Previous Paper Questions

1. Q.Id: 159601

If [x] denotes the greatest integer $\leq X$, then

$$\lim_{n\to\infty}\frac{1}{n^3}\{[1^2x]+[2^2x]+[3^2x]+....+[n^2x]\}=$$

A) $\frac{x}{2}$

B) $\frac{x}{3}$

C) $\frac{x}{6}$

D) 0

2. Q.Id: 139072

If a message signal of frequency 10 kHz and peak voltage 12 V is used to modulate a carrier wave of frequency 1 MHz. the modulation index is 0.6. To make the modulation index is 0.75, the carrier peak voltage should be

A) decreased by 25%

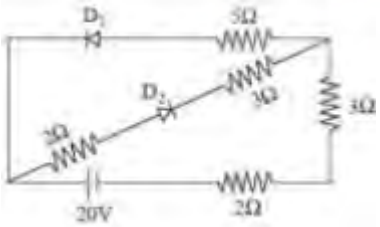
B) increased by 25%

C) decreased by 20%

D) increased by 20%

3. Q.Id: 139069

If the diodes are ideal in the circuits given below, then the current through the cell is



A) 4 A

B) 1.5 A

C) 2 A

D) 3 A

4. Q.Id: 139068

If 200 MeV of energy is released in the fission of one nucleus of $^{235}_{92}U$, the number of nucleithat must undergo fission to release an energy of 1000 J is

A) 3.125×10^{13}

B) 6.25×10^{13}

C) 12.5×10^{13}

D) 3.125×10^{14}

5. Q.Id: 139067

Hydrogen atom is in its n^{th} energy state. If de - Broglie wavelength of the electron is λ, then

A) $\lambda \propto \frac{1}{n^2}$

B) $\lambda \propto \frac{1}{n}$

C) $\lambda \propto n^2$

D) $\lambda \propto n$

6. Q.Id: 139063

Photons of frequencies equal to the frequencies of H_β and H_∞ lines of hydrogen incident on a photosensitive plate whose threshold frequency of H_α line of hydrogen. The ratio of the minimum kinetic energies of the emitted electrons is

A) 7:16

B) 3:4

C) 8:27

D) 5:36

7. Q.Id: 139062

In a plane electromagnetic wave, the electric field oscillates with a frequency $2\times10^{10}\ s^{-1}$ and amplitude $40\ Vm^{-1}$, then the energy density due to electric field is ___ $\left(\varepsilon_0 = 8.85\times10^{-12}\ \text{Fm}^{-1}\right)$

A) $1.52\times10^{-9}\ \text{Jm}^{-3}$

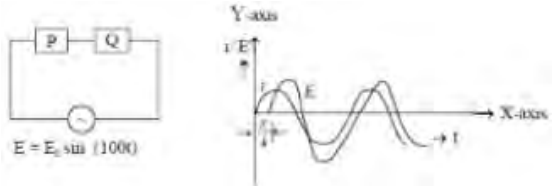
B) $2.54\times10^{-19}\ \text{Jm}^{-3}$

C) $3.54\times10^{-9}\ \text{Jm}^{-3}$

D) $4.56\times10^{-9}\ \text{Jm}^{-3}$

8. Q.Id: 139060

For the AC circuit shown below, phase difference between emf and current is $\frac{\pi}{4}$ radians as shown in the graph. If the impedance of the circuit is $1414\ \Omega$ then the values of P and Q are



A) 1 kΩ, 10 μF

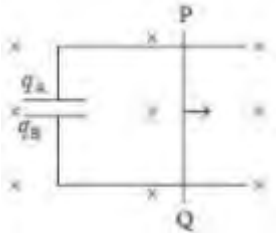
B) 1 kΩ, 1 μF

C) 1 kΩ, 10 mH

D) 1 kΩ, 1 mH

9. Q.Id: 139059

A conducting rod PQ of length 1m is moving with a uniform speed $2\ ms^{-1}$ in a uniform magnetic field of 4T which is directed into the paper. A capacitor of capacity $10\ \mu F$ is connected as shown in the figure. Then, the charges on the plates of the capacitor are



A) $q_A = +80\,\mu C, q_B = -80\,\mu C$

B) $q_A = -80\,\mu C, q_B = +80\,\mu C$

C) $q_A = +1.25\,\mu C, q_B = 1.25\,\mu C$

D) $q_A = -1.25\,\mu C, q_B = +1.25\,\mu C$

10. Q.Id: 139057

Two short bar magnets each of magnetic moment $9\ Am^2$ are placed such that one is at $x = -3\ cm$ and the other at $y = -3\ cm$. If their magnetic moments are directed along positive and negative X - directions respectively then the resultant magnetic field at the origin is

A) 100 T

B) 10 T

C) 0.1 T

D) 0.001 T

11. Q.Id: 139056

Two moving coil galvanometers. X and Y have coils with resistances $10\ \Omega$ and $14\ \Omega$, cross sectional areas $4.8 \times 10^{-3}\ m^2$ and $2.4 \times 10^{-3}\ m^2$, number of turns 30 and 45 respectively. They are placed in magnetic fields of 0.25 T and 0.50 T respectively. Then the ratio of their current sensitivities and the ratio of their voltage sensitivities are respectively.

A) 2:3; 14:15

B) 5:7; 2:1

C) 2:13; 1:2

D) 14:15; 2:9

12. Q.Id: 139055

Two infinitely long wires carry currents 4A and 3A placed along X - axis and Y - axis respectively. Magnetic field at a point $P(0, 0, d)$m will be _____T.

A) $\frac{4\mu_0}{2\pi d}$

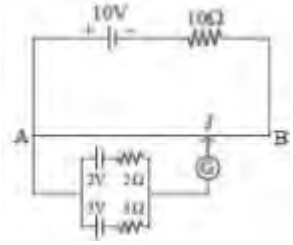
B) $\frac{3\mu_0}{2\pi d}$

C) $\frac{7\mu_0}{2\pi d}$

D) $\frac{5\mu_0}{2\pi d}$

13. Q.Id: 139054

A battery of emf 10 V is connected to a uniform wire AB of 1 m length and having a resistance of $10\ \Omega$ in series with a $10\ \Omega$ resistor as shown in the figure. Two cells of emf 2 V and 3 V having internal resistances $2\ \Omega$ and $3\ \Omega$ respectively are connected as shown in the figure. If the galvanometer shows null deflection at point J on the wire, the distance of point J front the point B is ____



A) 48 cm

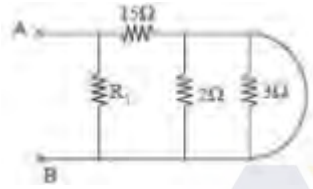
B) 50 cm

C) 52 cm

D) 54 cm

14. Q.Id: 139053

The equivalent resistance between A and B is 6Q. The value of R_1 is



A) $20\ \Omega$

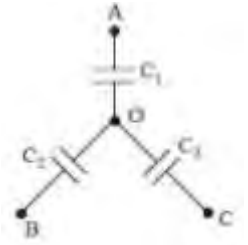
B) $10\ \Omega$

C) $5\ \Omega$

D) $25\ \Omega$

15. Q.Id: 139049

Three uncharged capacitors of capacities C_1, C_2 & C_3 are connected as shown in the figure. A, B and C are at potentials V_1, V_2 & V_3 respectively. The potential at O is



A) $\frac{C_1V_1+C_2V_2+C_3V_3}{C_1+C_2+C_3}$

B) $\frac{C_1V_1+C_2V_2-C_3V_3}{C_1+C_2+C_3}$

C) $\frac{C_1V_1-C_2V_2-C_3V_3}{C_1+C_2+C_3}$

D) zero

16. Q.Id: 139048

A parallel plate capacitor has a capacitor 80×10^{-6} F when air is present b/w its plates. The space between the plates is filled with a dielectric slab of dielectric constant 20. The capacitor is now connected to a battery of 30 V by wires. The dielectric slab is then removed. Then the charge passing through the wire is

A) $12\times10^{-3}\,C$

B) $25.3\times10^{-3}\,C$

C) $120\times10^{-3}\,C$

D) $45.6\times10^{-3}\,C$

17. Q.Id: 139047

A simple pendulum with a bob of mass 40 g and charge $+2\,\mu C$ makes 20 oscillations in 44 s. A vertical electric field magnitude $4.2\times10^{4}\,NC^{-1}$ pointing downwards is applied. The time taken by the pendulum to make 15 oscillations in the electric field is (acceleration due to gravity $=10\,ms^{-2}$)

