Previous Paper Questions

1. Q.Id: 159621

If α, β **are the roots of** $x^2+bx+c=0$, γ, δ **are the roots of** $x^2+b_1x+c_1=0$ **and** $r<\alpha<r<\beta$ **then** $(c-c_1)^2<$

A) $(b_1-b)(bc_1-b_1c)$

B) 1

C) $(b-b_1)^2$

D) $(c-c_1)(b_1c-c_1b)$

2. Q.Id: 159618

If α and β **are the roots of** $x^2+7x+3=0$ **and** $\frac{2\alpha}{3-4\alpha}+\frac{2\beta}{3-4\beta}$ **are the roots of** $ax^2+bx+c=0$ **and GCD of a, b, c is 1 then a + b + c**

A) 11

B) 0

C) 243

D) 81

3. Q.Id: 159615

If ω **is a complex cube root of unity then** $\sum_{r=1}^{9} r(r+1-\omega)(r+1-\omega^2)=$

A) 5025

B) 4020

C) 2016

D) 3015

4. Q.Id: 159613

If ω **represents a complex cube root of unity then**

$$\left(1+\frac{1}{\omega}\right)\left(1+\frac{1}{\omega^2}\right)+\left(2+\frac{1}{\omega}\right)\left(2+\frac{1}{\omega^2}\right)+.....+\left(n+\frac{1}{\omega}\right)\left(n+\frac{1}{\omega^2}\right)$$

A) $\frac{n(n^2+1)}{3}$

B) $\frac{n(n^2+2)}{3}$

C) $\frac{n(n^2-2)}{3}$

D) $\frac{n(n^2-1)}{6}$

5. Q.Id: 159612

If Z = x + iy, $x, y \in R$ **and the imaginary part of** $\frac{\bar{z}-1}{\bar{z}-i}$ **is 1 then the locus of Z is**

A) $x + y + 1 = 0$

B) $x + y + 1 = 0 (x, y) \neq (0, -1)$

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

D) $x^2+y^2-x+3y+2=0$ $(x, y) \neq (0, -1)$

6. Q.Id: 159610

If Z = x + iy $x, y \in R\ (x, y) \neq (0, -4)$ **and** $\text{Arg}\left(\frac{2z-3}{z+4i}\right)=\frac{\pi}{4}$ **then the locus of Z is**

A) $2x^2+2y^2+5x+5y-12=0$

B) $2x^2-3xy+y^2+5x+y-12=0$

C) $2x^2-3xy+y^2+5x+y+12=0$

D) $2x^2+2y^2-11x+7y-12=0$

7. Q.Id: 159609

Investigate the values of λ and μ **for the system x + 2y + 3z = 6, x + 3y + 5z = 9, 2x + 5y +** $\lambda z = \mu$ **and match the values in List - I with the items in List - II**

List1	List2
A. $\lambda = 8, \mu \neq 15$	I. Infinitely many solutions
B. $\lambda \neq 8, \mu \in R$	II. No solution
C. $\lambda = 8, \mu = 15$	III. Unique solution

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

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

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

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

8. Q.Id: 159607

If [X] is the greatest integer less than or equal to X and $|X|$ **is the modulus of a then the system of three equations**

$2x+3|y|+5[z]=0$

$x+|y|-2[z]=4$

$x+|y|+[z]=1$ has

A) A unique solutions

B) Finitely many solutions

C) Infinitely many solutions

D) No solution

9. Q.Id: 159603

Consider the following lists

List1	List2
A. $f(x)=\frac{\lvert x+2\rvert}{x+2}, x\neq -2$	I. $\left[\frac{1}{3}, 1\right]$
B. $g(x)=\lvert[x]\rvert, x\in R$	II. Z
C. $h(x)=\lvert X-[x]\rvert, x\in R$	III. W
D. $f(x)=\frac{1}{2-\sin 3x}, x\in R$	IV. [0, 1)
E. .	V. {-1, 1}

A) A-> V, B-> III, C-> II, D-> I

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

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

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

10. Q.Id: 138930

A signal of frequency 10 kHz and peak voltage 10 V is used to amplitude modulate a carrier of frequency 1 MHz and peak voltage 20 V. The side band frequencies in kHz are

A) 1010, 990

B) 910, 1090

C) 10, 11

D) 1.01, 0.99

11. Q.Id: 138929

In a p-type semiconductor the donor level is at 50 meV above the valence band. To produce one electron, the maximum wave length of light photon required is

(Planck's constant $=6.6\times10^{-34}$ **J−s and speed of light in vacuum** $=3\times10^{8}$ **m/s)**

A) 0.0248μm

B) 0.248μm

C) 2.48μm

D) 24.8μm

12. Q.Id: 138928

In a nuclear reactor the activity of a radioactive substance is 2000/s. If the mean life of the products is 50 minutes, then in the steady power generation, the number of radio nuclides is

A) 12×10^{5}

B) 60×10^{5}

C) 90×10^{5}

D) 15×10^{5}

13. Q.Id: 138926

Acetic acid on heating with NH_3 forms A. When A reacts with $LiAlH_4$ followed by hydrolysis gives B. When B is heated with chloroform in KOH medium gives C. What are B and C respectively?

