\times10^{9}\times\frac{q}{r}$$

$$v = \frac{9\times10^{9}\times3\times10^{-9}}{9\times10^{-2}} = 300V$$

37. A voltmeter reads 4V when connected to a parallel plate capacitor with air as a dielectric. When a dielectric slab is introduced between plates for the same configuration, voltmeter reads 2V. What is the dielectric constant of the material?

(1) 0.5 (2) 2 (3) 8 (4) 10

Ans: (2)

$$\in_r = \frac{V_a}{V_m} = \frac{4}{2} = 2$$

38. A spherical conductor of radius 2 cm is uniformly charged with 3 nC. What is the electric field at a distance of 3 cm from the centre of the sphere?

(1) 3×20^{6} V m^{-1} (2) 3 V m^{-1} (3) 3×10^{4} V m^{-1} (4) 3×10^{-4} V m^{-1}

Ans: (3)

$$E = 9\times10^{9}\times\frac{q}{r^{2}}$$

$$E = \frac{9\times10^{9}\times3\times10^{-9}}{(3\times10^{-2})^{2}} = 3\times10^{4}\ \mathbf{V}/m$$

39. A carbon film resistor has colour code Green Black Violet Gold. The value of the resistor is

(1) 50 MΩ (2) 500 MΩ (3) 500 ± 5% MΩ (4) 500 ± 10% MΩ

Ans: (3)

50 x 10^{7} ± 5% = 500 x 10^{6} ± 5% = 500 ± 5% MΩ

40. Two resistors of resistances 2Ω and 6Ω are connected in parallel. This combination is then connected to a battery of emf 2V and internal resistance 0.5 Ω. What is the current flowing through the battery?

(1) 4 A (2) $\frac{4}{3}$ A (3) $\frac{4}{17}$ A (4) 1 A

Ans: (4)

$$\frac{R_1R_2}{R_1+R_2}$$

$$R_p = \frac{2\times6}{(2+6)} = 1.5\Omega$$

$$I = \frac{E}{R_p+r} = \frac{2}{1.5+0.5} = 1A$$

41. The equivalent resistance of two resistors connected in series is 6Ω and their parallel equivalent resistance is $\frac{4}{3}\Omega$. What are the values of resistances?

(1) 4Ω, 6Ω (2) 8Ω, 1Ω (3) 4Ω, 2Ω (4) 6Ω, 2Ω

Ans: (3)

$R_1 + R_2 = 6$

$$\frac{R_1R_2}{R_1+R_2}=\frac{4}{3}\Rightarrow R_1R_2=8\Rightarrow R_1=2, R_2=4\Omega$$

42. In a potentiometer experiment of a cell of emf 1.25 V gives balancing length of 30 cm. If the cell is replaced by another cell, balancing length of 30 cm. If the cell is replaced by another cell, balancing length is found to be 40 cm. What is the emf of second cell?

(1) ≃ 1.57 V (2) ≃ 1.67 V (3) ≃ 1.47 V (4) ≃ 1.37V

Ans: (2)

$E_1 \propto L_1$

$E_1 \propto L_2$

$$\frac{E_1}{E_2}=\frac{L_1}{L_2}\Rightarrow\frac{1.25}{E_2}=\frac{30}{40}\Rightarrow E_2=\frac{5}{3}=1.67\ \text{V}$$

43. A charged particle experiences magnetic force in the presence of magnetic field. Which of the following statement is correct?

(1) The particle is moving and magnetic field is perpendicular to the velocity

(2) The particle is moving and magnetic field is parallel to velocity

(3) The particle is stationary and magnetic field is perpendicular

(4) The particle is stationary and magnetic field is parallel

Ans: (1)

No force acts in other cases.

44. If a velocity has both perpendicular and parallel components while moving through a magnetic field, what is the path followed by a charged particle?

(1) Circular (2) Elliptical (3) Linear (4) Helical

Ans: (4)

Parallel component drags the particle to side and perpendicular component gives circular path. Hence the path is helical.

45. A solenoid has length 0.4 cm, radius 1 cm and 400 turns of wire. If a current of 5 A is passed through this solenoid, what is the magnetic field inside the solenoid?

(1) 6.28 x 10^{-4}T (2) 6.28 x 10^{-3} T (3) 6.28 x 10^{-7} T (4) 6.28 x 10^{-6} T

Ans: (None of the above answers are correct)

$$B=\mu_0 nI \quad (n=N/L)$$

$$=4\times3.14\times10^{-7}\times\frac{400}{0.4\times10^{-2}}\times5$$

$$=0.628T$$

(No correct answer available)

46. A gyromagnetic ratio of the electron revolving in a circular orbit of hydrogen atom is 8.8×10^{10} C kg^{-1}. What is the mass of the electron? Given charge of the electron $= 1.6 \times 10^{-19}$C.

(1) 1×10^{-29} kg (2) 0.1×10^{-29} kg (3) 1.1×10^{-29} kg (4) $\frac{1}{11} \times 10^{-29}$ kg

Ans: (4)

$$\frac{\mu}{L} = \frac{e}{2m}$$

$$m = \frac{e}{2(\mu / L)} = \frac{1.6 \times 10^{-19}}{2 \times 8.8 \times 10^{10}} = \frac{1}{11} \times 10^{-29} kg$$

47. What is the value of shunt reistance required to convert a galvanometer of resistance 100 Ω into an ammeter of range 1A?
Given: Full scale deflection of the galvanometer is 5 mA.