A) 30 s

B) 60 s

C) 90 s

D) 15 s

18. Q.Id: 139042

Two point charges are kept in air with a separation b/w them. The force b/w them is F_1 is half of the space b/w the charges is filled with a dielectric of dielectric constant 4 and the force b/w them is F_2. If $\frac{1}{3}rd$ of the space b/w the charges is filled with dielectric of dielectric constant 9. Then $\frac{F_1}{F_2}$ is

A) $\frac{27}{64}$

B) $\frac{16}{81}$

C) $\frac{81}{64}$

D) $\frac{100}{81}$

19. Q.Id: 139038

Two Polaroid's are placed in the path of unpolarizedlight beam of intensity I_0 such that no light is emitted from the second Polaroid. If a third Polaroid whose polarization axis makes an angle θ with that of the first Polaroid is placed between the Polaroid's, then intensity of light emerging from the last Polaroid is

A) $\left(\frac{I_0}{8}\right)\sin^2 2\theta$

B) $\left(\frac{I_0}{4}\right)\sin^2 2\theta$

C) $\left(\frac{I_0}{2}\right)\cos^2\theta$

D) $I_0\cos^2\theta$

20. Q.Id: 139036

A light ray incidents normally on one surface of an equilateral prism. The angle of deviation of the light ray is (Refractive index of the material of the prism $=\sqrt{2}$)

A) $60°$

B) $30°$

C) $0°$

D) $120°$

21. Q.Id: 139035

A reflector is moving with $20\ ms^{-1}$ **towards a stationary source of sound. If the source is producing sound waves of 160 Hz then the wavelength of the reflected wave is (speed of sound in air is** $340\ ms^{-1}$**)**

A) $\frac{17}{8}m$

B) $\frac{17}{11}m$

C) $\frac{17}{9}m$

D) $\frac{17}{16}m$

22. Q.Id: 139029

A solid ball is suspended from the ceiling of a motor car through a light string. A transverse pulse travels at the speed $60\ cm^{-1}$ **on the string, when the car is at rest. When the car accelerates on a horizontal road, speed of the pulse is** $66\ cm^{-1}$**. The acceleration of the car is nearly** $(g = 10\ ms^{-2})$

A) $4.3\ \text{ms}^{-2}$

B) $2.9\ \text{ms}^{-2}$

C) $6.8\ \text{ms}^{-2}$

D) $5.5\ \text{ms}^{-2}$

23. Q.Id: 139025

For a molecule of an ideal gas, the number density is $2\sqrt{2}\times10^{8}\ cm^{-3}$ **and the mean free path is** $\frac{10^{-2}}{\pi}cm$**. The diameter of the gas molecule is**

A) $5\times10^{-4}\ \text{cm}$

B) $0.5\times10^{-4}\ \text{cm}$

C) $2.5\times10^{-4}\ \text{cm}$

D) $4\times10^{-4}\ \text{cm}$

24. Q.Id: 139024

Match the following.

List1	List2
A. Zeroth law of thermodynamics	I. Direction of flow of heat
B. First law of thermodynamics	II. Work done is zero
C. Free expansion of gas	III. Thermal equilibrium
D. Second law of thermodynamics	IV. Law of conservation of energy

A) A-II, B-IV, C-III, D-I

B) A-III, B-IV, C-II, D-I

C) A-III, B-I, C-II, D-IV

D) A-I, B-III, C-IV, D-II

25. Q.Id: 139023

A thermally insulated vessel with nitrogen gas at $27\ ^{\circ}C$ **is moving with a velocity of** $100\ ms^{-1}$**. If the vessel is stopped suddenly, the percentage change in the pressure of the gas is nearly**

(Assume entire loss in KE of the gas is given as heat to gas and $R = 8.3\ Jmol^{-1}K^{-1}$**)**

A) 1.1

B) 0.93

C) 0.5

D) 2.25

26. Q.Id: 139022

Three very large plates of same area are kept parallel and close to each other. They are considered as ideal black surfaces and have thermal conductivity. First and third plates are maintained at absolute temperatures 2T and 3T respectively. Temperature of the middle plate in steady state is

A) $\left(\frac{65}{2}\right)^{\frac{1}{4}} T$

B) $\left(\frac{97}{4}\right)^{\frac{1}{4}} T$

C) $\left(\frac{97}{2}\right)^{\frac{1}{4}} T$

D) $(97)^{\frac{1}{4}} T$

27. Q.Id: 139021

Stem at $100^\circ C$ is placed into 1 kg of water contained in a calorimeter at $9^\circ C$ till the temperature of water and calorimeter is increased to $90^\circ C$. The mass of the steam condensed is nearly (Water equivalent of calorimeter = 0.1 kg, Specific heat of water $= 1\ cal\ g^{-1}\ {}^\circ C_{-1}$ and latent heat of vapourisation $= 540\ cal\ g^{-1}$)

A) 81 g

B) 162 g

C) 243 g

D) 486 g

28. Q.Id: 139019

A body is suspended by a light string. The tensions in the string when the body is in air, when the body is totally immersed in water and when the body is totally immersed in a liquid are respectively 40.2 N, 28.4 N and 16.6 N. The density of the liquid is

A) $1200\ kg-m^{-3}$

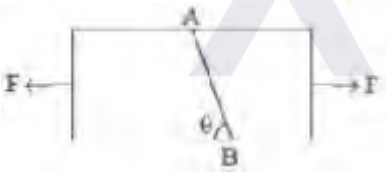
B) $1600\ kg-m^{-3}$

C) $2000\ kg-m^{-3}$

D) $2400\ kg-m^{-3}$

29. Q.Id: 139013

Two equal and opposite forces each F act on a rod of uniform cross - sectional area 'a' is shown in the figure. Shearing stress on the section AB will be



A) $\frac{F\sin\theta\cos\theta}{a}$

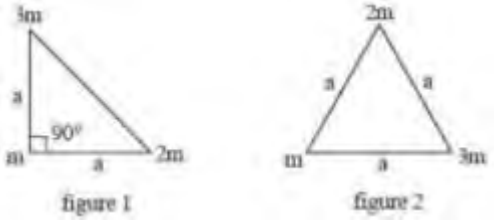
B) $\frac{F\sin\theta}{a}$

C) $\frac{F\cos\theta}{a}$

D) $\frac{F\sin^2\theta}{a}$

30. Q.Id: 139010

Three masses m, 2m and 3m are arranged in two triangular configurations as shown in figure 1 and figure 2. Work done by an external agent in changing, the configuration from figure 1 to figure 2 is



A) $\frac{6Gm^2}{a}\left[2-\frac{6}{\sqrt{2}}\right]$

B) 0

C) $-\frac{Gm^2}{a}\left[6+\frac{6}{\sqrt{2}}\right]$

D) $-\frac{Gm^2}{a}\left[6-\frac{6}{\sqrt{2}}\right]$

31. Q.Id: 139008

The potential energy of a simple harmonic oscillator of mass 2 kg at its mean position is 5 J. If its total energy is 9 J and amplitude is 1 cm, then its time period is

A) $\frac{\pi}{100}$ s

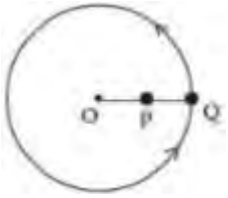
B) $\frac{\pi}{50}$ s

C) $\frac{\pi}{20}$ s

D) $\frac{\pi}{10}$ s

32. Q.Id: 138982

Two spheres P and Q each of mass 200g are attached to a string of length one metre as shown in the figure. The string and the spheres are then whirled in a horizontal circle about O at a constant angular speed. The ratio of the tension in the string between P and Q to that of between P and O is (P is at the mid point of line joining O and Q)



A) $\frac{1}{2}$

B) $\frac{2}{3}$

C) $\frac{3}{2}$

D) $\frac{2}{1}$

33. Q.Id: 138980

A rigid metallic sphere is spinning around its own axis in the absence of external torque. If the temperature is raised, its volume increases by 9%. The change in its angular speed is