A) CH_2CONH_2, CH_3CH_2NC

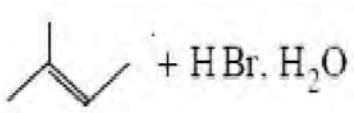
B) $CH_3CH_2NH_2, CH_3CH_2NC$

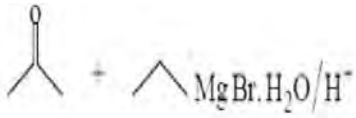
C) $CH_3CH_2NH_2, CH_3COOH$

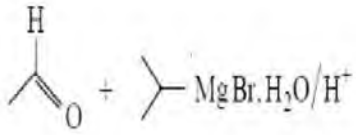
D) $CH_3CH_2CH_2NH_2, CH_3CH_2NC$

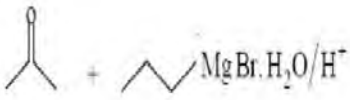
14. Q.Id: 138924

2-Methyl 2- butane on hydration gave an alcohol X. Isomer of X could be prepared from which of the following?

A) 

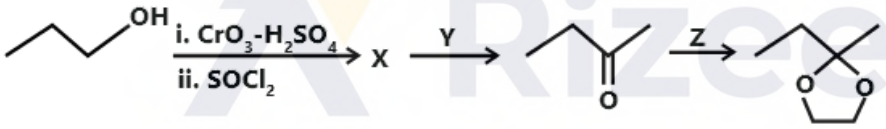
B) 

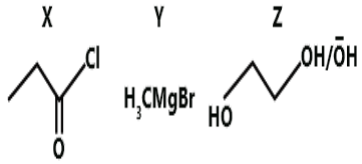
C) 

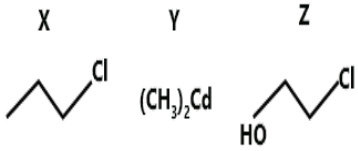
D) 

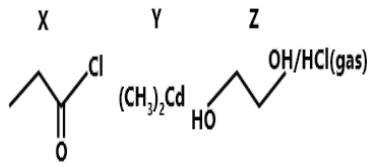
15. Q.Id: 138923

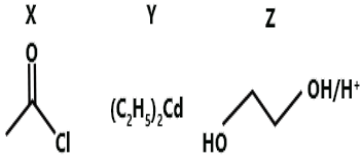
Identify X,Y,Z in the following reaction sequence.



A) 

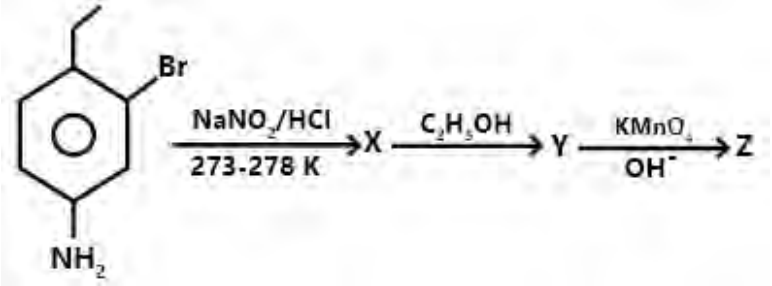
B) 

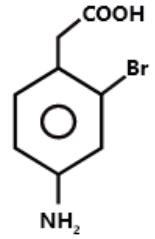
C) 

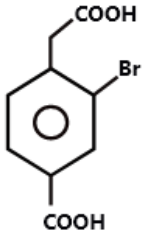
D) 

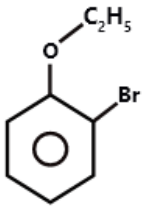
16. Q.Id: 138921

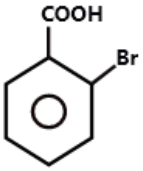
Identify Z in the following sequence of reactions.



A) 

B) 

C) 

D) 

17. Q.Id: 138919

The bond angle between C-O and O-H bonds in alcohols is close to

A) 109°

B) 120°

C) 180°

D) 90°

18. Q.Id: 138918

Arrange the following organic halides in correct order of reactivity towards S_N2 displacement.

$(CH_3)_2C(Br)CH_2CH_3$ (P) $\quad BrCH_2(CH_2)_3CH_3$ (Q) $\quad CH_3CH(Br)CH_2CH_3$ (R)

A) P>Q>R

B) R>P>Q

C) P>R>Q

D) Q>R>P

19. Q.Id: 138917

Which of the following are broad spectrum antibiotics?

Penicillin G Chloramphenicol Ofloxacin Ampicillin

I II III IV

A) I, II only

B) I, II, III

C) II, III, IV

D) I, III only

20. Q.Id: 138916

Identify the correct set of monosaccharides present in sucrose (X) , lactose (Y) and maltose (Z) .

