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KCET 2020 Question Paper with Solution

The Karnataka Common Entrance Test

KCET EXAMINATION – 2020
SUBJECT : PHYSICS

DATE :- 31-07-2020 **TIME : 10.30 AM TO 11.50 AM**

1. The value of acceleration due to gravity at a height of 10km from the surface of earth is x. At what depth inside the earth is the value of the acceleration due to gravity has the same value x ?
a) 5 km b) 20 km c) 10 km d) 15 km

Ans. **b**

Sol. $g_h = g\left(1-\frac{2h}{R}\right)$

$g_d = g\left(1-\frac{d}{R}\right)$

$g_h = g_d$

$g\left(1-\frac{2h}{R}\right) = g\left(1-\frac{d}{R}\right)$

$d = 2R$

$= 2\times 10 = 20 \text{ km}$

2. Young's modulus of a perfect rigid body is
a) Zero b) Unity c) Infinity
d) Between zero and unity

Ans. **c**

Sol. For a perfect rigid body elongation $\Delta l = 0$

$y = \left(\frac{f}{A}\right)\frac{l}{\Delta l}$ becomes infinity

3. A wheel starting from rest gains an angular velocity of 10 rad/s after uniformly accelerated for 5 sec. The total angle through which it has turned is
a) 25 rad
b) 100 rad
c) 25 π rad
d) 50 π rad about a vertical axis

Ans. **a**

Sol. $\omega_1 = 0$

$\omega_2 = 10 \text{ rad/sec}$

$t = 5 \text{ sec}$

$\theta = \left(\frac{\omega_1+\omega_2}{2}\right)\times t$

$\theta = \frac{(0+10)\times 5}{2} = 25 \text{ rad}$

4. Iceberg floats in water with part of it submerged. What is the fraction of the volume of iceberg submerged if the density of ice is ρ_i=0.917 g cm^{-3} ?
a) 0.917 b) 1 c) 0.458 d) 0

Ans. **a**

Sol. $V_b \cdot \rho_b = V_i \cdot \rho_l$

$\frac{V_i}{V_b} = \frac{\rho_b}{\rho_l} = \frac{0.917}{1} = 0.917$

5. A sphere, a cube and a thin circular plate all of same material and same mass initially heated to same high temperature are allowed to cool down under similar conditions. Then the
a) plate will cool the fastest and cube the slowest
b) sphere will cool the fastest and cube the slowest
c) plate will cool the fastest and sphere the slowest
d) cube will cool the fastest and plate the slowest

Ans. **c**

Sol. From $E = A\sigma T^4$

$E \alpha A$

Surface area is more for plate and less for sphere. Hence plate will cool the fastest and sphere the slowest

6. In an adiabatic expansion of an ideal gas the product of pressure and volume
a) Decreases
b) Increases
c) Remains constant
d) At first increases and then decreases

Ans. **a**

Sol. In an adiabatic expansion as temperature decreases from ideal gas equation PV=nRT the product of pressure and volume decreases

7. A certain amount of heat energy is supplied to a monoatomic ideal gas which expands at constant pressure. What fraction of the heat energy is converted into work ?

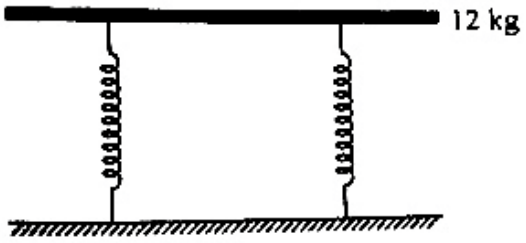
a) 1 b) $\frac{2}{3}$ c) $\frac{2}{5}$ d) $\frac{5}{7}$

Ans. c

Sol. $\frac{dW}{dQ} = 1 - \frac{1}{\gamma} = 1 - \frac{1}{(5/3)}$

$= \frac{2}{5}$

8. A tray of mass 12 kg is supported by two identical springs as shown in figure. When the tray is pressed down slightly and then released, it executes SHM with a time period of 1.5s. The spring constant of each spring is



a) 50 Nm^{-1} b) 0 c) 105 Nm^{-1} d) ∞

Ans. c

Sol. $T = 2\pi\sqrt{\frac{m}{k_{eff}}}$

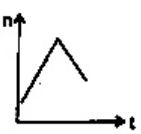
$\frac{3}{2} = 2\pi\sqrt{\frac{12}{2k}}$

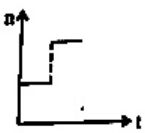
$\frac{9}{4} = 4\pi^2 \times \frac{12}{2k}$

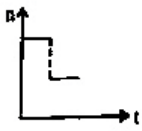
$k \simeq 105\ n/m$

9. A train whistling at constant frequency 'n' is moving towards a station at a constant speed V. The train goes past a stationary observer on the station. The frequency 'n' of the sound as heard by the observer is plotted as a function of time 't'. Identify the correct curve

a) 

b) 

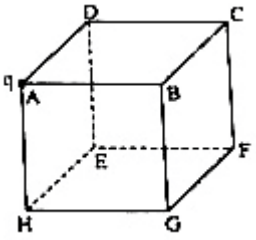
c) 

d) 

Ans. d

Sol. Conceptual

10. A point charge 'q' is placed at the corner of a cube of side 'a' as shown in the figure. What is the electric flux through the face ABCD ?



a) 0 b) $\frac{q}{24\varepsilon_0}$ c) $\frac{q}{6\varepsilon_0}$ d) $\frac{q}{72\varepsilon_0}$

Ans. c

Sol. $\phi_{ABCD} = \frac{\phi}{6} = \frac{q}{6\varepsilon_0}$

11. The electric field lines on the left have twice the separation on those on the right as shown in figure. If the magnitude of the field at A is 40 Vm^{-1}, what is the force on 20μC charge kept at B ?

a) $4x10^{-4}$ Vm^{-1} b) $8x10^{-4}$ Vm^{-1}
c) $16x10^{-4}$ Vm^{-1} d) $1x10^{-4}$ Vm^{-1}

Ans. a

Sol. $F = Eq$

$= 20 \times 20 \times 10^{-6}$

$= 4 \times 10^{-4}\ v/m$

12. An infinitely long thin straight wire has uniform charge density of $\frac{1}{4} \times 10^{-2} cm^{-1}$. What is the magnitude of electric field at a distance 20 cm from the axis of the wire ?

a) $1.12x10^{8}$ NC^{-1} b) $4.5x10^{8}$ NC^{-1}
c) $2.25x10^{8}$ NC^{-1} d) $9x10^{8}$ NC^{-1}

Ans. c

Sol. $E = \frac{\lambda}{2\pi\varepsilon_0 . r}$

$= \frac{1}{4} \times \frac{10^{-2}}{10^{-2}} \times 18 \times 10^9 \times 5$

$= 2.25 \times 10^8\ N/C$

13. A dipole moment 'P' and moment of inertia I is placed in a uniform electric field $\vec{E}$. If it is displaced slightly from its stable equilibrium position, the period of oscillation of dipole is

a) $\sqrt{\frac{PE}{I}}$ b) $2\pi\sqrt{\frac{I}{PE}}$ c) $\frac{1}{2\pi}\sqrt{\frac{PE}{I}}$ d) $\pi\sqrt{\frac{I}{PE}}$

Ans. b

Sol. $T = 2\pi\sqrt{\frac{I}{PE}}$

14. The difference between equivalent capacitances of two identical capacitors connected in parallel to that in series is 6μF. The value of capacitance of each capacitor is

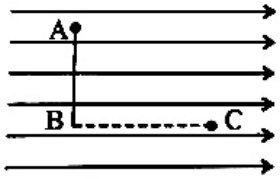
a) 2μF b) 3μF c) 4μF d) 6μF

Ans. c

Sol. $C_P - C_S = 6\mu F$

$2C - \frac{C}{2} = 6 \Rightarrow C = 4\mu F$

15. Figure shows three points A, B and C in a region of uniform electric field $\vec{E}$. The line AB is perpendicular and BC is parallel to the field lines. Then which of the following holds good ? (V_A, V_B and V_C represent the electric potential at points A, B and C respectively)



a) $V_A=V_B=V_C$ b) $V_A=V_B>V_C$

c) $V_A=V_B<V_C$ d) $V_A>V_B=V_C$

Ans. b

Sol. $V_A = V_B > V_C$

16. When a soap bubble is charged ?

a) Its radius increases

b) Its radius decreases

c) The radius remains the same

d) Its radius may increase or decrease

Ans. a

Sol. Its radius increases

17. A hot filament liberates an electron with zero initial velocity. The anode potential is 1200V. The speed of the electron when it strikes the anode is

a) 1.5×10^5 ms^{-1} b) 2.5×10^6 ms^{-1}

c) 2.1×10^7 ms^{-1} d) 2.5×10^8 ms^{-1}

Ans. c

Sol. $\frac{1}{2}mv^2 = Vq$ $\qquad v = \sqrt{\frac{2Vq}{m}} = 2.1\times10^7$

18. A metal rod of length 10 cm and a rectangular cross – section of $1cm\times\frac{1}{2}cm$ is connected to a battery across opposite faces. The resistance will be