A) increases by 9%

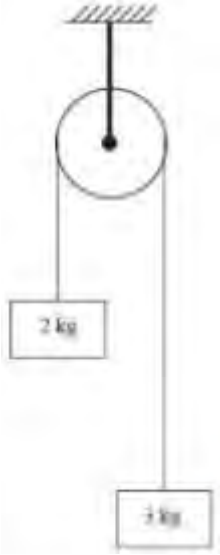
B) decreases by 9%

C) increases by 6%

D) decreases by 6%

34. Q.Id: 138977

The system of two masses 2 kg and 3 kg shown in the figure is released from rest. The work done on 3 kg block by the force of gravity during first 2 seconds of its motion is ($g = 10 ms^{-2}$)



A) 120 J

B) 80 J

C) 40 J

D) 30 J

35. Q.Id: 138976

A body of mass 2 kg thrown verticallyupward from the ground with a velocity of $8\ ms^{-1}$ **reaches a maximum height of 3 m. The work done by the air resistance is ____(Acceleration due to gravity** $= 10\ ms^{-2}$)

A) 4 J

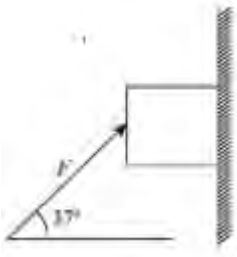
B) 60 J

C) 64 J

D) 8 J

36. Q.Id: 138973

A block of mass 2 kg is being pushed against a wall by a force $F = 90\ N$ as shown in the figure. If the coefficient of friction is 0.25, then the magnitude of acceleration of the block is (Take, $g = 10\ ms^{-2}$) ($\sin 37° = \frac{3}{5}$)



A) $16\ ms^{-2}$

B) $8\ ms^{-2}$

C) $38\ ms^{-2}$

D) $54\ ms^{-2}$

37. Q.Id: 138970

Sand is to be piled up on a horizontal ground in the form of a regular cone of a fixed base of radius R. coefficient of static friction between the sand layers is μ. Maximum volume of the sand that can be piled up in the from of cone with out slipping on the ground is

A) $\frac{\mu R^3}{3\pi}$

B) $\frac{\mu R^3}{3}$

C) $\frac{\pi R^3}{3\mu}$

D) $\frac{\mu \pi R^3}{3}$

38. Q.Id: 138969

A body is projected with a speed 'u' at an angle $'\theta'$ with the horizontal. The radius of curvature of the trajectory when it makes an angle $\left(\frac{\theta}{2}\right)$ with the horizontal is (g - acceleration due to gravity)

A) $\frac{u^2 \cos^2\theta\ sec^3\left(\frac{\theta}{2}\right)}{\sqrt{3}g}$

B) $\frac{u^2 \cos^2\theta\ sec^3\left(\frac{\theta}{2}\right)}{2g}$

C) $\frac{2u^2 \cos^3\theta\ sec^2\left(\frac{\theta}{2}\right)}{g}$

D) $\frac{u^2 \cos^2\theta\ sec^3\left(\frac{\theta}{2}\right)}{g}$

39. Q.Id: 138965

A body is projected from the ground at an angle of $\tan^{-1}\left(\frac{8}{7}\right)$ with the horizontal. The ratio of the maximum height attained by it to its range is

A) 8:7

B) 4:7

C) 2:7

D) 1:7

40. Q.Id: 138964

Assertion (A) : The velocity of a projectile at a point on its trajectory is equal to the slope at that point

Reason (R) : The velocity vector at a point is always along the tangent to the trajectoryat that point.

A) Both A and R are true and R is the correct explanation of A.

B) Both A and R are true and R is not the correct explanation of A.

C) A is true but R is false

D) A is false but R is true

41. Q.Id: 138963

Two resistances $60.36\ \Omega$ **and** $30.09\ \Omega$ **are connected in parallel. The equivalent resistance is**

A) $20 \pm 0.08\ \Omega$

B) $20 \pm 0.06\ \Omega$

C) $20 \pm 0.03\ \Omega$

D) $20 \pm 0.10\ \Omega$

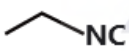
42. Q.Id: 138946

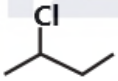
$$C_2H_5Cl \xrightarrow{KCN} X \xrightarrow{H_2/Catalyst} Y \xrightarrow[alc.KOH]{CHCl_3} Z$$

What is 'Z' in the above sequence of reactions?

A) 

B) 

C) 

D) 

43. Q.Id: 138945

What are A and B in the following reaction sequence?

$$\text{Propionitrile} + A \rightarrow B \xrightarrow{H_3O^+} \text{propiophenone}$$

A) A C_2H_5MgBr

B $CH_3CH_2-\overset{\overset{NMgBr}{\|}}{C}-C_2H_5$

B) A C_2H_5MgBr

B $CH_3CH_2CH_2-\overset{\overset{NH}{\|}}{C}-C_2H_5$

C) A C_6H_5MgBr

B $CH_3CH_2-\overset{\overset{NMgBr}{\|}}{C}-C_2H_5$

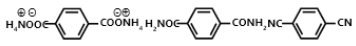
D) A $C_6H_5CH_2MgBr$

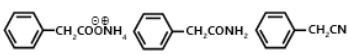
B $CH_3CH_2CH_2-\overset{\overset{NH}{\|}}{C}-CH_2C_6H_5$

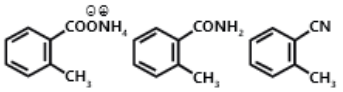
44. Q.Id: 138944

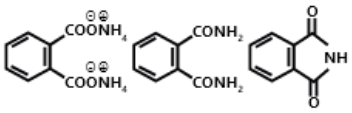
What are A, B and C in the following reactions?

$$\text{Phthalic acid} + NH_3 \rightarrow A \xrightarrow{\Delta} B \xrightarrow{\text{High temperature}} C$$

A) 

B) 

C) 

D) 

45. Q.Id: 138943

Match the following

The correct answer is

List1	List2
A. Lucas reagent	I. $SnCl_2 + HCl,\ H_3O^+$
B. Clemmensen reagent	II. $[Ag(NH_3)_2]^+$
C. Tollen's reagent	III. Anhydrous $ZnCl_2$ | conc. HCl
D. Stephen reaction	IV. $Zn - Hg \mid conc.HCl$
E. -	V. $C_6H_5SO_2Cl$

A) A-III, B-IV, C-II, D-I

B) A-III, B-IV, C-I, D-II

C) A-IV, B-II, C-III, D-V

D) A-IV, B-III, C-I, D-V

46. Q.Id: 138942

Identify A, B and C in the following reactions

$$\text{Isopropyl chloride} \xrightarrow{NaOH} A \xrightarrow[573\ K]{Cu} B \xrightarrow{NaOI} C + \text{Iodoform}$$

A) A $CH_3CH_2CH_2OH$

B $CH_3CH_2CH_2CHO$

C CH_3CH_2COONa

B) A CH_3CH_2OH

B CH_3CHO

C $HCOONa$

C) A $CH_3-\underset{\underset{OH}{|}}{CH}-CH_3$

B CH_3COCH_3

C CH_3COONa

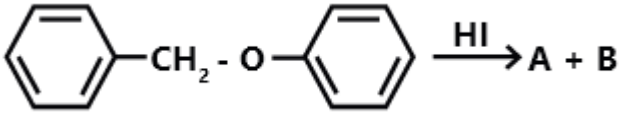
D) A $CH_3-\underset{\underset{OH}{|}}{CH}-\underset{\underset{OH}{|}}{CH}-CH_3$

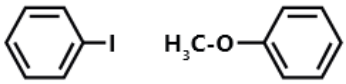
B $H_3C-\overset{\overset{O}{\|}}{C}-\overset{\overset{O}{\|}}{C}-CH_3$

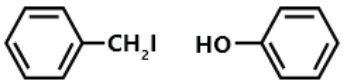
C CH_3COONa

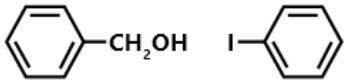
47. Q.Id: 138941

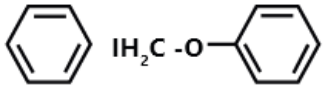
Identify A and B in the following reactions?