A) glucose, fructose galactose, glucose glucose, fructose

B) glucose, fructose galactose, glucose glucose, glucose

C) glucose, glucose galactose, glucose glucose, glucose

D) glucose, glucose glucose, fructose glucose, glucose

21. Q.Id: 138914

Match the following

List1	List2
A. Teflon	I. $SnCl_2$
B. Anionic polymerisation	II. C_2F_4
C. Cationic polymerisation	III. Bakelite
D. Thermosetting polymer	IV. Polystyrene
E. .	V. RLi

A) A-II;B-I;C-V;D-III

B) A-II;B-V;C-I;D-IV

C) A-II;B-V;C-I;D-III

D) A-V;B-II;C-I;D-IV

22. Q.Id: 138912

$KMnO_4$ **oxidizes** $S_2O_3^{2-}$ to SO_4^{2-} **in medium x and** NO_2^- to NO_3^- **in medium y. x and y are respectively.**

A) acidic, basic

B) acidic, acidic

C) acidic, neutral

D) neutral, acidic

23. Q.Id: 138911

The wavelength of the light absorbed by the complexes $\left[Ni(H_2O)_6\right]^{2+}.\left[Ni(en)_3\right]^{2+}.\left[Ni(H_2O)_4en\right]^{2+}$ **are** $\lambda_1,\lambda_2,\lambda_3$ **respectively. The correct order of wavelengths is**

A) $\lambda_1 > \lambda_2 > \lambda_3$

B) $\lambda_3 > \lambda_2 > \lambda_1$

C) $\lambda_1 > \lambda_3 > \lambda_2$

D) $\lambda_2 > \lambda_3 > \lambda_1$

24. Q.Id: 138909

Identify the set of acidic oxides.

A) Na_2O, CaO, BaO

B) ZnO, PbO, BeO

C) CO, NO, N_2O

D) Mn_2O_7, CrO_3, V_2O_5

25. Q.Id: 138908

Nobel metals like gold and platinum are soluble in which of the following mixtures?

A) 1:1 mixture of conc.HNO_3 and conc.H_2SO_4

B) 1:3 mixture of conc. HCl and conc. HNO_3

C) 1:3 mixture of conc.HNO_3 and conc.HCl

D) 1:3 mixture of conc.H_2SO_4 and conc.HCl

26. Q.Id: 138906

Which of the following statements is not correct?

A) FromSO_2 toTeO_2 reducing power decreases

B) The order of boiling points of hydrides of 16th group elements is$H_2S < H_2Se < H_2Te < H_2O$

C) Rhombicsulphur hasS_8molecules while monoclinic sulphur hasS_6 molecules.

D) The bond angle in Ozone molecule is$117°$.

27. Q.Id: 138904

Which of the following are carbonate ores?.

I) Magnetite

II) Kaolinite

III) Siderite

IV) Calamine

A) I, II, III

B) II, III, IV

C) I, II only

D) III, IV only

28. Q.Id: 138903

Identify the correct statements from the following.

I) Sulphur sol is an example of multimolecular colloid.

II) Tyndall effect is observed when the diameter of the dispersed particles is not much smaller than the wavelength of the light used.

III) The process of removing a dissolved substance from a colloidal solution by means of diffusion through a suitable membrane is called peptization.

IV) Eosin, gelatin are examples of negatively charged sols.

A) I, II, III

B) I, II, IV

C) I, III, IV

D) II, III, IV

29. Q.Id: 138902

In a system, a particle A of mass m and charge $-2q$ is moving in the nearest orbit around a very heavy particle B having charge $+q$. Assuming Bohr's model of the atom to be applicable to this system, the orbital angular velocity of the particle A is

A) $\frac{2\pi m^2q^2}{\epsilon_0 h^4}$

B) $\frac{3\pi m^3q^3}{\epsilon_0 h^2}$

C) $\frac{2\pi mq^4}{\epsilon_0^2 h^3}$

D) $\frac{5\pi m^2q^3}{\epsilon_0^2 h^2}$

30. Q.Id: 138901

In the first thermal decomposition of $C_2H_5I_{(g)} \rightarrow C_2H_{4(g)} + HI_{(g)}$ the reactant in the beginning exerts a pressure of 2 bar in a closed vessel at 600 K. If the partial pressure of the reactant is 0.1 bar after 1000 minutes at the same temperature the rate constant in min^{-1} is

(log 2=0.30)

A) 6.0×10^{-4}

B) 6.0×10^{-3}

C) 3.0×10^{-3}

D) 3.0×10^{-4}

31. Q.Id: 138899

Under which of the following conditions E value of the cell for the cell reaction given is maximum?