a) maximum when the battery is connected across $1cm\times\frac{1}{2}cm$ faces

b) maximum when the battery is connected across $10cm\times\frac{1}{2}cm$ faces

c) maximum when the battery is connected across 10 cm x 1 cm faces

d) same irrespective of the three faces

Ans. a

Sol. $R\alpha\frac{1}{A}$

Maximum when the battery is connected across $1cm\times\frac{1}{2}cm$ faces

19. A car has a fresh storage battery of e.m.f 12V and internal resistance $2\times10^{-2}\Omega$. If the starter motor draws a current of 80A. Then the terminal voltage when the starter is on is

a) 12V b) 8.4V c) 10.4V d) 9.3V

Ans. c

Sol. $V = E - ir = 10.4\,V$

20. A potentiometer has a uniform wire of length 5m. A battery of emf 10V and negligible internal resistance is connected between its ends. A secondary cell connected to the circuit gives balancing length at 200 cm. The emf of the secondary cell is

a) 4V b) 6V c) 2V d) 8V

Ans. a

Sol. $\frac{E_1}{E_2} = \frac{l_1}{l_2} \Rightarrow \frac{10}{E_2} = \frac{5}{2} \Rightarrow E_2 = 4\,V$

21. The colour code for a carbon resistor of resistance $0.28k\Omega\pm10\%$ is

a) Red, Grey, Brown, Silver

b) Red, Green, Brown, Silver

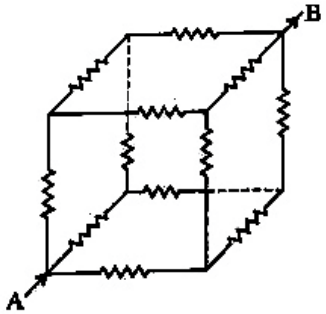
c) Red, Grey, Silver, Silver

d) Red, Green, Silver

Ans. a

Sol. Red, Grey, Brown, Silver

22. Each resistance in the given cubical network has resistance of 1Ω and equivalent resistance between A and B is

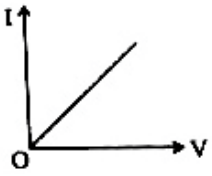


a) $\frac{5}{6}\Omega$ b) $\frac{6}{5}\Omega$ c) $\frac{5}{12}\Omega$ d) $\frac{12}{5}\Omega$

Ans. a

Sol. $R_{eff} = \frac{5}{6}r = \frac{5}{6}\Omega$

23. I-V characteristic of a copper wire of length L and area of cross-section A is shown in figure. The slope of the curve becomes



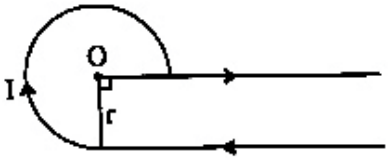
a) More if experiment is performed at higher temperature
b) More if a wire of steel of same dimension is used
c) Less if the area of the wire is increased
d) Less if the length of the wire is increased

Ans. d

Sol. $\text{Slope} = \frac{1}{R} = \frac{A}{\rho \times l}$

Less if the length of the wire is increased

24. In the given figure, the magnetic field at 'O'.



a) $\frac{3}{4}\frac{\mu_0 I}{r} + \frac{\mu_0 I}{4\pi r}$ b) $\frac{3}{10}\frac{\mu_0 I}{r} - \frac{\mu_0 I}{4\pi r}$

c) $\frac{3}{8}\frac{\mu_0 I}{r} + \frac{\mu_0 I}{4\pi r}$ d) $\frac{3}{8}\frac{\mu_0 I}{r} - \frac{\mu_0 I}{4\pi r}$

Ans. c

Sol. $B_{net} = B_1 + B_2 + B_3$

$= \frac{3}{8}\frac{\mu_0 I}{r} + \frac{\mu_0 I}{4\pi r} + 0$

25. The magnetic field at the origin due to a current element $i\vec{dl}$ placed at a point with vector position $\vec{r}$ is

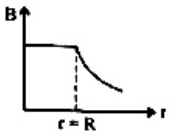
a) $\frac{\mu_0 i}{4\pi}\frac{\vec{dl}\times\vec{r}}{r^3}$ b) $\frac{\mu_0 i}{4\pi}\frac{\vec{r}\times\vec{dl}}{r^3}$

c) $\frac{\mu_0 i}{4\pi}\frac{\vec{dl}\times\vec{r}}{r^2}$ d) $\frac{\mu_0 i}{4\pi}\frac{\vec{r}\times\vec{dl}}{r^2}$

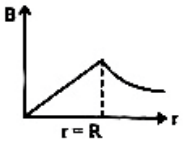
Ans. a

Sol. $\frac{\mu_0 i}{4\pi}\frac{\vec{dl}\times\vec{r}}{r^3}$

26. A long cylindrical wire of radius R carries a uniform current I flowing through it. The variation of magnetic field with distance 'r' from the axis of the wire is shown by

a) 

b) 

c) 

d) 

Ans. c

Sol. Conceptual

27. A cyclotron is used to accelerate protons $\left({}_1^1H\right)$, Deuterons $\left({}_1^2H\right)$ and α-particles $\left({}_2^4He\right)$. While exiting under similar conditions, the minimum K.E. is gained by

a) α-particle b) Proton
c) Deuteron d) Same for all

Ans. c

Sol. $K.E = \frac{q^2B^2r}{2m}$ $\quad K.E = \frac{q^2}{m}$

Minimum K.E is gained by deuteron

28. A paramagnetic sample shows a net magnetization of 8 Am^{-1} when placed in an external magnetic field of 0.6T at a temperature of 4K. When the same sample is placed in an external magnetic field of 0.2 T at a temperature of 16 K. the magnetization will be

a) $\frac{32}{3}$ Am^{-1} b) $\frac{2}{3}$ Am^{-1}

c) 6 Am^{-1} d) 2.4 Am^{-1}

Ans. b

Sol. $I\alpha \frac{B}{T}$

$\frac{I_2}{I_1} = \frac{B_2}{B_1} \times \frac{T_1}{T_2}$ $\quad \frac{I_2}{8} = \frac{0.2}{0.6} \times \frac{4}{16}$ $\quad I_2 = \frac{2}{3} Am^{-1}$

29. The ratio of magnetic field at the centre of a current carrying circular coil to its magnetic moment is 'x' if the current and the radius both are doubled. The new ratio will become

a) 2x b) 4x c) $\frac{x}{4}$ d) $\frac{x}{8}$

Ans. d

Sol. $\frac{B}{M} = \frac{(\mu_0 IN / 2r)}{NI\pi r^2}$

$\frac{B}{M} = \alpha \frac{1}{r^3}$

$x = \frac{B}{M}$ (let)

$\frac{x_2}{x} = \left(\frac{r}{2r}\right)^3 = \frac{x}{8}$

30. In a permanent magnet at room temperature

a) Magnetic moment of each molecule is zero

b) The individual molecules have non-zero magnetic moment which are all perfectly aligned

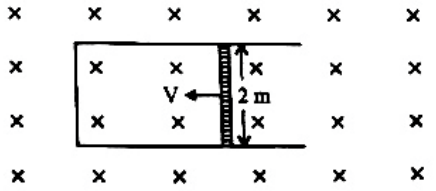
c) Domains are partially aligned

d) Domains are all perfectly aligned

Ans. d

Sol. Domains are all perfectly aligned

31. A rod of length 2 m slides with a speed of 5 ms^{-1} on a rectangular conducting frame as shown in figure. There exists a uniform magnetic filed of 0.04 T perpendicular to the plane of the figure. If the resistance of the rod is 3Ω. The current through the rod is



a) 75 mA b) 133 mA c) 0.75 A d) 1.33 A

Ans. b

Sol. $i = \frac{Blv}{R} = \frac{0.04 \times 2 \times 5}{3}$

$= 133\,mA$

32. The current in a coil of inductance 0.2 H changes from 5A to 2A in 0.5sec. The magnitude of the average induced emf in the coil is

a) 0.6 V b) 1.2 V c) 30 V d) 0.3 V

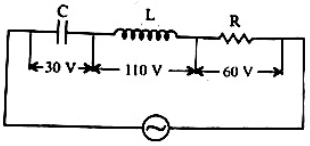
Ans. b

Sol. $e = L\frac{di}{dt}$

$= 0.2\left(\frac{5-2}{0.5}\right)$

$= \frac{2}{5} \times 3 = 1.2\ V$

33. In the given circuit the peak voltage across C, L and R are 30 V, 110 V and 60 V respectively. The rms value of the applied voltage is



a) 100 V b) 200 V c) 70.7 V d) 141 V

Ans. c

Sol. $V_0 = \sqrt{V_R^2 + (V_L - V_C)^2}$

$= \sqrt{(60)^2 + (110-30)^2}$

$= 100$

$V_{rms} = \frac{V_0}{\sqrt{2}} = \frac{100}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$