(1) $\frac{5}{9.95}$ Ω (2) $\frac{9.95}{5}$ Ω (3) 0.5 Ω (4) 0.05 Ω

Ans: (1)

$$S = \frac{I_g G}{I - I_g} = \frac{5 \times 10^{-3} \times 10^2}{1 - 5 \times 10^{-3}} = \frac{0.5}{1 - 5 \times 10^{-3}} = \frac{5}{10 - 0.05} = \frac{5}{9.95} \Omega$$

48. A circular coil of radius 10 cm and 100 turns carries a current 1 A. What is the magnetic moment of the coil?

(1) 3.142×10^4 A m^2 (2) 10^4 A m^2 (3) 3.142 A m^2 (4) 3 A m^2

Ans: (3)

$M = NIA = NI\pi r^2 = 10^2 \times 1 \times 3.142 \times 10^{-2} = 3.142$ Am^2

49. A susceptibility of a certain magnetic material is 400. What is the class of the magnetic material?

(1) Diamagnetic (2) Paramagnetic (3) Ferromagnetic (4) Ferroelectric

Ans: (3)

50. A solenoid of inductance 2H carries a current 1 A. What is the magnetic energy stored in a solenoid?

(1) 2 J (2) 1 J (3) 4 J (4) 5 J

Ans: (2)

U = $\frac{1}{2} LI^2 = \frac{1}{2} \times 2 \times 1 = 1J$

51. A multimeter reads a voltage of a certain A.C. source as 100 V. What is the peak value of voltage of A.C. source?

(1) 200 V (2) 100 V (3) 141.4 V (4) 400 V

Ans: (3)

$$V_0 = \sqrt{2} V_{rms} = 1.414 \times 100 = 141.4 \text{ V}$$

52. A series LCR circuit contains inductance 5 mH, capacitance 2 μF and resistance 10 Ω. If a frequency A.C. source is varied, what is the frequency at which maximum power is dissipated?

(1) $\frac{10^5}{\pi}$ Hz (2) $\frac{10^{-5}}{\pi}$ Hz (3) $\frac{2}{\pi} \times 10^5$ Hz (4) $\frac{5}{\pi} \times 10^3$ Hz

Ans: (4)

$$f_0 = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{5\times10^{-3}\times2\times10^{-6}}} = \frac{10^{-4}}{2\pi} = \frac{5\times10^{-3}}{\pi} Hz$$

53. A step down transformer has 50 turns on secondary and 1000 turns on primary winding. If a transformer is connected to 220 V 1 A A.C. source, what is output current of the transformer?

(1) $\frac{1}{20}$ A (2) 20 A (3) 100 A (4) 2 A

Ans: (2)

$$\frac{N_s}{N_p} = \frac{V_s}{V_p}$$

$$\frac{50}{1000} = \frac{V_s}{220}$$

$$V_s = 11V$$

$$V_s I_s = V_p I_p$$

$$11\times I_s = 220\times1$$

$$I_s = 20\,A$$

54. The average power dissipated in A.C. circuit is 2 watt. If a current flowing through a circuit is 2 A impedance is 1 Ω, what is the power factor of the AC circuit?

(1) 0.5 (2) 1 (3) 0 (4) $\frac{1}{\sqrt{2}}$

Ans: (1)

$$P = VI\cos\phi = I^2 \mathrm{Z}\cos\phi$$

$$\cos\phi = \frac{P}{I^2 Z} = \frac{2}{4\times1} = 0.5$$

55. A plane electromagnetic wave of frequency 20 MHz travels through a space along x direction. If the electric field vector at a certain point in space is 6 V m^{-1}, what is the magnetic field vector at that point?

(1) 2 x 10^{-3} T (2) $\frac{1}{2}$ x 10^{-8} T (3) 2 T (4) $\frac{1}{2}$ T

Ans: (1)

E/B = C

B = E/C = $\frac{6}{3\times10^8} = 2\times10^{-8}T$

56. Two capacitors of 10 PF and 20 PF are connected to 200 V and 100 V sources respectively. If they are connected by the wire, what is the common potential of the capacitors?

(1) 133.3 volt (2) 150 volt (3) 300 volt (4) 400 volt

Ans: (1)

$$V = \frac{C_1V_1 + C_2V_2}{C_1 + C_2} = \frac{10\times200 + 20\times100}{10+20} = 133.3V$$

57. A physical quantity Q is found to depend on observables x, y and z, obeying relation $Q = \frac{x^3 y^2}{z}$. The percentage error in the measurements of x, y and z are 1%, 2% and 4% respectively. What is percentage error in the quantity Q?

(1) 4% (2) 3% (3) 11% (4) 1%

Ans: (3)

$$\frac{\Delta Q}{Q} = 3\frac{\Delta x}{x} + 2\frac{\Delta y}{y} + \frac{\Delta z}{z} = 3\times 1 + 2\times 2 + 4 = 11\%$$

58. What of the following is not a vector quantity?

(1) Weight (2) Nuclear spin (3) Momentum (4) Potential energy

Ans: (4)

59. A car moves form A to B with a speed of 30 kmph and from B to A with a speed of 20 kmph. What is the average speed of the car?

(1) 25 kmph (2) 24 kmph (3) 50 kmph (4) 10 kmph

Ans: (2)

$$v_{av} = \frac{2v_1 v_2}{v_1 + v_2} = \frac{2\times 30\times 20}{30+20} = 24\,kmph$$

60. A body starts from rest and moves with constant acceleration for t s. It travels a distance x_1 in first half of time and x_2 in next half of time, then

(1) $x_2 = x_1$ (2) $x_2 = 2x_1$ (3) $x_2 = 3x_1$ (4) $x_2 = 4x_1$

Ans: (3)

a = $\frac{x_2 - x_1}{t^2}$ ------ (1)

$x_1 = \frac{1}{2}at^2 \quad (\because u = 0)$

In (1) $3x_1 = x_2$