$Zn_{(s)} + Cu^{2+}_{(aq)} \rightleftharpoons Cu_{(s)} + Zn^{2+}_{(aq)}$

$\left(\frac{2.303RT}{F} \text{ at } 298\text{ K} = 0.059\text{ V}, E^0_{Zn^{2+}|Zn} = -0.76\text{V}, E^0_{Cu^{2+}|Cu} = +0.34\text{V}\right)$

A) $C_1 = 0.1M, C_2 = 0.01M$

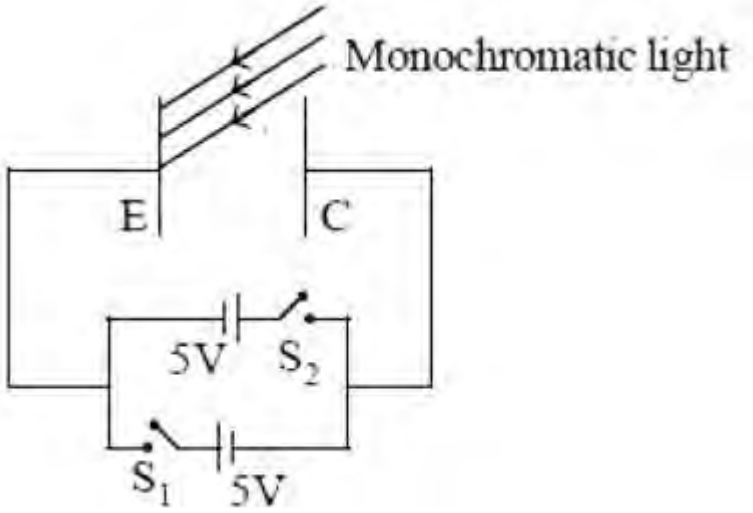
B) $C_1 = 0.01M, C_2 = 0.1M$

C) $C_1 = 0.1M, C_2 = 0.2M$

D) $C_1 = 0.2M, C_2 = 0.1M$

32. Q.Id: 138898

In a photoelectric experiment, a monochromatic light is incident on the emitter plate E, as shown in the figure. When switch S_1 is closed and switch S_2 is open, the photoelectrons strike the collector plate C with a maximum kinetic energy of 1eV. If switch S_1 is open and switch S_2 is closed and the frequency of the incident light is doubled, the photoelectrons strike the collector plate with a maximum kinetic energy of



A) 5233.3 Å

B) 4133.3 Å

C) 4166.7 Å

D) 5336.7 Å

33. Q.Id: 138897

An electromagnetic wave of frequency $1\times10^{14}Hz$ is propagating along Z-axis. The amplitude of electric field is $4Vm^{-1}$, then energy density of electric field will be

(Permittivity of free space $=8.8\times10^{-12}C^2N^{-1}m^{-2}$)

A) $35.2\times10^{-13}\text{Jm}^{-3}$

B) $70.4\times10^{-13}\text{Jm}^{-3}$

C) $70.4\times10^{-12}\text{Jm}^{-3}$

D) $35.2\times10^{-12}\text{Jm}^{-3}$

34. Q.Id: 138895

6 g of a mixture of naphthalene $(C_{10}H_8)$ and anthracene $(C_{14}H_{10})$ is dissolved in 300 g of benzene. If the depression in freezing point is 0.70 K, the composition of naphthalene and anthracene in the mixture respectively in g are (molal depression constant of benzene is $5.1\ \text{K kg mol}^{-1}$)

A) 2.60, 3.40

B) 3.40, 2.60

C) 2.90, 3.10

D) 3.10, 2.90

35. Q.Id: 138894

In an oscillating LC circuit, the maximum charge on the capacitor is Q. The charge on the capacitor when the energy is stored equally between the electric and magnetic fields is

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

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

C) Q

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

36. Q.Id: 138893

The number of moles of solute present in the solution of I, II and III is respectively.

I) 500 mL of 0.2MNaOH

II) 200mL of 0.1NH_2SO_4

III) 6 g of urea in 1kg of water

A) -0.1, 0.01, 0.1

B) 0.1, 0.02, 0.1

C) -0.2, 0.01, 0.1

D) 0.1, 0.01, 0.2

37. Q.Id: 138892

To measure a magnetic field between the magnetic poles of a loud speaker, a small coil having 30 turns and 2.5cm^2 **area is placed perpendicular to the field and removed immediately. If the total charge flown through the coil is** $7.5\times10^{-3}C$**, and the total resistance of wire and galvanometer is**$0.3\ \Omega$**, then the magnitude of the magnetic field is**

A) 0.03 T

B) 0.3 T

C) 3 T

D) 3×10^{2}T

38. Q.Id: 138891

At T(K) copper (atomic mass= 63.5 U) has fcc unit cell structure with edge length of x . What is the approximate density of Cu in gcm^{-3} **at that temperature?**