$= 100\left(\frac{\sqrt{2}}{2}\right)$

$= 100\left(\frac{1.414}{2}\right)$

$= 70.7\ V$

34. The power factor of R-L circuit is $\frac{1}{\sqrt{3}}$. If the inductive reactance is 2Ω. The value of resistance is

a) 2Ω b) $\sqrt{2}\,\Omega$ c) $0.5\,\Omega$ d) $\frac{1}{\sqrt{2}}\Omega$

Ans. b

Sol. $\cos\phi = \frac{1}{\sqrt{3}}$

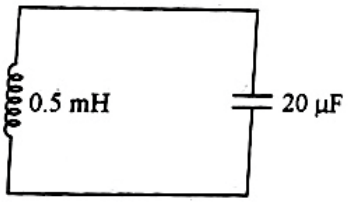
$\tan\phi = \frac{\sqrt{2}}{1}$

$\tan\phi = \frac{X_L}{R}$

$\sqrt{2} = \frac{2}{R}$

$R = \frac{2}{\sqrt{2}} = \sqrt{2}\ \Omega$

35. In the given circuit, the resonant frequency is



a) 15.92 Hz b) 159.2 Hz
c) 1592 Hz d) 15910 Hz

Ans. c

Sol. $V = \frac{1}{2\pi\sqrt{LC}}$

$= \frac{1}{2\pi\sqrt{0.5\times10^{-3}\times20\times10^{-6}}}$

$= 1592$ Hz

36. A light beam of intensity 20 W/cm^2 is incident normally on a perfectly reflecting surface of sides 25 cm×15 cm. The momentum imparted to the surface by the light per second is

a) 2×10^{-5} kg ms^{-1} b) 1×10^{-5} kg ms^{-1}
c) 5×10^{-5} kg ms^{-1} d) 1.2×10^{-5} kg ms^{-1}

Ans. c

Sol. $I = \frac{E}{A}$

$E = IA$

$P = \frac{2E}{C}$

$P = \frac{2IA}{C}$

$= \frac{2\times20\times25\times15}{3\times10^{8}}$

$= 5\times10^{-5}$ kg ms^{-1}

37. An object approaches a convergent lens from the left of the lens with a uniform speed 5 m/s and stops at the focus, the image

a) Moves away from the lens with an uniform speed 5 m/s

b) Moves away from the lens with an uniform acceleration

c) Moves away from the lens with a non-uniform acceleration

d) Moves towards the lens with a non-uniform acceleration

Ans. c

Sol. Moves away from the lens with a non-uniform acceleration.

38. The refracting angle of prism is A and refractive index of material of prism is $\cot\frac{A}{2}$. The angle of minimum deviation is

a) $180^0 - 3A$ b) $180^0 + 2A$
c) $90^0 - A$ d) $180^0 - 2A$

Ans. d

Sol. $n = \frac{\sin\left(\frac{A+d_m}{2}\right)}{\sin\frac{A}{2}}$

$\cot\frac{A}{2} = \frac{\sin\left(\frac{A+d_m}{2}\right)}{\sin\frac{A}{2}}$

$\frac{\cos\frac{A}{2}}{\sin\frac{A}{2}} = \frac{\sin\left(\frac{A+d_m}{2}\right)}{\sin\frac{A}{2}}$

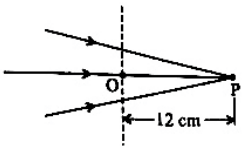
$\sin\left(90-\frac{A}{2}\right) = \sin\left(\frac{A+d_m}{2}\right)$

$90 - \frac{A}{2} = \frac{A+d_m}{2}$

$180 - A - A = d_m$

$180 - 2A = d_m$

39. The following figure shows a beam of light converging at point P. When a concave lens of focal length 16 cm is introduced in the path of the beam at a place shown by dotted line such that OP becomes the axis of the lens, the beam converges at a distance x from the lens. The value of x will be equal to



a) 12 cm b) 24 cm c) 36 cm d) 48 cm

Ans. d

Sol. $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ f=16 cm, u= 12 cm

40. Three polaroid sheets P_1, P_2 and P_3 are kept parallel to each other such that the angle between pass axes of P_1 and P_2 is 45^0 and that between P_2 and P_3 is 45^0. If unpolarised beam of light of intensity 128 Wm^{-2} is incident on P_1. What is the intensity of light coming out of P_3?

a) 128 Wm^{-2} b) 0
c) 16 Wm^{-2} d) 64 Wm^{-2}

Ans. c

Sol. $I = \frac{I_0}{2}\left(\cos^2\theta\right)^2$

41. Two poles are separated by a distance of 3.14 m. The resolving power of human eye is 1 minute of an arc. The maximum distance from which he can identify the two poles distinctly is

a) 10.8 km b) 5.4 km c) 188 m d) 376 m

Ans. a

Sol. $\theta = \frac{d}{D}$

42. In young's Double Slit Experiment, the distance between the slits and the screen is 1.2 m and the distance between the two slits is 2.4 mm. If a thin transparent mica sheet of thickness 1 μm and R.I. 1.5 is introduced between one of the interfering beams, the shift in the position of central bright fringe is

a) 2 mm b) 0.5 mm
c) 0.125 mm d) 0.25 mm

Ans. d

Sol. Shift $= (M-1)t\frac{D}{d}$ =0.25 mm

43. The de-Broglie wavelength associated with electron of hydrogen atom in this ground state is

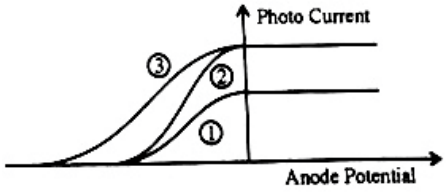
a) $0.3\,\overset{0}{A}$ b) $3.3\,\overset{0}{A}$ c) $6.26\,\overset{0}{A}$ d) $10\,\overset{0}{A}$

Ans. b

Sol. E=13.6 V

$$\lambda = \frac{12.27}{\sqrt{13.6}} = \frac{12.27}{3.68} = 3.33A^0$$

44. The following graph represents the variation of photo current with anode potential for a metal surface. Here I_1, I_2 and I_3 represents intensities and γ_1, γ_2, γ_3 represent frequency for curves 1, 2 and 3 respectively, then



a) $\gamma_1 = \gamma_2$ and $I_1 \neq I_2$ b) $\gamma_1 = \gamma_3$ and $I_1 \neq I_3$
c) $\gamma_1 = \gamma_2$ and $I_1 = I_2$ d) $\gamma_2 = \gamma_3$ and $I_1 = I_3$

Ans. a

Sol. Stopping potential same

So frequencies same $(r_1 = r_2)$

Currents are different

So intensity are different

$I_1 \neq I_2$

45. The period of revolution of an electron revolving in n^{th} orbit of H-atom is proportional to

a) n^2 b) $\frac{1}{n}$
c) n^3 d) Independent of n

Ans. c

Sol. $T \alpha n^3$

46. Angular momentum of an electron in hydrogen atom is $\frac{3h}{2\pi}$ (h is the Planck's constant). The K.E. of the electron is

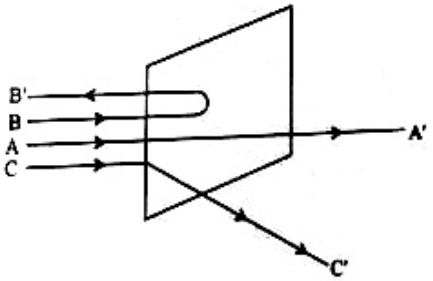
a) 4.35 eV b) 1.51 eV c) 3.4 eV d) 6.8 eV

Ans. b

Sol. $mvr = \frac{nh}{2\pi}$

n=3

47. A beam of fast moving alpha particles were directed towards a thin film of gold. The parts A, B and C of the transmitted and reflected beams corresponding to the incident parts A, B and C of the beam are shown in the adjoining diagram. The number of alpha particles in



a) B' will be minimum and in C' maximum
b) A' will be maximum and in C' minimum
c) A' will be minimum and in B' maximum
d) C' will be minimum and in B' maximum

Ans.