A) 

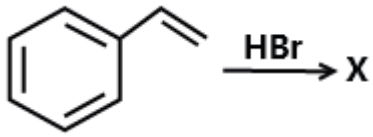
B) 

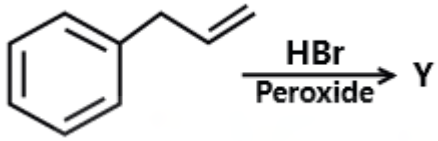
C) 

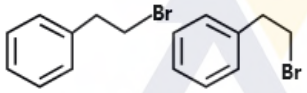
D) 

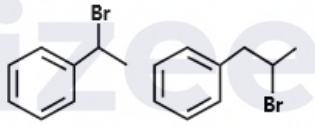
48. Q.Id: 138940

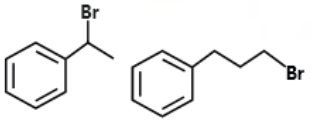
Identify the major products X and Y in the following reactions

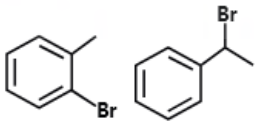
(a) 

(b) 

A) 

B) 

C) 

D) 

49. Q.Id: 138939

Which of the following statements are correct?

a) Drugs that mimic natural messenger by switching on the receptor are called agonists

b) Shape of the receptor does not change after attachment of chemical messenger

c) A cationic detergent is formed when stearic acid reacts with polyethylene glycol

d) Seldane is an antihistamine

A) b, c

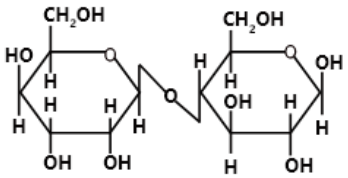
B) a, c, d

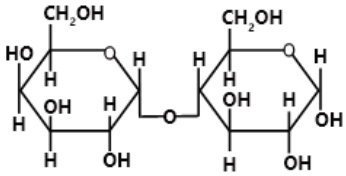
C) a, d

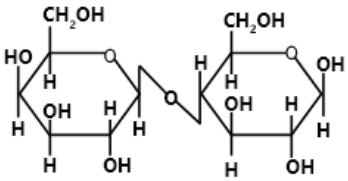
D) a, b, c

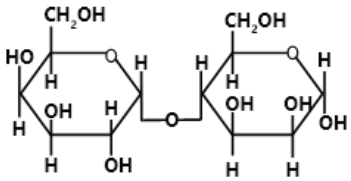
50. Q.Id: 138938

Which one of the following is the structure of lactose ?

A) 

B) 

C) 

D) 

51. Q.Id: 138936

In Lanthanide series, the element well known to exhibit +4 oxidation state is

A) Lu

B) Ce

C) Pm

D) Nd

52. Q.Id: 138935

Crystal field splitting energies for octahedral (Δ_0) and tetrahedral (Δ_t) geometries caused by the same ligands are related through the expression

A) $\Delta_0 = \Delta_t$

B) $4\Delta_0 = 9\Delta_t$

C) $9\Delta_0 = 4\Delta_t$

D) $\Delta_0 = 2\Delta_t$

53. Q.Id: 138934

Which statement about noble gases is not correct?

A) 'Xe' forms XeF_6 under suitable conditions

B) 'Ar' is used in electric bulbs.

C) The number of lone pair of electrons present on Xe in XeF_2 is 3.

D) 'He' has the highest boiling point among all the noble gases

54. Q.Id: 138933

Identify the molecule which contains lone pair of electrons on the sulphur atom

A) H_2SO_5

B) $H_2S_2O_8$

C) $H_2S_2O_7$

D) H_2SO_3

55. Q.Id: 138932

Identify the reaction which does not liberate N_2

A) $NaN_3 \xrightarrow[\Delta]{} ?$

B) $(NH_4)_2Cr_2O_7 \xrightarrow[\Delta]{} ?$

C) $NH_4Cl + Ca(OH)_2 \rightarrow ?$

D) $Ba(N_3)_2 \xrightarrow[\Delta]{} ?$

56. Q.Id: 138931

The general solution of $\left(1+e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1-\frac{x}{y}\right)dy = 0$ **is**

A) $ye^{y/x} + x = c$

B) $ye^{x/y} - x = c$

C) $ye^{x/y} + y = c$

D) $ye^{x/y} + x = c$

57. Q.Id: 138927

If m and n are respectively the order and degree of the differential equation of the family of parabolas with focus at the origin and X-axis as its axis, then mn - m + n =

A) 1

B) 4

C) 3

D) 2

58. Q.Id: 138925

The area (in sq. units) of the region bounded by the X-axis and the curve $y = 1 - x - 6x^2$ **is**

A) $\frac{125}{216}$

B) $\frac{125}{512}$

C) $\frac{25}{216}$

D) $\frac{25}{512}$

59. Q.Id: 138920

$$\int_0^{\alpha/3} \frac{f(x)}{f(x)+f\left(\frac{\alpha-3x}{3}\right)}\,dx =$$

A) $\frac{2\alpha}{3}$

B) $\frac{\alpha}{2}$

C) $\frac{\alpha}{3}$

D) $\frac{\alpha}{6}$

60. Q.Id: 138915

$$\lim_{n\to\infty}\left(\frac{\sqrt{1}+2\sqrt{2}+3\sqrt{3}+\ldots+n\sqrt{n}}{n^{5/2}}\right)=$$

A) 1

B) $\frac{5}{2}$

C) 0

D) $\frac{2}{5}$

61. Q.Id: 138913

For $n\geq 2$, **If** $I_n=\int sec^n\, x\, dx$, **then** $I_4-\frac{2}{3}I_2=$

A) $sec^2\, x\tan x+C$

B) $\frac{1}{3}sec^2\, x\tan x+C$

C) $\frac{2}{3}sec^2\, x\tan x+C$

D) $\frac{1}{2}\log|sec\, x+\tan x|+C$

62. Q.Id: 138910

$$\int\frac{dx}{x^3+3x^2+2x}=$$

A) $\log|x|+\log\left|\frac{x+2}{x+1}\right|+c$

B) $\log|x|-\log|x+1|+\log|x+2|+c$

C) $\frac{1}{2}[\log|x|+\log|x+1|+\log|x+2|]+c$

D) $\frac{1}{2}\log\left(\frac{|x^2+2x|}{(x+1)^2}\right)+c$

63. Q.Id: 138907

$$\int\left(\frac{\log x-1}{1+(\log x)^2}\right)^2 dx=$$

A) $\frac{\log x}{1+(\log x)^2}+C$

B) $\frac{x}{x^2+1}+C$

C) $\frac{x}{1+(\log x)^2}+C$

D) $\frac{-x}{1+(\log x)^2}+C$

64. Q.Id: 138905

$$\int\frac{\sin 2x\, dx}{\sin^4 x+\cos^4 x}=\tan^{-1}(f(x))+c,\ \textbf{then}\ f\left(\frac{\pi}{3}\right)=$$

A) 1

B) 2

C) 3

D) $\frac{1}{2}$

65. Q.Id: 138900

The constant 'c' of Lagrange's mean value theorem for the function $f(x)=\frac{2x+3}{4x-1}$ defined on $[1, 2]$ is

A) $\frac{1+\sqrt{5}}{3}$

B) $\frac{1+\sqrt{21}}{4}$

C) $\frac{5}{3}$

D) $\frac{3}{2}$

66. Q.Id: 138896

If x and y are two positive numbers such that $x+y=32$, then the minimum value of x^2+y^2 is,

A) 500

B) 256

C) 1024

D) 512

67. Q.Id: 138887

The approximate value of $\cos 31°$ is (Take $1°=0.0174$)

A) 0.7521

B) 0.866

C) 0.7146

D) 0.8573

68. Q.Id: 138882

If $f(x)=x^3+ax^2+bx+5\sin^2 x$ is an increasing function on R, then

A) $a^2-3b+15<0$

B) $a^2-3b+15>0$

C) $a^2-3b-15>0$

D) $a^2+3b+15>0$

69. Q.Id: 138877

If $y=\frac{2}{\sqrt{a^2-b^2}}\tan^{-1}\left[\sqrt{\frac{a-b}{a+b}}\tan\frac{x}{2}\right]$**, then** $\left.\frac{d^2y}{dx^2}\right|_{x=\frac{\pi}{2}}=$

A) $\frac{b}{2a^2}$

B) $\frac{b}{a^2}$

C) $\frac{2b}{a}$

D) $\frac{b^2}{2a}$

70. Q.Id: 138862

If $x = 3\cos t$ and $y = 4\sin t$, then $\frac{d^2y}{dx^2}$ at the point $(x_0, y_0) = \left(\frac{3}{2}\sqrt{2}, 2\sqrt{2}\right)$, is