$\left(N_A = 6.0\times10^{23} mol^{-1}\right)$

A) $\frac{42.3}{x^3}$

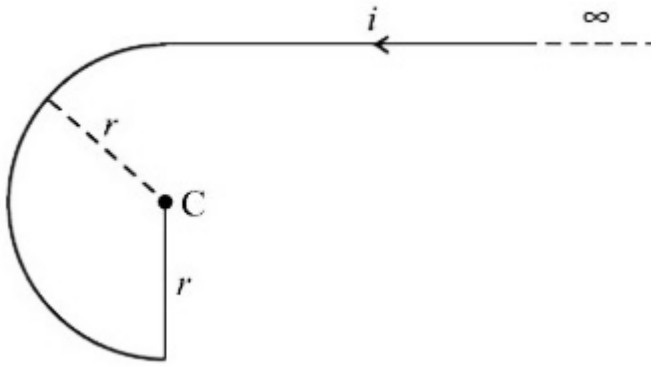
B) $\frac{4.23}{x^3}$

C) $\frac{423}{x^3}$

D) $\frac{212}{x^3}$

39. Q.Id: 138890

The magnetic field at the centre C of the arrangement shown in the figure is



A) $\frac{\mu_0 i}{2\pi r}(1+\pi)$

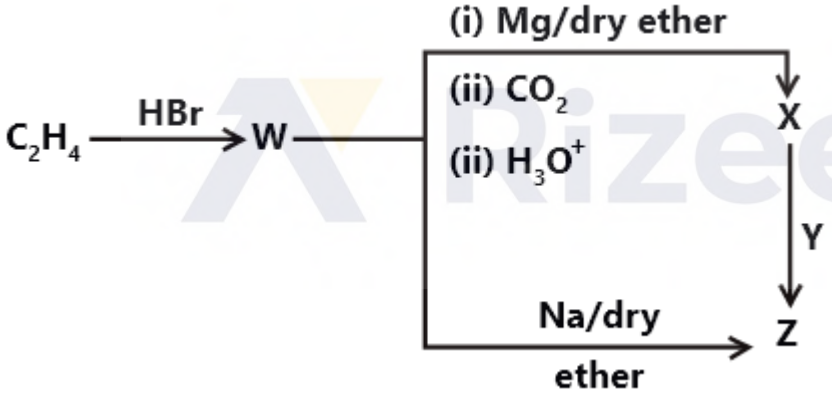
B) $\frac{\mu_0 i}{4\pi r}(1+\pi)$

C) $\frac{\mu_0 i}{\pi r}(1+\pi)$

D) $\frac{\mu_0 i}{r}(1+\pi)$

40. Q.Id: 138889

What are Y and Z in the following reaction sequence?



A)

Y	Z
$NaOH/CaO$	$CH_3(CH_2)_2CH$

B)

Y	Z
$NaOH/electrolysis$	H_3C-CH_3

C)

Y	Z
$NaOH/CaO$	H_3C-CH_3

D)

Y	Z
$NaOH/electrolysis$	$CH_3(CH_2)_2CH_3$

41. Q.Id: 138888

If only $\frac{1}{51}^{th}$ of the main current is to be passed through a galvanometer then the shunt required is R_1 and if only $\frac{1}{11}^{th}$ of the main voltage is to be developed across the galvanometer, then the resistance required is R_2. Then $\frac{R_2}{R_1} =$

A) $\frac{1}{500}$

B) $\frac{50}{9}$

C) $\frac{500}{3}$

D) 500

42. Q.Id: 138886

Assertion (A): When a proton and a neutron enter into a transverse magnetic field with equal speeds, then they trace circular paths of equal radii.

Reason (R): In a transverse magnetic field, the period of revolution of a charged particle in a circular path is directly proportional to the mass of the particle.

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

43. Q.Id: 138885

When an inductor of inductance $\frac{6}{\pi}H$, a capacitor of capacitance $\frac{50}{\pi}\mu F$ and resistor of resistance R are connected in series with an ac supply of rmsvoltage 220 V and frequency 50 Hz, the rms current through the circuit is 440 mA. Match the inductive reactance(X_L). the capacitive reactance(X_C), the resistance (R) and the impedance (Z) of the circuit given in list-I with the corresponding values given in list-II.

List1	List2
A. X_L	I. 200Ω
B. X_C	II. 300Ω
C. R	III. 500Ω
D. Z	IV. 600Ω

A) A->IV; B->II; C->I; D->III

B) A->IV; B->III; C->I; D->II

C) A->IV; B->I; C->II; D->III

D) A->I; B->IV; C->III; D->II

44. Q.Id: 138884

Sodium acetate was electrolysed by Kolbe's method to form two gases A and B at anode. C and D are formed when B is heated with regulated supply of O_2 or air in the presence of$(CH_3COO)_2Mn$. C reacts with NaOH to form a salt. A and D are respectively.

A) CO_2, CH_3COOH

B) CO_2,H_2O

C) C_2H_6,H_2O

D) CO_2,H_2O_2

45. Q.Id: 138883

The ratio of heats generated through shunt and galvanometer is 7:5 when they are connected to make an ammeter. If the resistance of the galvanometer is112Ω then the resistance of the shunt is

A) 80Ω

B) 8Ω

C) 15.6Ω

D) 1.56Ω

46. Q.Id: 138881

In Dumas method one gram of carbon compound gives 50 mL of N_2 at 300 K and 740 mm Hg pressure. If the aqueous tension at 300 K is 15mm Hg, what is the percentage of nitrogen in it?