Sol. A' will be maximum

B' will be Minimum

48. Two protons are kept at a separation of 10 nm. Let F_n and F_e the nuclear force and the electromagnetic force between them

a) $F_e = F_n$
b) $F_e >> F_n$
c) $F_e << F_n$
d) F_e and F_n differ only slightly

Ans. b

Sol. Conceptual

49. During a β^- decay

a) An atomic electron is ejected

b) An electron which is already present within the nucleus is ejected

c) A neutron in the nucleus decays emitting an electron

d) A proton in the nucleus decays emitting an electron

Ans. c

Sol. A neutron in the nucleus decays emitting an electron

50. A radio-active elements has half-life of 15 years. What is the fraction that will decay in 30 years?

a) 0.25 b) 0.5 c) 0.75 d) 0.85

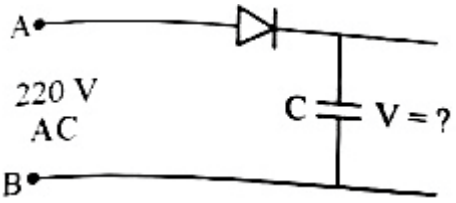
Ans. c

Sol. Fraction of remaining element

$$\left(1-\frac{N}{N_0}\right)\times 100=\left(\frac{1}{2}\right)^{t/T}\times 100=0.25$$

The fraction that will decay in 30 years is 0.75

51. A 220 V A.C supply is connected between points A and B as shown in figure what will be the potential difference V across the capacitor?



a) 220 V b) 110 V

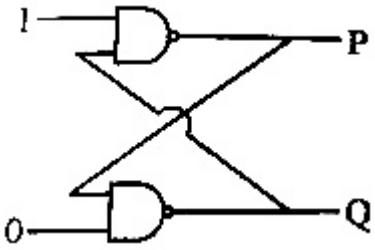
c) 0 d) $220\sqrt{2}$ V

Ans. d

Sol. The potential difference a cross the capacitor is peak voltage.

$$V_{max}=V_{rms}\times\sqrt{2}=220\sqrt{2}V$$

52. In the following circuit what are P and Q:



a) P = 1, Q = 0 b) P = 0, Q = 1

c) P = 0, Q = 0 d) P = 1, Q = 1

Ans. b

Sol. P=0, Q=1

53. A positive hole in a semiconductor is

a) An anti-particle of electron

b) A vacancy created when an electron leaves a covalent bond

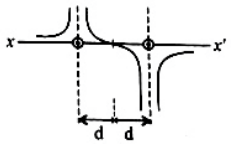
c) Absence of free electrons

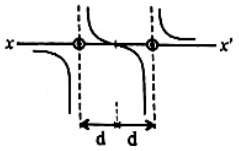
d) An artificially created particle

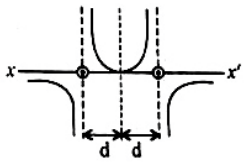
Ans. b

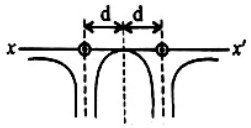
Sol. A vacancy created when an electron leaves a covalent bond.

54. Two long straight parallel wires are a distance 2 d part. They carry steady equal currents flowing out of the plane of the paper. The variation of magnetic field B along the line xx' is given by

a) 

b) 

c) 

d) 

Ans. b

Sol. $B=\frac{\mu_0 i}{2\pi r}$

$B\alpha\frac{1}{r}$

55. A cylindrical wire has a mass (0.3 ± 0.003)g, radius (0.5 ± 0.005)mm and length (6 ± 0.06)cm. The maximum percentage error in the measurement of its density is

a) 1 b) 2 c) 3 d) 4

Ans. d

Sol. $d=\frac{m}{v}=\frac{m}{\pi r^2 l}$

$$\frac{\Delta d}{d}\times 100\%=\frac{\Delta m}{m}\times 100\%+2\frac{\Delta r}{r}\times 100\%+\frac{\Delta l}{l}\times 100\%=4$$

56. At a metro station, a girl walks up a stationary escalator in 20 sec. If she remains stationary on the escalator, then the escalator take her up in 30 sec. The time taken by her to walk up on the moving escalator will be

a) 25 sec b) 60 sec c) 12 sec d) 10 sec

Ans. c

Sol. $t=\frac{t_1 t_2}{t_1+t_2}=12$

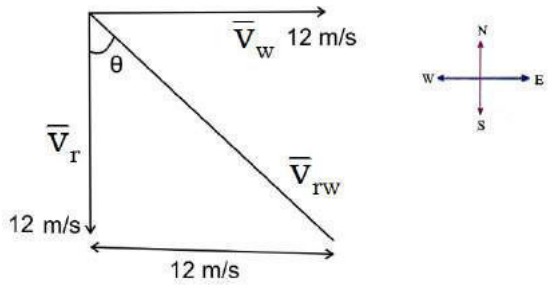
57. Rain is falling vertically with a speed of 12 ms^{-1}. A woman rides a bicycles with a speed of 12 ms^{-1} in east to west direction. What is the direction in which she should hold her umbrella?

a) 30^0 towards East b) 45^0 towards East

c) 30^0 towards West d) 45^0 towards West

Ans. b

Sol.



$$\tan\theta = \frac{|v_r|}{|v_m|} = \frac{12}{12} = 1$$

$\theta = 45^0$ towards east

58. One end of a string of length ' l ' is connected to a particle of mass 'm' and the other to a small peg on a smooth horizontal table. If the particle moves in a circle with speed 'v', the net force on the particle (directed towards the centre) is : (T is the tension in the string)

a) T b) $T - \frac{mv^2}{l}$

c) $T + \frac{mv^2}{l}$ d) 0

Ans. a

Sol. The net force on the particle (directed towards the centre) is tension (T) in the string

59. A body is initially at rest. It undergoes one-dimensional motion with constant acceleration. The power delivered to it at time 't' is proportional to

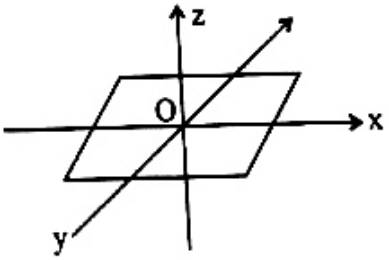
a) $t^{1/2}$ b) t c) $t^{3/2}$ d) t^2

Ans. b

Sol. $P = \frac{1}{2}\frac{mv^2}{t} = \frac{1}{2}\frac{m\times(at)^2}{t}$

$p\alpha t$

60. A thin uniform rectangular plate of mass 2 kg is placed in X-Y plane as shown in figure. The moment of inertial about x-axis is $I_x = 0.2$ kg m^2 and the moment of inertia about y-axis is $I_y = 0.3$ kg m^2. The radius of gyration of the plate about the axis passing through O and perpendicular to the plane of the plate is



a) 50 cm b) 5 cm c) 38.7 cm d) 31.6 cm

Ans. a

Sol. $I_z = I_x + I_y = 0.5\,Kg\ m^2$

$I = mK^2$

$K = 0.5\,m = 50cm$

KCET EXAMINATION – 2020
SUBJECT : CHEMISTRY

DATE :- 31-07-2020 **TIME : 02.30 PM TO 03.50 PM**

1. Copper is extracted from copper pyrites by
a) Thermal decomposition
b) Reduction by coke
c) Electrometallurgy
d) Auto reduction

Ans. d

2. Function of potassium ethyl xanthate in froth floatation process is to make the ore
a) Lighter b) Hydrophobic
c) Hydrophilic d) Heavier

Ans. b

3. Sulphide ore on roasting gives a gas X. X reacts with Cl_2 in the presence of activated charcoal to give Y. Y is:
a) SO_2Cl_2 b) S_2Cl_2 c) SCl_6 d) $SOCl_2$

Ans. a

4. Aqueous solution of a salt (A) forms a dense white precipitate with $BaCl_2$ solution. The precipitate dissolves in dilute HCl to produce a gas (B) which decolourises acidified $KMnO_4$ solution
A and B respectively are:
a) $BaSO_3$, SO_2 b) $BaSO_4$, H_2S
c) $BaSO_3$, H_2S d) $BaSO_4$, SO_2

Ans. a

5. Bond angle in PH_4^+ is more than that of PH_3. This is because
a) Lone pair – bond pair repulsion exists in PH_3
b) PH_4^+ has square planar structure
c) PH_3 has planar trigonal structure
d) Hybridisation of P changes when PH_3 is converted to PH_4^+

Ans. a

6. Incorrectly matched pair is:
a) XeO_3 – pyramidal
b) XeF_4 – tetrahedral
c) XeF_6 – disorted octahedral
d) $XeOF_4$ – square pyramidal

Ans. b

7. Phosphorus pentachloride
a) On hydrolysis gives an oxo acid of phosphorus which is tribasic
b) On hydrolysis gives an oxo acid of phosphorus which is a good reducing agent
c) Has all the five equivalent bonds
d) Exists as an ionic solid in which cation has octahedral structure and anion has tetrahedral structure

Ans. a

8. Identify the set of paramagnetic ions among the following:
a) V^{2+}, Co^{2+}, Ti^{4+} b) $Ni^{2+}, Cu^{2+}, Zn^{2+}$
c) $Ti^{3+}, Cu^{2+}, Mn^{3+}$ d) Sc^{3+}, Ti^{3+}, V^{3+}

Ans. c

9. How many moles of acidified $K_2Cr_2O_7$ is required to liberate 6 moles of I_2 from an aqueous solution of I^- ?
a) 2 b) 1 c) 0.25 d) 0.5