A) $\frac{4\sqrt{2}}{9}$

B) $-\frac{4\sqrt{2}}{9}$

C) $\frac{8\sqrt{2}}{9}$

D) $\frac{-8\sqrt{2}}{9}$

71. Q.Id: 138852

The derivative of $f(x) = x^{\tan^{-1}x}$ with respect to $g(x) = sec^{-1}\left(\frac{1}{2x^2-1}\right)$ is

A) $\frac{1}{2}\sqrt{1-x^2}.x^{\tan^{-1}x}\left[\frac{\log x}{1+x^2}+\frac{\tan^{-1}x}{x}\right]$

B) $\frac{1}{2}\sqrt{1-x^2}.x^{\tan^{-1}x}\left[\log(\tan^{-1}x)+x(1+x^2)\tan^{-1}x\right]$

C) $\frac{-2\tan^{-1}x\left[\frac{\log x}{1+x^2}+\frac{\tan^{-1}x}{x}\right]}{\sqrt{1+x^2}}$

D) $-\frac{1}{2}\sqrt{1-x^2}.x^{\tan^{-1}x}\left[\frac{\log x}{1+x^2}+\frac{\tan^{-1}x}{x}\right]$

72. Q.Id: 138843

If $[x]$ denotes the greatest integer $\le x$, then

$\lim_{n\to\infty}\frac{1}{n^3}\{[1^2x]+[2^2x]+[3^2x]+\ldots+[n^2x]\} =$

A) $\frac{x}{2}$

B) $\frac{x}{3}$

C) $\frac{x}{6}$

D) 0

73. Q.Id: 138841

If the foot of the perpendicular drawn from the origin to a plane is $(1, 2, 3)$, then a point on that plane is

A) $(3, 2, 1)$

B) $(7, 2, 1)$

C) $(7, 3, -1)$

D) $(6, -3, 4)$

74. Q.Id: 138837

A plane cuts the coordinate axes X, Y, Z at A, B, C respectively such that the centroid of the ΔABC is $(6, 6, 3)$. Then the equation of that plane is

A) $x+y+z-6=0$

B) $x+2y+z-18=0$

C) $2x+y+z-18=0$

D) $x+y+2z-18=0$

75. Q.Id: 138834

If the orthocentre and. the centroid of a triangle are $(-3, 5, 2)$ & $(3, 3, 4)$ **respectively, then its circumcentre is**

A) $(6, 2, 5)$

B) $(6, 2, -5)$

C) $(6, -2, 5)$

D) $(6, -2, -5)$

76. Q.Id: 138831

The equation of the hyperbola whose asymptotes are the lines $3x+4y-2=0$, $2x+y+1=0$ **and which passes through the point (1,1) is**

A) $6x^2+11xy+4y^2-30x+2y+7=0$

B) $6x^2+11xy+4y^2-x+2y-22=0$

C) $6x^2+11xy+4y^2-x+2y+22=0$

D) $6x^2+11xy+4y^2-3x-7y-11=0$

77. Q.Id: 138828

The product of the perpendicular distances drawn from the points $(3, 0)$ **and** $(-3, 0)$ **to the tangent of the ellipse** $\frac{x^2}{36}+\frac{y^2}{27}=1$ **at** $\left(3, \frac{9}{2}\right)$ **is**

A) 36

B) 27

C) 9

D) 63

78. Q.Id: 138825

An ellipse haying the coordinate axes as its axes and its major axis along Y-axis, passes through the point $(-3, 1)$ **and has eccentricity** $\sqrt{\frac{2}{5}}$ **. Then its equation is**

A) $3x^2+5y^2-15=0$

B) $5x^2+3y^2-32=0$

C) $3x^2+5y^2-32=0$

D) $5x^2+3y^2-48=0$

79. Q.Id: 138824

A point on the parabola whose focus is $S(1, -1)$ **and whose vertex is** $A(1, 1)$ **is**

A) $\left(3, \frac{1}{2}\right)$

B) $(1, 2)$

C) $\left(2, \frac{1}{2}\right)$

D) $(2, 2)$

80. Q.Id: 138823

The line $y = 6x + 1$ touches the parabola $y^2 = 24x$. The coordinates of a point P on this line, from which the tangent to $y^2 = 24x$ is perpendicular to the line $y = 6x + 1$, is

A) $(-1, -5)$

B) $(-2, -11)$

C) $(-6, -35)$

D) $(-7, -41)$

81. Q.Id: 138822

If the radical axis of the circles $x^2 + y^2 + 2gx + 2fy + c = 0$ and $2x^2 + 2y^2 + 3x + 8y + 2c = 0$ touches the circle $x^2 + y^2 + 2x + 2y + 1 = 0$, then

A) $g = \frac{3}{4}$ or $f = 2$

B) $g \neq \frac{3}{4}$ or $f = 2$

C) $g = \frac{3}{4}$ or $f \neq 2$

D) $g = \frac{2}{5}$ or $f = 1$

82. Q.Id: 138821

In List-I, a pair of circles is given in A, B. C and in List-II, angle between those pair of circles is given. Match the items from List-I to List-II.

List1	List2
A. $(x-2)^2 + y^2 = 2$ $(x-2)^2 + (y-1)^2 = 1$	I. $90°$
	II. $135°$
B. $x^2 + y^2 - 6x - 6y + 9 = 0$ $x^2 + y^2 - 4x + 4y - 9 = 0$	III. $60°$
	IV. $30°$
C. $x^2 + y^2 + 4x - 14y + 28 = 0$ $x^2 + y^2 + 4x - 5 = 0$	
D. -	

A) A-I, B-II, C-III

B) A-II, B-I, C-III

C) A-III, B-I, C-IV

D) A-IV, B-III, C-I

83. Q.Id: 138817

The point of intersection of the direct common tangents drawn to the circles $(x+11)^2+(y-2)^2=225$ and $(x-11)^2+(y+2)^2=25$ is

A) $\left(-\frac{11}{2},1\right)$ **B)** $(-22,4)$

C) $\left(\frac{11}{2},-1\right)$ **D)** $(22,-4)$

84. Q.Id: 138816

The pole of the straight line $9x+y-28=0$ with respect to the circle $2x^2+2y^2-3x+5y-7=0$ is

A) $(3,1)$ **B)** $(3,-1)$

C) $(-3,1)$ **D)** $(4,-8)$

85. Q.Id: 138815

The equation of a circle touching the coordinate axes and the line $3x-4y=12$ is

A) $x^2+y^2+6x+6y+9=0$ **B)** $x^2+y^2+6x+6y-9=0$

C) $x^2+y^2-6x-6y+9=0$ **D)** $x^2+y^2-6x-6y-9=0$

86. Q.Id: 138812

If the lengths of the tangents drawn from P to the circles $x^2+y^2-2x+4y-20=0$ and $x^2+y^2-2x-8y+1=0$ are in the ratio 2 : 1, then the locus P is

A) $x^2+y^2+2x+12y+8=0$ **B)** $x^2+y^2-2x+12y+8=0$

C) $x^2+y^2+2x-12y+8=0$ **D)** $x^2+y^2-2x-12y+8=0$

87. Q.Id: 138811

If $2x^2+3xy-2y^2=0$ represent two sides of a parallelogram and $3x+y+1=0$ is one of its diagonals, then the other diagonal is

A) $x-3y+1=0$ **B)** $x-3y+2=0$

C) $x-3y=0$ **D)** $3x-y=0$

88. Q.Id: 138810

If the line $x+2y=k$ intersects the curve $x^2-xy+y^2+3x+3y-2=0$ at two points A and B and if O is the origin, then the condition for $\angle AOB=90^\circ$ is

A) $k^2+k+1=0$ **B)** $k^2-2k+10=0$

C) $2k^2+9k-10=0$ **D)** $3k^2+8k-1=0$

89. Q.Id: 138809

The lines are represented by the equations $23x^2 - 48xy + 3y^2 = 0$ **and** $2x + 3y + 4 = 0$ **form**

A) an isosceles triangle

B) a right angled triangle

C) an equilateral triangle

D) a scalene triangle

90. Q.Id: 138808

The equation of the line joining the centroid with the orthocentre of the triangle formed by the points $(-2, 3), (2, -1), (4, 0)$ **is**