A) 5.42

B) 10.84

C) 21.68

D) 2.71

47. Q.Id: 138880

The radius of a soap bubble is r and the surface tension of the soap solution is S, The electric potential to which the soap bubble be raised by charging it so that the pressure inside the bubble becomes equal to the pressure outside the bubble is

($\in_0$-permittivity of free space)

A) $\sqrt{\frac{Sr}{8\in_0}}$

B) $\sqrt{\frac{Sr}{4\in_0}}$

C) $\sqrt{\frac{4Sr}{\in_0}}$

D) $\sqrt{\frac{8Sr}{\in_0}}$

48. Q.Id: 138879

Which one of the following has maximum number of hybrid orbitals?

A) C_6H_6

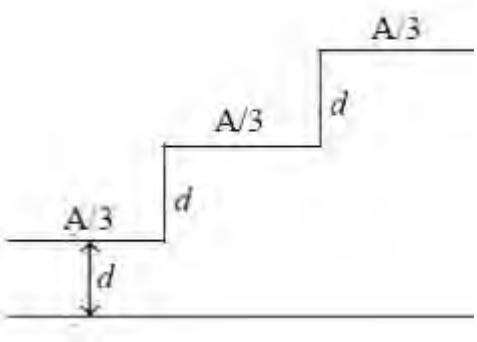
B) $(CH_3)_4C$

C) $(CH_3)_2C=0$

D) $CH_2-CH=CH-CN$

49. Q.Id: 138878

A capacitor is made of a flat plate of area A and a second plate of stair-like structure as shown in the figure. The area each stair is $\frac{A}{3}$ and the height is d. The capacitance of the arrangement is



A) $\frac{\epsilon_0 A}{3d}$

B) $\frac{6\epsilon_0 A}{11d}$

C) $\frac{3\epsilon_0 A}{d}$

D) $\frac{11\epsilon_0 A}{18d}$

50. Q.Id: 138876

The non-biodegradable waste formed in fertilizer industries is

A) fly-ash

B) Carbon monoxide

C) gypsum

D) lead

51. Q.Id: 138875

Formic acid is heated with conc.H_2SO_4 at$100°C$ to form A and B. WhenFe_2O_3 is heated strongly with B, the products formed are C and D. C can also be obtained by reacting$CaCO_3$with dil HCl. What is D?

A) Fe

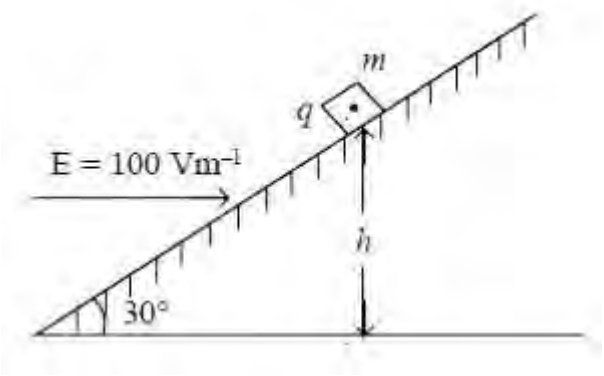
B) CO

C) CO_2

D) Fe_3O_4

52. Q.Id: 138874

All inclined plane making an angle 30o with the horizontal is placed in a uniform horizontal electric field of $100 Vm^{-1}$ as shown in figure, A small block of mass 1 kg and charge 0.01 C is allowed to slide down from rest from a height h = 1 m. If the coefficient of friction is 0.2, then the acceleration of the block is nearly
(Acceleration due to gravity = $10 ms^{-2}$)



A) $1.3\ ms^{-2}$

B) $2.3\ ms^{-2}$

C) $3.3\ ms^{-2}$

D) $4.3\ ms^{-2}$

53. Q.Id: 138873

Three charges of each magnitude $100 \mu C$ are placed at the corners A, B and C of an equilateral triangle of side 4 m. If the charges at A and C are positive and the charge at point B is negative, then the magnitude of total force acting on charge at 'C' and angle made by it with $\overline{AC}$ are

A) 5.625N, 60°

B) 0.5625N, 60°

C) 5.625N, 30°

D) 0.5625N, 30°

54. Q.Id: 138872

Which of the following metals exist in liquid state during summer season?

A) Ga

B) Al

C) Pb

D) Sn

55. Q.Id: 138871

Identify the correct statements from the following.

I) Tendency to form halide hydrates gradually increases from Be to Ba down the group.

II) Tendency to form stable super oxides increases from Li to Cs down the group.

III) Low solubility of LiF is due its high lattice energy.

IV) Solubility of carbonates of group-2 elements increases down the group.

A) I, II

B) III, IV

C) II, III

D) I, III

56. Q.Id: 138870

In Young's double slit experiment, if the slit separation is twice the wavelength of light used, then the maximum number of interference maxima is

A) 0

B) 3

C) 5

D) 7

57. Q.Id: 138869

Which one of the following properties has same value for $^{H}_{2}$ **and** $^{D}_{2}$

A) density

B) enthalpy of bond dissociation

C) bond length

D) melting point

58. Q.Id: 138868

An object is placed 0.1m in front of a convex lens of focal length 20 cm made of a material of refractive index 1.5. The surface of the lens away from the object is silvered. If the radius of curvature of the silvered surface is 22 cm, then the distance of the final image from the silvered surface is

A) 10 cm

B) 11 cm

C) 12 cm

D) 13 cm

59. Q.Id: 138867

The number of species of the following that can act both as Bronsted acids and bases is

$HCl, ClO_4^-, \_OH, H^+, H_2O, HSO_4^-, SO_4^{2-}, H_2SO_4, Cl^-$

A) 4

B) 3

C) 1

D) 2

60. Q.Id: 138866

An observer moves towards a stationary source of sound with a speed $\frac{1}{5}^{th}$ of the speed of sound. The wavelength and frequency of the waves emitted by the source are $'\lambda'$ and $'f'$ respectively.
The apparent frequency and wavelength heard by the observer are respectively.