Ans. a

10. Cu_2Cl_2 and $CuCl_2$ in aqueous medium
a) $CuCl_2$ is more stable than Cu_2Cl_2
b) Stability of Cu_2Cl_2 is equal to stability of $CuCl_2$
c) Both are unstable
d) Cu_2Cl_2 is more stable than $CuCl_2$

Ans. a

11. The Co-ordination number of Fe and Co in the complex ions, $\left[Fe(C_2O_4)_3\right]^{3-}$ and $\left[Co(SCN)_4\right]^{2-}$ are respectively:
a) 3 and 4 b) 6 and 8
c) 4 and 6 d) 6 and 4

Ans. d

12. Number of stereoisomers exhibited by $\left[Co(en)_2Cl_2\right]^+$ is
a) 4 b) 2 c) 5 d) 3

Ans. d

13. Give the IUPAC name of $\left[Pt(NH_3)_4\right][PtCl_4]$ is

a) Tetra ammine platinum (o) tetra chlorido platinum (IV)
b) Tetra ammine palatinate (II) tetra chlorido platinum (II)
c) Tetra ammine palatinate (o) tetra chlorido platinum (IV)
d) Tetra ammine platinum (II) tetra chlorido palatinate (II)

Ans. d

14. Prolonged exposure of chloroform in humans may cause damage to liver. It is due to the formation of the following compound

a) CCl_4 b) $COCl_2$ c) CH_2Cl_2 d) Cl_2

Ans. b

Sol. $CHCl_3 \xrightarrow{[o]} COCl_2 + HCl$

15. Which of the following halide shows highest reactivity towards S_N1 reaction?

a) $C_6H_5CH_2Cl$
b) $CH_3 - CH_2Cl$
c) $CH_3 - CH_2 - CH_2 - CH_2I$
d) C_6H_5Cl

Ans. a

Sol. Rate of SN^1 reaction is directly proportional to stability of carbocation or Reactivity of SN^1 reaction is influenced by stability of carbocation.

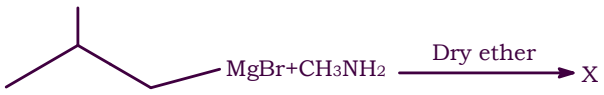
16. In the reaction

The number of possible isomers for the organic compound X is

a) 4 b) 5 c) 3 d) 2

Ans. d

Sol.



x = isobutane and it has two isomers.

17. Which of the following on heating gives an ether as major products?

P: $C_6H_5CH_2Br + CH_3ONa$
Q: $C_6H_5ONa + CH_3Br$
R: $(CH_3)_3C - Cl + CH_3ONa$
S: $C_6H_5CH = CHCl + CH_3ONa$

a) Both R and S b) Both P and R
c) Both Q and S d) Both P and Q

Ans. d

Sol. Primary alkyl halides/benzyl halides reacts with alkoxide/phenoxide through SN^2 mechanism gives ethers.
Vinyl and aryl halides least reactive towards SN^1

18. The steps involved in the conversion of propan -2-ol to propan -1-ol are in the order

a) Dehydration, addition of HBr, heating with aq. KOH
b) Heating with PCl_5, heating with alc. KOH, acid catalysed addition of water
c) Heating with PCl_5, heating with alc. KOH, hydroboration oxidation
d) Dehydration, addition of HBr in presence of peroxide, heating with alc. KOH

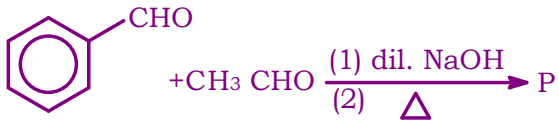
Ans. c

19. Which of the following is the strongest base?

a) CH_3COO^- b) Cl^-
c) OH^- d) CH_3O^-

Ans. d

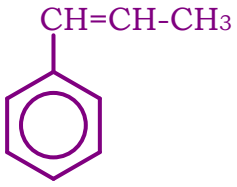
20.



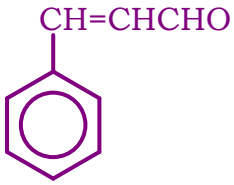
The product 'P' is

a)

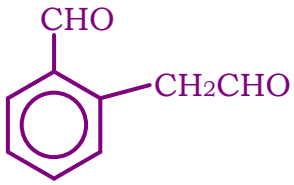
b)



c)

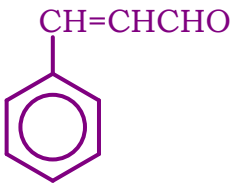


d)



Ans. c

Sol.



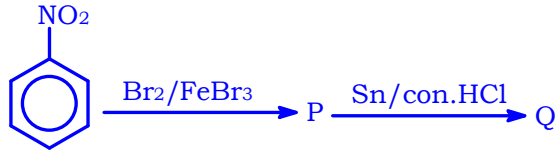
21. Which of the following has the lowest boiling point?
a) CH_3CH_2OH b) $CH_3-CH_2-NH_2$
c) CH_3-O-CH_3 d) HCOOH

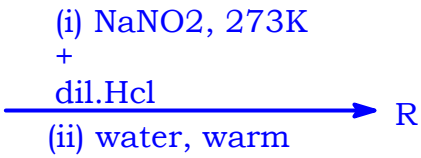
Ans. c

22. The carbonyl compound that does not undergo aldol condensation is
a) Acetone
b) Di chloro acetaldehyde
c) Tri chloro acetaldehyde
d) Acetaldehyde

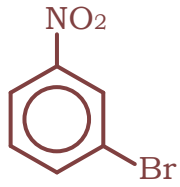
Ans. c

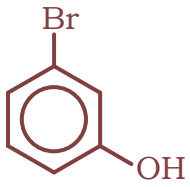
Sol. Aldehydes and ketones containing alpha hydrogens will undergo aldol condensation

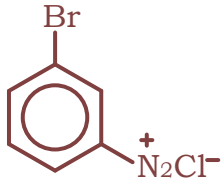
23. 

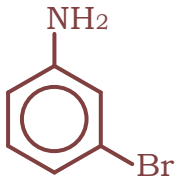


. The final product is

a) 

b) 

c) 

d) 

Ans. b

24. Hinsberg's reagent is
a) $(CH_3CO)_2O$ / pyridine
b) $C_6H_5SO_2Cl$
c) $C_6H_5SO_2NH_2$
d) CH_3COCl / pyridine

Ans. b

25. Which one of the following vitamins is not stored in adipose tissue?
a) A b) B_6 c) D d) E

Ans. b

26. Hypothyroidism is caused by the deficiency of
a) Vitamin B-12 b) Adrenalin
c) Thyroxine d) Glucocorticoid

Ans. c

27. C_1-C_4 glycosidic bond is NOT found in
a) Maltose b) Sucrose
c) Lactose d) Starch

Ans. b

28. Which of the following polymer has strongest intermolecular forces of attraction?
a) Neoprene b) Terylene
c) Polythene d) Polystyrene

Ans. b

29. Which of the following monomers can undergo condensation polymerization?
a) Styrene b) Glycine
c) Isoprene d) Propene

Ans. b

30. A food additive that acts as an antioxidant is
a) BHA b) Saccharin
c) Sugar syrup d) Salt

Ans. a

31. Which of the following is not related to drug-enzyme interaction?
a) Allosteric site b) Antagonist
c) Co-enzymes d) Enzyme inhibitor

Ans. b

32. 0.4 g of dihydrogen is made to react with 7.4 g of dichlorine to form hydrogen chloride. The volume of hydrogen formed at 273K and 1 bar pressure is
a) 9.08L b) 4.54L c) 90.8L d) 45.4L

Ans. b

33. With regard to photoelectric effect, identify the correct statement among the following
a) Energy of e^- ejected increases with the increase in the intensity of incident light
b) Number of e^- ejected increases with the increase in the frequency of incident light
c) Number of e^- ejected increases with the increase in work function
d) Number of e^- ejected increases with the increase in the intensity of incident light

Ans. d

34. The last element of the p-block in 6th period is represented by the outer most electronic configuration
a) $7s^2\ 7p^6$
b) $5f^{14}6d^{10}7s^27p^5$
c) $4f^{14}5d^{10}6s^26p^4$
d) $4f^{14}5d^{10}6s^26p^6$

Ans. d

35. The conjugate base of NH_3 is
a) NH_4^+ b) NH_4OH c) NH_2OH d) NH_2^-

Ans. d

36. A gas mixture contains 25% He and 75% CH_4 by volume at a given temperature and pressure. The percentage by mass of methane in the mixture is approximately____
a) 75% b) 25% c) 92% d) 8%

Ans. c

37. The percentage of s-character in the hybrid orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ respectively are
a) 33.3%, 50%, 25% b) 33.3%, 25%, 50%
c) 50%, 33.3%, 25% d) 25%, 50%, 33.3%