A) $x + y - 2 = 0$

B) $11x - y - 14 = 0$

C) $x - 11y + 6 = 0$

D) $2x - y - 2 = 0$

91. Q.Id: 138796

The equation of the line passing through the point of intersection of the lines $2x + y - 4 = 0; x - 3y + 5 = 0$ **and lying at a distance of** $\sqrt{5}$ **units from the origin, is**

A) $x - 2y - 5 = 0$

B) $x + 2y - 5 = 0$

C) $x + 2y + 5 = 0$

D) $x - 2y + 5 = 0$

92. Q.Id: 138791

If the portion of a line intercepted between the coordinate axes is divided by the point $(2, -1)$ **in the ratio 3:2, then the equation of that line is**

A) $5x - 2y - 20 = 0$

B) $2x - y - 5 = 0$

C) $3x - y - 7 = 0$

D) $x - 3y - 5 = 0$

93. Q.Id: 138789

If the coordinates of a point P changes to $(2, -6)$ **when the coordinate axes are rotated through an angle of 135°, then the coordinates of P in the original system are**

A) $(-2, 6)$

B) $(-6, 2)$

C) $(2\sqrt{2}, 4\sqrt{2})$

D) $(\sqrt{2}, -\sqrt{2})$

94. Q.Id: 138787

Let $A(2, 3), B(3, -6), C(5, -7)$ **be three points. If P is a point satisfying the condition** $PA^2 + PB^2 = 2PC^2$**, then a point that lies on the locus of P is**

A) $(2, -5)$

B) $(-2, 5)$

C) $(13, 10)$

D) $(-13, -10)$

95. Q.Id: 138766

In Ellingham diagram, the plot is drawn between

A) Temperature, ΔH°

B) Temperature, ΔG°

C) Pressure, ΔS°

D) Temperature, ΔE°

96. Q.Id: 138765

Which one of the following statements is not correct?

A) A mixture of dinitrogen and dioxygen at room temperature is an example for aerosol.

B) Lyophilic sols are more stable compared to lyophobic sols

C) Formation of micelles is possible only above Kraft temperature

D) An example for a soap is sodium stearate and an example for detergent is sodium lauryl sulphate

97. Q.Id: 138764

Thermal decomposition of HCOOH is a first order reaction and the rate constant at T(K) is $4.606 \times 10^{-3}\ s^{-1}$**. The time required to decompose 90% of initial quantity of HCOOH at T(K) in seconds is**

A) 100

B) 500

C) 1000

D) 50

98. Q.Id: 138763

When an aqueous solution of $CuCl_2$ **is electrolysed using Pt electrodes, the reaction at cathode and anode respectively are**

A) $4H_2O_{(l)} \xrightarrow{+4e^-} 2H_{2(g)} + 4OH^-_{(aq)}$;
$2H_2O_{(l)} \xrightarrow{-4e^-} O_{2(g)} + 4H^+_{(aq)}$

B) $2Cu^{2+}_{(aq)} \xrightarrow{+4e^-} 2Cu_{(s)}$;
$2H_2O_{(l)} \xrightarrow{-4e^-} O_{2(g)} + 4H^+_{(aq)}$

C) $Cu^{2+}_{(aq)} \xrightarrow{+2e^-} Cu_{(s)}$;
$2Cl^-_{(aq)} \xrightarrow{-2e^-} Cl_{2(g)}$

D) $2H_2O_{(l)} \xrightarrow{+2e^-} H_{2(g)} + 2OH^-_{(aq)}$;
$2Cl^-_{(aq)} \xrightarrow{-2e^-} Cl_{2(g)}$

99. Q.Id: 138762

Dissolving 120 g of a compound (mol.wt = 60) in 1000 g of water gave a solution of density $1.12\ g\ mL^{-1}$**. The molarity of solution is**

A) 1.0 M

B) 2.0 M

C) 2.5 M

D) 4.0 M

100. Q.Id: 138761

The measured osmotic pressure of a solution prepared by dissolving 17.4 mg of K_2SO_4 in 2L of water at $27°C$ is 3.735×10^{-3} *bar*. The Van't Hoff factor is ($R = 0.083$ L bar K^{-1} mol^{-1}; atomic weights K = 39; S = 32; O = 16)

A) 2.84

B) 3.0

C) 2.0

D) 2.32

101. Q.Id: 138760

The total number of body centered lattices is Possible among the 14 Bravais lattices is

A) 2

B) 1

C) 4

D) 3

102. Q.Id: 138759

What are X and Y in the following reaction?

$$\text{Pent}-2-\text{ene} \xrightarrow[\text{(ii) } Zn/H_2O]{\text{(i) } O_3} X + Y$$

A) X CH_3CHO
Y CH_3CH_2CHO

B) X CH_3CH_2CHO
Y CH_3CH_2CHO

C) X CH_3CHO
Y $(CH_3)_2CO$

D) X CH_3CHO
Y CH_3CHO

103. Q.Id: 138757

Identify the correct statements from the following

a. Petrol and CNG operated automobiles causes less pollution.

b. Alkanes having tertiary hydrogen can be oxidized to alcohols by $KMnO_4$

c. Methane can be prepared by Kolbe's electrolytic method

d. Alkyl chloride on reduction with zinc and dilute hydrochloric acid gives alkane

A) b, c, d

B) a, b

C) a, b, d

D) c, d

104. Q.Id: 138755

The IUPAC name of the following compound is

A) 5-Cyanopentan-2-one

B) 5-Oxohexanenitrile

C) 4-Oxopentanenitrile

D) 2-Oxopentanenitrile

105. Q.Id: 138754

The environmental friendly chemical now-a-days used for bleaching the paper in the presence of a suitable catalyst is

A) Chlorine

B) Sulphur dioxide

C) Hydrogen peroxide

D) Bleaching powder

106. Q.Id: 138752

Assertion (A) : $[SiF_6]^{2-}$ **is formed but** $[SiCl_6]^{2-}$ **is not**

Reason (R) : Electronegativity (EN) of F is higher than EN of Cl

A) Both (A) and (R) are correct and (R) is the correct explanation of (A)

B) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

C) (A) is correct but (R) is not correct

D) (A) is not correct but (R) is correct

107. Q.Id: 138751

BF_3 **reacts with NaH at 450 K to form NaF and X. When X reacts with LiH in di ethyl ether, Y is formed. What is Y?**

A) $LiBO_2$

B) $Li_2B_4O_7$

C) $LiBH_4$

D) $B_2H_6.LiH$

108. Q.Id: 138750

Which of the following nitrates on heating does not give its oxide?

A) $LiNO_3$

B) $NaNO_3$

C) $Ba(NO_3)_2$

D) $Be(NO_3)_2$

109. Q.Id: 138748

Which of the following statements are correct?

a) $NaH(s)$ **reacts with violently with water to form NaOH and** H_2

b) An example for electron rich hydride is NH_3

c) Nickel; forms saline hydride

A) a, c

B) b, c

C) a, b, c

D) a, b

110. Q.Id: 138746

If the pK_a **of acetic acid and** pK_b **of dimethyl amine are 4.76 and 3.26 respectively, the pH of dimethyl ammonium acetate solution is**

A) 7.75

B) 6.75

C) 7.0

D) 8.5

111. Q.Id: 138744

At 1000 K, the equilibrium constant, K_c for the reaction $2NOCl_{(g)} \rightleftharpoons 2NO_{(g)} + Cl_{2(g)}$ is 4.0×10^{-6} mol L^{-1}. The K_p (in bar) at the same temperature is $(R = 0.083$ L bar K^{-1} $mol^{-1})$

A) 3.32×10^{-6}

B) 3.32×10^{4}

C) 3.32×10^{-4}

D) 3.32×10^{-3}

112. Q.Id: 138742

From the following data

$$CH_3OH_{(l)} + \frac{3}{2}O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)};\ \Delta_r H^\circ = -726 \text{ kJ mol}^{-1}$$

$$H_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow H_2O_{(l)};\ \Delta_r H^\circ = -286 \text{ kJ mol}^{-1}$$

$$C_{(graphite)} + O_{2(g)} \rightarrow CO_{2(g)};\ \Delta_r H^\circ = -393 \text{ kJ mol}^{-1}$$

The standard enthalpy of formation of CH_3OH in kJ mol^{-1} is

A) -239

B) 239

C) 547

D) -905

113. Q.Id: 138739

In anionic polymerisation, the compound which acts as effective chain initiator is :

A) BF_3

B) $(CH_3CO)_2O_2$

C) $SnCl_2$

D) $R-Li$

114. Q.Id: 138738

One litre of 0.15 M Na_2SO_3 aqueous solution is mixed with 500 mL of $K_2Cr_2O_7$ aqueous solution in acid medium. What is the number of moles of $K_2Cr_2O_7$ remaining in the solution after the reaction?