A) $1.2\,f, \lambda$

B) $f, 1.2\,\lambda$

C) $0.8\,f, 0.8\,\lambda$

D) $1.2\,f, 1.2\,\lambda$

61. Q.Id: 138865

An earthquake generates both transverse (S) and longitudinal (P) waves in the earth with speeds 4.5 kms^{-1} and 8.0 kms^{-1} respectively. A seismograph records that the first P-wave arrives 3.5 minutes earlier than the first S-wave. From the seismograph, the epicenter of the earthquake is located at a distance

A) 1080 km

B) 2468 km

C) 2160 km

D) 4320 km

62. Q.Id: 138864

In which of the following, the solubility of AgCl will be minimum?

A) 0.1M KNO_3

B) 0.1MKCl

C) 0.2M KNO_3

D) Water

63. Q.Id: 138863

The average translational kinetic energy of a molecule in a gas becomes equal to 0.69 eV at a temperature about
[Boltzmann constant $= 1.38 \times 10^{-23} JK^{-1}$]

A) 3370^0C

B) 3388^0C

C) 5333^0C

D) 5060^0C

64. Q.Id: 138861

6 g of graphite is burnt in a bomb calorimeter at $25°C$ **and 1 atm pressure. The temperature of water increased from** $25°C$ **to** $31°C$**. If** ΔH **of this reaction is** $-248\ kJ\ mol^{-1}$**. Find out** $C_v = (\text{in } kJ\ K^{-1})$ **of bomb calorimeter.**

A) 20.667

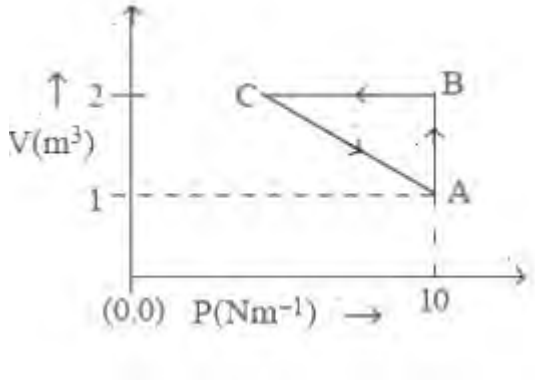
B) 41.33

C) 1488

D) 0.145

65. Q.Id: 138860

An ideal gas is taken through the cycle $A \to B \to C \to A$ as shown in the figure. If the net heat supplied to the gas in the cycle is 5 J, the magnitude of work done during the process $C \to A$ is



A) 5 J

B) 10 J

C) 15 J

D) 20 J

66. Q.Id: 138859

The volume of 0.02M acidified permanganate solution required for complete reaction of 60 mL of 0.01M I^- **ion solution to form** I_2 **in mL is**

A) 60

B) 20

C) 40

D) 6

67. Q.Id: 138858

A gas expands with temperature according to the relation $V = kT^{2/3}$, where k is a constant. Work done when the temperature changes by 60 K is (R-Universal gas constant)

A) 10 R

B) 20 R

C) 50 R

D) 40 R

68. Q.Id: 138857

A metal rod of length 10 cm and area of cross section $2.8 \times 10^{-4} m^2$ is covered with a non-conducting substance, One end of it is maintained at 80 °C, while the other end is put in ice at 0 °C. It is found that 20 g of ice melts in 5 min. The thermal conductivity of the metal in $Js^{-1}m^{-1}K^{-1}$ is (Latent heat of ice is 80 cal g^{-1})

A) 70

B) 80

C) 90

D) 100

69. Q.Id: 138856

If the kinetic energy of O_2 gas is $4.0 kJmol^{-1}$, its RMS speed in cms^{-1} is

A) 5.0×10^2

B) 5.0×10^3

C) 5.0×10^4

D) 5.0×10^{-4}

70. Q.Id: 138854

The focal length of a spherical mirror made of steel is 150 cm, If the temperature of the mirror increases by 200 K, its focal length becomes

(Coefficient of linear expansion of steel $= 12 \times 10^{-6}\ {}_0C_{-1}$**)**

A) 186.3 cm

B) 153.6 cm

C) 150.036 cm

D) 150.36 cm

71. Q.Id: 138853

The molecule/ion having diamagnetic nature and a bond order of 1.0 is

A) He_2^+

B) Li_2^+

C) B_2

D) C_2

72. Q.Id: 138851

A long cylindrical glass vessel has a pin hole of diameter $0.2\ mm$ **at its bottom. The depth to which the vessel can be lowered vertically in a deep water bath without the water entering into the vessel is**

(Surface tension of water $= 0.07\ Nm^{-1}$**, Acceleration due to gravity** $= 10 ms^{-2}$**)**

A) 14 cm

B) 7 cm

C) 21 cm

D) 28 cm

73. Q.Id: 138850

Which of the following orders are correct against the property given?