Ans. c

38. The formal charge on central oxygen atom in ozone is
a) -1 b) 0 c) +2 d) +1

Ans. d

39. When the same quantity of heat is absorbed by a system at two different temperatures T_1 and T_2, such that $T_1 > T_2$, change in entropies are ΔS_1 and ΔS_2 respectively. Then
a) $\Delta S_1 < \Delta S_2$ b) $\Delta S_1 = \Delta S_2$
c) $S_2 > S_1$ d) $\Delta S_2 < \Delta S_1$

Ans. a

Sol. $\boxed{\Delta S = \frac{q}{T}}$

q is same (constant)

$\therefore \boxed{\Delta S \alpha \frac{1}{T}}$

40. The oxidation number of nitrogen atoms in NH_4NO_3 are
a) +5, +5 b) -3, +5 c) +3, -5 d) -3, -3

Ans. b

41. A Lewis acid 'X' reacts with $LiAlH_4$ in ether medium to give a highly toxic gas. This gas when heated with NH_3 gives a compound commonly known as inorganic benzene. The gas is
a) B_2O_3 b) B_2H_6 c) $B_3N_3H_6$ d) BF_3

Ans. b

42. The oxide of potassium that does not exist is
a) K_2O b) KO_2 c) K_2O_2 d) K_2O_3

Ans. d

43. The metal that products H_2 with both dil HCl and NaOH (aq) is
a) Zn b) Mg c) Ca d) Fe

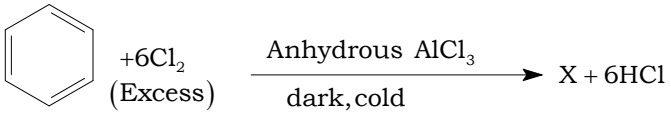
Ans. a

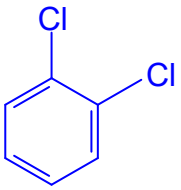
Sol. Amphoteric metals can react with both acids and bases.

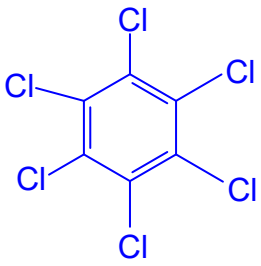
44. Which of the following is NOT a pair of functional isomers?
a) $C_2H_5OC_2H_5$ and $C_3H_7OCH_3$
b) CH_3CH_2OH and CH_3OCH_3
c) $CH_3CH_2NO_2$ and H_2NCH_2COOH
d) CH_3COOH and $HCOOCH_3$

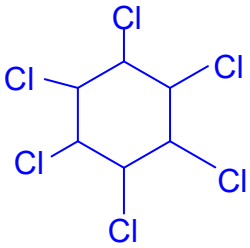
Ans. a

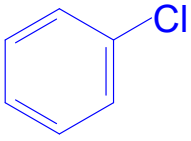
45. Identify 'X' in the following reaction



a) 

b) 

c) 

d) 

Ans. b

46. Which of the following is NOT a green house gas?
a) CFC b) CO_2 c) O_2 d) NO_2

Ans. c

47. A metal exists as an oxide with formula $M_{0.96}O$. Metal M can exist as M^{+2} and M^{+3} in its oxide $M_{0.96}O$. The percentage of M^{+3} in the oxide is nearly

a) 8.3% b) 4.6% c) 5% d) 9.6%

Ans. a

Sol. $M_O.96^0$

No. of M^{+2} ions $= x$

No. of M^{+3} ions $= 0.96 - x$

Total positive charges = Total negative charge (in magnitude)

$$x(2) + (0.96 - x)(3) = 1\,(2)$$

$$2x + 2.88 - 3x = 2$$

$$-x = 2 - 2.88$$

$$\therefore x = 0.88$$

No. of M^{+3} ions $= 0.96 - 0.88$

$= 0.08$

Percentage of $M^{+3} = \dfrac{0.08}{0.96} \times 100$

$= 8.33\ \%$

48. A metal crystallises in face centred cubic structure with metallic radius $\sqrt{2}A^0$. The volume of the unit cell (in m^3) is

a) 4×10^{-10} b) 6.4×10^{-29}

c) 4×10^{-9} d) 6.4×10^{-30}

Ans. b

Sol. For FCC

$$\boxed{\text{Atomic radius}(r) = \frac{\sqrt{2}a}{4}}$$

$$\sqrt{2} \times 10^{-10} = \frac{\sqrt{2}a}{4}$$

$$a = \frac{4 \times \sqrt{2} \times 10^{-10}}{\sqrt{2}}$$

$$a = 4 \times 10^{-10}\,m$$

Volume of unit cell $= a^3$

$$= \left(4 \times 10^{-10}\right)^3$$

$$= 64 \times 10^{-30}$$

$$= 6.4 \times 10^{-29}\,m^3$$

49. Silicon doped with gallium forms

a) n-type semiconductor

b) both n and p type semiconductor

c) an intrinsic semiconductor

d) p-type semiconductor

Ans. d

50. The pair of electrolytes that posses same value for the constant (A) in the Debye – Huckel – Onsagar equation, $\lambda_m = \lambda_m^e - A\sqrt{C}$ is

a) $MgSO_4$, $NaSO_4$ b) NH_4Cl, NaBr

c) NaBr, $MgSO_4$ d) NaCl, $CaCl_2$

Ans. b

51. Which of the following pair of solutions is isotonic ?

a) 0.01M $BaCl_2$ and 0.015M NaCl

b) 0.001M $Al_2(SO_4)_3$ and 0.01 M $BaCl_2$

c) 0.001M $CaCl_2$ and 0.001M $Al_2(SO_4)_3$

d) 0.01M $BaCl_2$ and 0.001M $CaCl_2$

Ans. a

Sol. When solute particle concentration is same then they are isotonic

52. Solute 'X' dimerises in water to the extent of 80%. 2.5g of 'X' in 100g of water increases the boiling point by 0.3 ^0C. The molar mass of 'X' is [K_b=0.52K kg mol^{-1}]

a) 13 b) 52 c) 65 d) 26

Ans. d

Sol. $i = 1 + \alpha\left(\dfrac{1}{n} - 1\right)$

$$i = 1 + 0.8\left(\frac{1}{2} - 1\right)$$

$$i = 1 - 0.4 = 0.6$$

$$\Delta T_b = k_b \times \frac{W}{m} \times \frac{100}{W(gm)} \times i$$

$$0.3 = 0.52 \times \frac{2.5}{m} \times \frac{1000}{100} \times 0.6$$

$$\text{Molar mass of } x(m) = \frac{0.52 \times 2.5 \times 10 \times 0.6}{0.3}$$

$$= 26$$

53. Given $E^0_{Fe^{+3}/Fe^{+2}} = +0.76V$ and $E^0_{I_2/I^-} = +0.55V$. The equilibrium constant for the reaction taking place in galvanic cell consisting of above two electrodes is $\left[\dfrac{2.303RT}{F} = 0.06\right]$

a) 1×10^7 b) 1×10^9 c) 3×10^8 d) 5×10^{12}

Ans. a

Sol. $E^0_{Fe^{+3}/Fe^{+2}} = +0.76\ (\text{cathode})$

$$E^0_{I_2/I^-} = +0.55\ (\text{Anode})$$

$$E^0_{cell} = E^0{}_C - E^o{}_A$$

$$= 0.76 - 0.55 = 0.21$$

$2Fe^{+3} + 2I^- \rightarrow 2Fe^{+2} + I_2$

$E^0_{Cell} = \frac{0.059}{n} \log k_c$

$0.21 = \frac{0.059}{2} \log\ k_c$

$\log k_c = 7$

$\boxed{k_c = 10^7}$

54. If an aqueous solution of NaF is electrolyzed between inert electrodes, the product obtained at anode is

a) F_2 b) H_2 c) Na d) O_2

Ans. d

55. In which of the following cases a chemical reaction is possible ?

a) $ZnSO_{4(aq)}$ is placed in a copper vessel

b) $AgNO_3$ solution is stirred with a copper spoon

c) Conc. HNO_3 is stored in a platinum vessel

d) gold ornaments are washed with dil HCl

Ans. b

56. The time required for 60% completion of a first order reaction is 50 min. The time required for 93.6% completion of the same reaction will be

a) 100 min b) 83.8 min

c) 50 min d) 150 min

Ans. d

Sol. 60% completion

$K = \frac{2.303}{t} \log \frac{[R_0]}{[R]}$

$K = \frac{2.303}{50} \log \frac{100}{40}$

$K = \frac{2.303}{50} \times 0.397$

93.6% completion

$K = \frac{2.303}{t} \log \frac{[R_0]}{[R]}$

$\frac{2.303}{50} \times 0.397 = \frac{2.303}{t} \log \frac{100}{6.4}$

$t = 150\ min$

57. For an elementary reaction 2A+3B→ 4C+D the rate of appearance of C at time 't' is 2.8×10^{-3} mol $L^{-1}S^{-1}$. Rate of disappearance of B at 't' t will be

a) $\frac{4}{3}\left(2.8 \times 10^{-3}\right) mol\ L^{-1}\ S^{-1}$

b) $\frac{3}{4}\left(2.8 \times 10^{-3}\right) mol\ L^{-1}\ S^{-1}$

c) $2\left(2.8 \times 10^{-3}\right) mol\ L^{-1}\ S^{-1}$

d) $\frac{1}{4}\left(2.8 \times 10^{-3}\right) mol\ L^{-1}\ S^{-1}$

Ans. b

Sol. $-\frac{1}{3}\frac{d(B)}{dt} = +\frac{1}{4}\frac{d(C)}{dt}$

$\frac{-d(B)}{dt} = +\frac{3}{4}\frac{d(C)}{dt}$

$= \frac{+3}{4}\left(2.8 \times 10^{-3}\right) mol\ L^{-1}\ S^{-1}$

58. The rate constant of a reaction is given by $k = P\ Ze^{-Ea/RT}$ under standard notation. In order to speed up the reaction, which of the following factors has to be decreased ?