A) 0.1

B) 0.0125

C) 0.025

D) 0.05

115. Q.Id: 138735

16 g each of H_2, He and O_2 are present in a container exerting 10 atm. pressure at T(K). The pressure in atm exerted by 36 g each of He and O_2 in the second container of same volume and temperature is

A) 1.8

B) 6.4

C) 3.6

D) 5.4

116. Q.Id: 138734

XeF_4 is square planar where asCCl_4 is tetrahedral because

A) InXeF_4, $'Xe'$ issp^2 hybridized and inCCl_4 $'C'$ issp^3 hybridised

B) In bothXeF_4 andCCl_4 the central atom issp^3 hybridised

C) InXeF_4, $'Xe'$ issp^3d^2 hybridized but due to the presence of 2 lone pairs of electrons shape is square planar whereas inCCl_4 $'C'$ issp^3 hybridised

D) Xe is noble gas, whereas C is a non-metal.

117. Q.Id: 138732

Which set of the following molecules has only one lone pair of electrons on their respective central atoms?

a) SO_2 b) XeF_4 c) $PbCl_2$ d) ClF_3

Identify the correct statements

A) a, c, d

B) b, c, d

C) a, b, e

D) a, c, e

118. Q.Id: 138731

To which group and period does the element belong if the electronic configuration of an element in its −2 oxidation state is$1s^2 2s^2 2p^6 3s^2 3p^6$

A) period 3, group 16

B) period 3, group 17

C) period 4, group 16

D) period 4, group 17

119. Q.Id: 138729

A light of frequency$1.6 \times 10^{16}\ Hz$ when falls on a metal plate emits electrons that have double the kinetic energy compared to the kinetic energy of emitted electrons when frequency of$1.0 \times 10^{16}\ Hz$ falls on the same plate. The threshold frequency (ν_0) of the metal in Hz is

A) 1×10^{15}

B) 4×10^{15}

C) 3×10^{15}

D) 4×10^{13}

120. Q.Id: 138728

If the radius of electron orbit in the excited state of hydrogen atom is 476.1 pm, the energy of the electron in that excited state in J is (Radius and energy of electron in the first orbit of hydrogen atom are 52.9 pm and$-2.18 \times 10^{-8}\ J$ respectively)

A) -2.42×10^{-8}

B) -19.62×10^{-18}

C) -2.42×10^{-19}

D) -6.05×10^{-19}

121. Q.Id: 138725

If X is a binomial variate with mean 6 and variance 2, then the value of $P(5 \le X \le 7)$ is

A) $\frac{4762}{6561}$

B) $\frac{4672}{6561}$

C) $\frac{5264}{6561}$

D) $\frac{5462}{6651}$

122. Q.Id: 138724

If the probability function of a random variable X is defined by $P(X=k)=a\left(\frac{k+1}{2^k}\right)$ for $k=0,1,2,3,4,5$ then the probability that X takes a prime value is

A) $\frac{13}{20}$

B) $\frac{23}{60}$

C) $\frac{11}{20}$

D) $\frac{19}{60}$

123. Q.Id: 138722

A man is known to speak the truth 2 out of 3 rimes, If he throws a die and reports that it is six, then the probability that it is actually five, is

A) $\frac{3}{8}$

B) $\frac{1}{7}$

C) $\frac{2}{7}$

D) $\frac{4}{5}$

124. Q.Id: 138719

If a die is rolled three times, then the probability of getting a larger number on its face than the previous number each time, is

A) $\frac{15}{216}$

B) $\frac{5}{54}$

C) $\frac{13}{216}$

D) $\frac{1}{18}$

125. Q.Id: 138717

The mean deviation from the median for the following distribution f collected to two decimals) is

x_i	6	9	3	12	15	13	21	22
f_i	4	5	3	2	5	4	4	3

A) 13.42

B) 5.45

C) 4.97

D) 11.25

126. Q.Id: 138715

The mean and the standard deviation of a data of 8 items are 25 and 5 respectively. If two items 15 and 25 are added to this data, then the variance of the new data is

A) 29

B) 24

C) 26

D) $\sqrt{29}$

127. Q.Id: 138714

If $\vec{a}$, $\vec{b}$ **and** $\vec{c}$ **are non-coplanar vectors and the four points with position vectors** $2\vec{a}+3\vec{b}-\vec{c}, \vec{a}-2\vec{b}+3\vec{c}, 3\vec{a}+4\vec{b}+2\vec{c}$ **and** $k\vec{a}-6\vec{b}+6\vec{c}$ **are coplanar, then k =**

A) 0

B) 1

C) 2

D) 3

128. Q.Id: 138713

If $\vec{a}$, $\vec{b}$ **and** $\vec{c}$ **are mutually perpendicular vectors of the same magnitude, then the cosine of the angle between** $\vec{a}$ **and** $\vec{a}+\vec{b}+\vec{c}$ **is**

A) $\frac{1}{\sqrt{2}}$

B) $\frac{1}{\sqrt{3}}$

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

D) $\frac{\sqrt{3}}{2}$

129. Q.Id: 138712

If $\vec{a}=\hat{i}+2\hat{j}+3\hat{k}$, $\vec{b}=-\hat{i}+2\hat{j}+\hat{k}$, $\vec{c}=\hat{i}+2\hat{j}-2\hat{k}$, **n is perpendicular to both** $\vec{a}$ **and** $\vec{b}$ **and** θ **is the angle between c and n then** $\sin\theta =$

A) $\sqrt{\frac{2}{3}}$

B) $\frac{\sqrt{2}}{3\sqrt{3}}$

C) $\frac{2}{\sqrt{3}}$

D) $\frac{\sqrt{3}}{2}$

130. Q.Id: 138705

If $\vec{a}=\hat{i}-2\hat{j}-3\hat{k}$, $\vec{b}=2\hat{i}+\hat{j}-\hat{k}$, $\vec{c}=\hat{i}+3\hat{j}-2\hat{k}$, then $[(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c})(\vec{b}\times\vec{c})\times(\vec{c}\times\vec{a})(\vec{c}\times\vec{a})\times(\vec{a}\times\vec{b})]=$

A) 160000

B) -8000

C) 400

D) -40

131. Q.Id: 138703

In ΔPQR, M is the midpoint of QR and C is the midpoint of PM. If QC when extended meets PR at N, then $\frac{|\overline{QN}|}{|\overline{CN}|}=$

A) 1

B) 2

C) 3

D) 4

132. Q.Id: 138702

Let $\vec{a}$, $\vec{b}$ and $\vec{c}$ three non-coplanar vectors. The vector equation of a line which passes through the point of intersection of two lines, one joining the points $\vec{a}+2\vec{b}-5\vec{c}$, $-\vec{a}-2\vec{b}-3\vec{c}$ and the other joining the points $-4\vec{c}$, $6\vec{a}-4\vec{b}+4\vec{c}$ is,

A) $\vec{r}=2\vec{a}-4\vec{b}+3\vec{c}+\mu(\vec{a}-6\vec{b}+4\vec{c})$

B) $\vec{r}=3\vec{a}+6\vec{b}-\vec{c}+\mu(\vec{a}+2\vec{b}+\vec{c})$

C) $\vec{r}=2\vec{a}+3\vec{b}-\vec{c}+\mu(\vec{a}+\vec{b}-\vec{c})$

D) $\vec{r}=-2\vec{b}+3\vec{c}+\mu(\vec{a}-4\vec{b}+3\vec{c})$

133. Q.Id: 138701

In a ΔABC, D, E and F respectively are the points of contact of the in circle with the sides AB, BC and CA such that $AD=\alpha$, $BE=\beta$ and $CF=y$, then $\frac{\alpha\beta y}{\alpha+\beta+y}=$

A) R^2

B) $2R$

C) $2r$

D) r^2

134. Q.Id: 138699

In ΔABC, $\tan\frac{A}{2}+\tan\frac{B}{2}=$

A) $\frac{c\cot\frac{C}{2}}{4s}$

B) $\frac{2c\cot\frac{C}{2}}{a+b+c}$

C) $\frac{2c\tan\frac{C}{2}}{s}$

D) $\frac{c\cot\frac{C}{2}}{a+b+c}$

135. Q.Id: 138697

If the median of a ΔABC through A is perpendicular to AC, then $\frac{\tan A}{\tan C} =$

A) $1+\sqrt{2}$

B) $-\frac{1}{\sqrt{3}}+1$

C) -2

D) $1+\frac{2}{\sqrt{3}}$

136. Q.Id: 138694

$\tanh^{-1}\frac{1}{2}+\coth^{-1}3=$

A) $\log\sqrt{6}$

B) $\log 6$

C) $-\log\sqrt{6}$

D) $-\log 6$

137. Q.Id: 138692

Let x, y be real numbers such that $x\neq y$ and $xy\neq 1$. If $ax+b\sec(\tan^{-1}x)=c$ and $ay+b\sec(\tan^{-1}x)=c$, then $\frac{x+y}{1-xy} =$

A) $\frac{2ab}{a^2-b^2}$

B) $\frac{2ac}{a^2+c^2}$

C) $\frac{2ab}{a^2+b^2}$

D) $\frac{2ac}{a^2-c^2}$

138. Q.Id: 138689

If the general solution of $\sin 5x=\cos 2x$ is of the form $a_n.\frac{\pi}{2}$ for $n=0,\ \pm1,\ \pm2,\ldots$, then $a_n =$

A) $\frac{2n}{5+2(-1)^n}$

B) $\frac{2n+(-1)^n}{5+2(-1)^n}$

C) $\frac{2n+1}{5+2(-1)^n}$

D) $\frac{2n-1}{5+2(-1)^n}$

139. Q.Id: 138684

$\cos^3 10^\circ+\cos^3 110^\circ+\cos^3 130^\circ$

A) $\frac{3}{4}$

B) $\frac{3}{8}$

C) $\frac{3\sqrt{3}}{8}$

D) $\frac{3\sqrt{3}}{4}$

140. Q.Id: 138683

If $\cos\left(x-\frac{\pi}{3}\right), \cos x, \cos\left(x+\frac{\pi}{3}\right)$ are in a harmonic progression, then $\cos x =$

A) $\frac{3}{2}$

B) 1

C) $\frac{\sqrt{3}}{2}$

D) $\sqrt{\frac{3}{2}}$

141. Q.Id: 138682

If $\frac{x^2+5x+7}{(x-3)^2}+\frac{A}{(x-3)}+\frac{B}{(x-3)^2}+\frac{C}{(x-3)^3}$ then the equation of the line having slope A and passing through the point (B, C) is

A) $x+y-20=0$

B) $x-y+20=0$

C) $x+y+20=0$

D) $x-y-20=0$

142. Q.Id: 138679

The numerically greatest term in the binomial expansion of $(2a-3b)^{19}$ when $a=\frac{1}{4}$ and $b=\frac{2}{3}$ is,

A) ${}_{19}C_5.2^{11}$

B) ${}_{19}C_3.\frac{1}{2^{11}}$

C) ${}_{19}C_4.\frac{1}{2^{13}}$

D) ${}_{19}C_3.2^{13}$

143. Q.Id: 138677

The number of rational terms in the binomial expansion of $(\sqrt[4]{5}+\sqrt[5]{4})^{100}$ is

A) 50

B) 5

C) 6

D) 51

144. Q.Id: 138673

The number of 5-letter words that can be formed by using the letters of the word SARANAM is

A) 1120

B) 6720

C) 480

D) 720

145. Q.Id: 138672

If x is the number of ways in which six women and six men can be arranged to sit in a row such that no two women are together and if y is the number of ways they are seated around a table in the same manner, then x:y =

A) 12:1

B) 42:1

C) 16:1

D) 6:1

146. Q.Id: 138670

The sum of the four digit even numbers that can be formed with the digits 0, 3, 5, 4 without repetition is

A) 14684

B) 43536

C) 46526

D) 52336

147. Q.Id: 138669

If the sum of two roots of the equation $x^3-2px^2+3qx-4r=0$ **is zero, then the value of** r **is**

A) $\frac{3pq}{2}$

B) $\frac{3pq}{4}$

C) pq

D) $2pq$

148. Q.Id: 138668

If a, b **and** c **are the roots of** $x^3+qx+r=0$ **then** $(a-b)^2+(b-c)^2+(c-a)^2=$

A) $-6q$

B) $-4q$

C) $6q$

D) $4q$

149. Q.Id: 138667

For real number x, if the minimum value of $f(x)=x^2+2bx+2c^2$ **is greater than the maximum value of** $g(x)=-x^2-2cx+b^2$**, then**

A) $c^2>2b^2$

B) $c^2<2b^2$

C) $b^2=2c^2$

D) $c^2=2b^2$

150. Q.Id: 138666

The number of integral values of x **satisfying** $5x-1<(x+1)^2<7x-3$ **is**

A) 0

B) 1

C) 2

D) 3

151. Q.Id: 138665

If $1, \omega, \omega^2$ are the cube roots of unity, then $\frac{1}{1+2\omega}+\frac{1}{2+\omega}-\frac{1}{1+\omega}=$

A) 1 **B)** ω

C) ω^2 **D)** 0

152. Q.Id: 138664

If $z_1=1-2i;\ z_2=1+i$ and $z_3=3+4i$, then $\left(\frac{1}{z_1}+\frac{3}{z_2}\right)\frac{z_3}{z_2}=$

A) $13-6i$ **B)** $13-3i$

C) $6-\frac{13}{2}i$ **D)** $\frac{13}{2}-3i$

153. Q.Id: 138663

If $13e^{i\tan^{-1}\frac{5}{12}}=a+ib$, then the ordered pair $(a, b)=$

A) $(12, 5)$ **B)** $(5, 12)$

C) $(24, 10)$ **D)** $(10, 24)$

154. Q.Id: 138662

Let $z=x+iy$ and point P represent z z in the Argand plane. If the real part of $\frac{z-1}{z+i}$ is 1, then a point that lies on the locus of P is

A) $(2016, 2017)$ **B)** $(-2016, 2017)$

C) $(-2016, -2017)$ **D)** $(2016, -2017)$

155. Q.Id: 138661

If A and B are the two real values of k for which the system of equations $x+2y+z=1,\ x+3y+4z=k, x+5y+10z=k^2$ is consistent, then $A+B=$

A) 3 **B)** 4

C) 5 **D)** 7

156. Q.Id: 138660

If $A=\begin{bmatrix} k/2 & 0 & 0 \\ 0 & l/3 & 0 \\ 0 & 0 & m/4 \end{bmatrix}$ and $A^{-1}=\begin{bmatrix} 1/2 & 0 & 0 \\ 0 & 1/3 & 0 \\ 0 & 0 & 1/4 \end{bmatrix}$, then $k+l+m=$

A) 1 **B)** 9

C) 14 **D)** 29

157. Q.Id: 138659

For the matrix $A=\begin{bmatrix}3 & -3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix}$. $A^{-1}=$

A) A **B)** A^2

C) A^3 **D)** A^4

158. Q.Id: 138658

For any natural number n, $(15\times 5^{2n})+(2\times 2^{3n})$ is divisible by

A) 7 **B)** 11

C) 13 **D)** 17

159. Q.Id: 138657

Given that a, b and c are real numbers suet that $b^2=4ac$ and $a>0$. The maximal possible set $D\subseteq R$ on which the function $f:D\to R$ given by, $f(x)=\log\{ax^3+(a+b)x^2+(b+c)x+c\}$ is defined by,

A) $R-\left\{-\frac{b}{2a}\right\}$ **B)** $R-\left(\left\{-\frac{b}{2a}\right\}\cup(-\infty,-1)\right)$

C) $R-\left(\left\{-\frac{b}{2a}\right\}\cup\{x:x\geq 1\}\right)$ **D)** $R-\left(\left\{-\frac{b}{2a}\right\}\cup(-\infty,-1]\right)$

160. Q.Id: 138656

If $f:R\to R$ is defined by $f(x)=[2x]-2[x]$ for $x\in R$, then the range of f is (Here [x] denotes the greatest integer not exceeding x)

A) Z, the set of all integers **B)** N, the set of all natural numbers

C) R, the set of all real numbers **D)** {0, 1}

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