a) Z b) Both Z and T

c) E_a d) T

Ans. c

59. A sol of AgI is prepared by mixing equal volumes of 0.1M $AgNO_3$ and 0.2M KI, which of the following statement is correct ?

a) Sol obtained is a negative sol with NO_3^- adsorbed on AgI

b) Sol obtained is a positive sol with Ag^+ adsorbed on AgI

c) Sol obtained is a positive sol with K^+ adsorbed on AgI

d) Sol obtained is a negative sol with I^- adsorbed on AgI

Ans. d

60. During Adsorption of a gas on a solid

a) $\Delta G<0, \Delta H<0, \Delta S<0$

b) $\Delta G>0, \Delta H>0, \Delta S>0$

c) $\Delta G<0, \Delta H<0, \Delta S>0$

d) $\Delta G<0, \Delta H>0, \Delta S>0$

Ans. a

KCET EXAMINATION – 2020
SUBJECT : MATHEMATICS

DATE :- 30-07-2020 **TIME : 02.30 PM TO 03.50 PM**

1. If $2^x+2^y=2^{x+y}$, then $\frac{dy}{dx}$ is

a) 2^{y-x} b) -2^{y-x} c) 2^{x-y} d) $\frac{2^y-1}{2^x-1}$

Ans. b

2. If $f(x)=\sin^{-1}\left(\frac{2x}{1+x^2}\right)$, then $f'\left(\sqrt{3}\right)$ is

a) $-\frac{1}{2}$ b) $\frac{1}{2}$ c) $\frac{1}{\sqrt{3}}$ d) $-\frac{1}{\sqrt{3}}$

Ans. b

3. The right hand and left hand limit of the function

$$f(x)=\begin{cases}\frac{e^{1/x}-1}{e^{1/x}+1}, & \text{if } x\neq 0\\ 0, & \text{if } x=0\end{cases}$$

are respectively

a) 1 and 1 b) 1 and -1
c) -1 and -1 d) -1 and 1

Ans. b

4. If $y=2x^{n+1}+\frac{3}{x^n}$, then $x^2\frac{d^2y}{dx^2}$ is

a) 6n(n+1)y b) n(n+1)y
c) $x\frac{dy}{dx}+y$ d) y

Ans. b

5. If the curves $2x=y^2$ and $2xy=K$ intersect perpendicularly, then the value of K^2 is

a) 4 b) $2\sqrt{2}$ c) 2 d) 8

Ans. d

6. if $(xe)^y=e^y$, then $\frac{dy}{dx}$ is

a) $\frac{\log x}{(1+\log x)^2}$ b) $\frac{1}{(1+\log x)^2}$
c) $\frac{\log x}{(1+\log x)}$ d) $\frac{e^x}{x(y-1)}$

Ans. a

7. If the side of a cube is increased by 5%, then the surface area of a cube is increased by

a) 10% b) 60% c) 6% d) 20%

Ans. a

8. The value of $\int\frac{1+x^4}{1+x^6}dx$ is

a) $\tan^{-1}x+\tan^{-1}x^3+C$
b) $\tan^{-1}x+\frac{1}{3}\tan^{-1}x^3+C$
c) $\tan^{-1}x-\frac{1}{3}\tan^{-1}x^3+C$
d) $\tan^{-1}x+\frac{1}{3}\tan^{-1}x^2+C$

Ans. b

9. The maximum value of $\frac{\log_e x}{x}$, if x>0 is

a) e b) 1 c) $\frac{1}{e}$ d) $-\frac{1}{e}$

Ans. c

10. The value of $\int e^{\sin x}\sin 2x dx$ is

a) $2e^{\sin x}(\sin x-1)+C$
b) $2e^{\sin x}(\sin x+1)+C$
c) $2e^{\sin x}(\cos x+1)+C$
d) $2e^{\sin x}(\cos x-1)+C$

Ans. a

11. The value of $\int_{-\frac{1}{2}}^{\frac{1}{2}}\cos^{-1}x\,dx$ is

a) π b) $\frac{\pi}{2}$ c) 1 d) $\frac{\pi^2}{2}$

Ans. b

12. If $\int \frac{3x+1}{(x-1)(x-2)(x-3)}dx$ $= A\log|x-1| + B\log|x-2| + C\log|x-3| + C$, then the values of A, B and C are respectively.

a) 5, -7, -5 b) 2, -7, -5
c) 5, -7, 5 d) 2, -7, 5

Ans. d

13. The value of $\int_0^1 \frac{\log(1+x)}{1+x^2}dx$ is

a) $\frac{\pi}{2}\log 2$ b) $\frac{\pi}{4}\log 2$
c) $\frac{1}{2}$ d) $\frac{\pi}{8}\log 2$

Ans. d

14. The area of the region bounded by the curve $y^2=8x$ and the line $y=2x$ is

a) $\frac{16}{3}$sq.units b) $\frac{4}{3}$sq.units
c) $\frac{3}{4}$sq.units d) $\frac{8}{3}$sq.units

Ans. b

15. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\cos x}{1+e^x}dx$ is

a) 2 b) 0 c) 1 d) -2

Ans. c

16. The order of the differential equation obtained by eliminating arbitrary constants in the family of curves $c_1y = (c_2+c_3)e^{x+c_4}$ is

a) 1 b) 2 c) 3 d) 4

Ans. a

17. The general solution of the differential equation $x^2dy-2xydx=x^4\cos x\,dx$ is

a) $y=x^2\sin x+cx^2$ b) $y=x^2\sin x+c$
c) $y=\sin x+cx^2$ d) $y=\cos x+cx^2$

Ans. a

18. The area of the region bounded by the line $y=2x+1$, x-axis and the ordinates $x=-1$ and $x=1$ is

a) $\frac{9}{4}$ b) 2 c) $\frac{5}{2}$ d) 5

Ans. c

19. The two vectors $\hat{i}+\hat{j}+\hat{k}$ and $\hat{i}+3\hat{j}+5\hat{k}$ represent the two sides $\overrightarrow{AB}$ and $\overrightarrow{AC}$ respectively of a ΔABC. The length of the median through A is

a) $\frac{\sqrt{14}}{2}$ b) 14 c) 7 d) $\sqrt{14}$

Ans. d

20. If $\vec{a}$ and $\vec{b}$ are unit vectors and θ is the angle between $\vec{a}$ and $\vec{b}$, then $\sin\frac{\theta}{2}$ is

a) $|\vec{a}+\vec{b}|$ b) $\frac{|\vec{a}+\vec{b}|}{2}$ c) $\frac{|\vec{a}-\vec{b}|}{2}$ d) $|\vec{a}-\vec{b}|$

Ans. c

21. The curve passing through the point (1, 2) given that the slope of the tangent at any point (x, y) is $\frac{3x}{y}$ represents

a) Circle b) Parabola
c) Ellipse d) Hyperbola

Ans. d

22. If $|\vec{a}\times\vec{b}|^2 + |\vec{a}.\vec{b}|^2 = 144$ and $|\vec{a}| = 6$ then $|\vec{b}|$ is equal to

a) 6 b) 3 c) 2 d) 4

Ans. c

23. The point (1, -3, 4) lies in the octant

a) Second b) Third c) Fourth d) Eighth

Ans. c

24. If the vectors $2\hat{i}-3\hat{j}+4\hat{k}, 2\hat{i}+\hat{j}-\hat{k}$ and $\lambda\hat{i}-\hat{j}+2\hat{k}$ are coplanar, then the value of λ is

a) 6 b) -5 c) -6 d) 5

Ans. a

25. The distance of the point (1, 2, -4) from the line $\frac{x-3}{2} = \frac{y-3}{3} = \frac{z+5}{6}$ is

a) $\frac{293}{7}$ b) $\frac{\sqrt{293}}{7}$ c) $\frac{293}{49}$ d) $\frac{\sqrt{293}}{49}$

Ans. b

26. The sine of the angle between the straight line $\frac{x-2}{3}=\frac{3-y}{-4}=\frac{z-4}{5}$ and the plane $2x-2y+z=5$ is

a) $\frac{3}{\sqrt{50}}$ b) $\frac{3}{50}$ c) $\frac{4}{5\sqrt{2}}$ d) $\frac{\sqrt{2}}{10}$

Ans. G

27. If a line makes an angle of $\frac{\pi}{3}$ with each of x and y-axis, then the acute angle made by z-axis is

a) $\frac{\pi}{4}$ b) $\frac{\pi}{6}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$

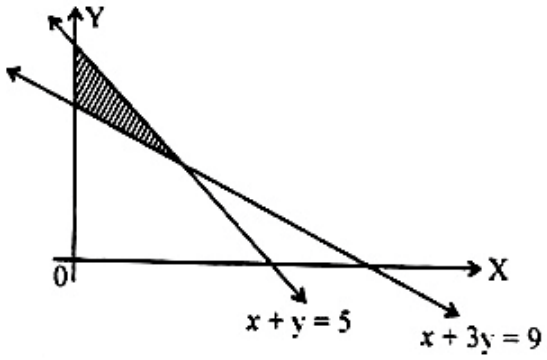
Ans. a

28. Corner points of the feasible region determined by the system of linear constraints are (0, 3), (1, 1) and (3, 0). Let $z=px+qy$, where p, q>0. Condition on p and q so that the minimum of z occurs at (3, 0) and (1, 1) is

a) $p=2q$ b) $p=\frac{q}{2}$ c) $p=3q$ d) $p=q$

Ans. b

29. The feasible region of an LPP is shown in the figure. If $Z=11x+7y$, then the maximum value of Z occurs at



a) $(0,5)$ b) $(3,3)$ c) $(5,0)$ d) $(3,2)$

Ans. d

30. A die is thrown 10 times, the probability that an odd number will come up atleast one time is

a) $\frac{1}{1024}$ b) $\frac{1023}{1024}$ c) $\frac{11}{1024}$ d) $\frac{1013}{1024}$

Ans. b

31. If A and B are two events such that $P(A)=\frac{1}{3}, P(B)=\frac{1}{2}$ and $P(A\cap B)=\frac{1}{6}$, then $P(A'/B)$ is

a) $\frac{2}{3}$ b) $\frac{1}{3}$ c) $\frac{1}{2}$ d) $\frac{1}{12}$

Ans. a

32. Events E_1 and E_2 from a partition of the sample space S. A is any event such that $P(E_1)=P(E_2)=\frac{1}{2}$, $P(E_2/A)=\frac{1}{2}$ and $P(A/E_2)=\frac{2}{3}$, then $P(E_1/A)$ is

a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) 1 d) $\frac{1}{4}$

Ans. a

33. The probability of solving a problem by three persons A, B and C independently is $\frac{1}{2}, \frac{1}{4}$ and $\frac{1}{3}$ respectively. Then the probability of the problem is solved by any two of them is

a) $\frac{1}{12}$ b) $\frac{1}{4}$ c) $\frac{1}{24}$ d) $\frac{1}{8}$

Ans. b

34. If $n(A)=2$ and total number of possible relations from Set A to set B is 1024, then $n(B)$ is

a) 512 b) 20 c) 10 d) 5

Ans. d

35. The value of $\sin^2 51^\circ+\sin^2 39^\circ$ is

a) 1 b) 0 c) $\sin 12^\circ$ d) $\cos 12^\circ$

Ans. a

36. If $\tan A+\cot A=2$, then the value of $\tan^4 A+\cot^4 A=$

a) 2 b) 1 c) 4 d) 5

Ans. a

37. If $A=\{1,2,3,4,5,6\}$, then the number of subsets of A which contain atleast two elements is

a) 64 b) 63 c) 57 d) 58

Ans. c

38. If $z = x + iy$, then the equation $|z+1| = |z-1|$ represents
a) a circle b) a parabola
c) x-axis d) y-axis
Ans. d

39. The value of ${}^{16}C_9 + {}^{16}C_{10} - {}^{16}C_6 - {}^{16}C_7$ is
a) 0 b) 1 c) ${}^{17}C_{10}$ d) ${}^{17}C_3$
Ans. a

40. The number of terms in the expansion of $(x+y+z)^{10}$ is
a) 66 b) 142 c) 11 d) 110
Ans. a

41. If $P(n): 2^n < n!$
Then the smallest positive integer for which P(n) is true if
a) 2 b) 3 c) 4 d) 5
Ans. c

42. The two lines $lx + my = n$ and $l'x + m'y = n'$ are perpendicular if
a) $ll' + mm' = 0$ b) $lm' = ml'$
c) $lm + l'm' = 0$ d) $lm' + ml' = 0$
Ans. a

43. If the parabola $x^2=4ay$ passes through the point (2, 1), then the length of the latus rectum is
a) 1 b) 4 c) 2 d) 8
Ans. b

44. If the sum of n terms of an A.P is given by $S_n = n^2 + n$, then the common difference of the A.P is
a) 4 b) 1 c) 2 d) 6
Ans. a

45. The negation of the statement "For all real numbers x and y, x + y = y + x" is
a) For all real numbers x and y, $x + y \neq y + x$
b) For some real numbers x and y, $x + y = y + x$
c) For some real number x and y, $x + y \neq y + x$
d) for some real numbers x and y, $x - y = y - x$
Ans. a

46. The standard deviation of the data 6, 7, 8, 9, 10 is
a) $\sqrt{2}$ b) $\sqrt{10}$ c) 2 d) 10
Ans. a

47. $\lim_{x\to 0}\left(\frac{\tan x}{\sqrt{2x+4}-2}\right)$ is equal to
a) 2 b) 3 c) 4 d) 6
Ans. a

48. If a relation R on the set {1, 2, 3} be defined by R={(1, 1)}, then R is
a) Reflexive and symmetric
b) Reflexive and transitive
c) symmetric and transitive
d) Only symmetric
Ans. a

49. Let $f:[2,\infty) \to R$ be the function defined $f(x) = x^2 - 4x + 5$, then the range of f is
a) $(-\infty, \infty)$ b) $[1, \infty)$ c) $(1, \infty)$ d) $[5, \infty)$
Ans. b

50. If A, B, C are three mutually exclusive and exhaustive events of an experiment such that $P(A) = 2P(B) = 3P(C)$, then $P(B)$ is equal to
a) $\frac{1}{11}$ b) $\frac{2}{11}$ c) $\frac{3}{11}$ d) $\frac{4}{11}$
Ans. c

51. The domain of the function defined by $f(x) = \cos^{-1}\sqrt{x-1}$ is
a) [1, 2] b) [0, 2] c) [-1, 1] d) [0, 1]
Ans. a

52. The value of $\cos\left(\sin^{-1}\frac{\pi}{3} + \cos^{-1}\frac{\pi}{3}\right)$ is
a) 0 b) 1 c) -0
d) Does not exist
Ans. a

53. If $A = \begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$, then A^4 is equal to
a) A b) 2A c) I d) 4A
Ans. a

54. If $A=\{a,b,c\}$, then the number of binary operations on A is

a) 3 b) 3^6 c) 3^3 d) 3^9

Ans. a

55. If $\begin{pmatrix}2&1\\3&2\end{pmatrix}A=\begin{pmatrix}1&0\\0&1\end{pmatrix}$, then the matrix a is

a) $\begin{pmatrix}2&1\\3&2\end{pmatrix}$

b) $\begin{pmatrix}2&-1\\-3&2\end{pmatrix}$

c) $\begin{pmatrix}-2&1\\3&-2\end{pmatrix}$

d) $\begin{pmatrix}2&-1\\3&2\end{pmatrix}$

Ans. b

56. If $f(x)=\begin{vmatrix}x^3-x & a+x & b+x\\ x-a & x^2-x & c+x\\ x-b & x-c & 0\end{vmatrix}$ then

a) $f(1)=0$ b) $f(2)=0$

c) $f(0)=0$ d) $f(-1)=0$

Ans. c

57. If A and B are square matrices of same order and B is a skew symmetric matrix, then A'BA is

a) Symmetric matrix
b) Null matrix
c) Diagonal matrix
d) Skew symmetric matrix

Ans. a

58. If A is a square matrix of order 3 and |A|=5, then |A adj.A| is

a) 5 b) 125 c) 25 d) 625

Ans. b

59. If $f(x)\begin{cases}\dfrac{1-\cos Kx}{x\sin x}, & \text{If } x\neq 0\\ \dfrac{1}{2}, & \text{If } x=0\end{cases}$ is continuous at x=0, then the value of K is

a) $\pm\dfrac{1}{2}$ b) 0

c) ± 2 d) ± 1

Ans. d

60. If $a_1a_2a_3.....a_9$ are in A.P. then the value of $\begin{vmatrix}a_1&a_2&a_3\\a_4&a_5&a_6\\a_7&a_8&a_9\end{vmatrix}$ is

a) $\dfrac{9}{2}(a_1+a_9)$ b) a_1+a_9

c) $\log_e(\log_e e)$ d) 1

Ans. c