I) dipole moment $NF_3 > NH_3 > BF_3$

II) Covalent bond length $C-O > N-O > O-H$

III) Bond order $C_2 > B_2 > He_2$

A) I, II only

B) II, III only

C) I, III only

D) I, II, III

74. Q.Id: 138849

In which of the following the electron gain enthalpy of elements is correctly arranged?

A) $S > Se > Te > O$

B) $F > Cl > Br > I$

C) $Na > Li > K > Pb$

D) $O > S > Se > Te$

75. Q.Id: 138848

The energy of an electron in an orbit of hydrogen like ion with an orbit radius of 52.9 pm in J is (ground state energy of electron in hydrogen atom is -2.18×10^{-18} J)

A) -4.36×10^{-18}

B) -1.09×10^{-17}

C) -8.72×10^{-18}

D) -6.54×10^{-18}

76. Q.Id: 138846

The wavelength of a microscope particle of mass 9.1×10^{-31} kg **is 182 nm, its kinetic energy in J is** ($h = 6.625 \times 10^{-34}$ Js)

A) 7.28×10^{-23}

B) 7.28×10^{-24}

C) 3.64×10^{-23}

D) 3.64×10^{-24}

77. Q.Id: 138840

A solid copper cube of 7 cm edge is subjected to a hydraulic pressure of 8000 kPa The volume contraction of the copper cube is
(Bulk modulus of copper =140 GPa)

A) $196 \times 10^{-3} cm^3$

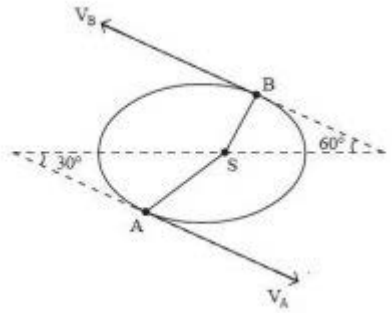
B) $19.6 \times 10^{-6} cm^3$

C) $19.6 \times 10^{-3} cm^3$

D) $196 \times 10^{3} cm^3$

78. Q.Id: 138838

A planet is revolving around the sun as shown in the figure. The radius vectors joining the sun and the planet at points A and B are $90\times10^6\ km$ and $60\times10^6\ km$ respectively. The ratio of velocities of the planet at A and B when its velocities make 30° and 60° with major axis of the orbit is



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

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

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

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

79. Q.Id: 138836

Two bodies of masses m_1. and m_2 initially at rest at infinite distance apart move towards each other under gravitational force of attraction. Their relative velocity of approach when they are separated by a distance 'r' is (G-Universal gravitational constant)

A) $\left[\frac{2G(m_1-m_2)}{r}\right]^{1/2}$

B) $\left[\frac{2G(m_1+m_2)}{r}\right]^{1/2}$

C) $\left[\frac{r}{2G(m_1m_2)}\right]^{1/2}$

D) $\left[\frac{2G}{r}m_1m_2\right]^{1/2}$

80. Q.Id: 138807

A semicircular plate of mass 'm' has radius 'r' and centre 'c'. The centre of mass of the plate is at a distance 'x' from its centre 'c'. Its moment of inertia about an axis passing through its centre of mass and perpendicular to its plane is

A) $\frac{mr^2}{2}$

B) $\frac{mr^2}{4}$

C) $\frac{mr^2}{2}+mx^2$

D) $\frac{mr^2}{2}-mx^2$

81. Q.Id: 138806

A solid sphere of mass 100 kg and radius 10 m moving in a space becomes a circular disc of radius 20 m in one hour. Then the rate of change of moment of inertia in the process is

A) $\frac{40}{9}\text{kg m}^2\text{s}^{-1}$

B) $\frac{10}{9}\text{kg m}^2\text{s}^{-1}$

C) $\frac{50}{9}\text{kg m}^2\text{s}^{-1}$

D) $\frac{25}{9}\text{kg m}^2\text{s}^{-1}$

82. Q.Id: 138805

A motor engine pumps 1800 litre of water per minute from a well of depth 30 m and allows to pass through a pipe of cross sectional area $30cm^2$**. Then the power of the engine is**

(Acceleration due to gravity = $10ms^{-2}$**)**

A) 20.5 kW

B) 15.5 kW

C) 10.5 kW

D) 9.5 kW

83. Q.Id: 138804

Two particles P and Q each of mass 3m lie at rest on the X-axis at points $(-a,0)$ **and** $(+a,0)$ **respectively. A third particle R of mass 2m initially at the origin moves towards particle Q. If all the collisions of the system of 3 particles are elastic and head-on the total number of collisions in the system is**

A) 2

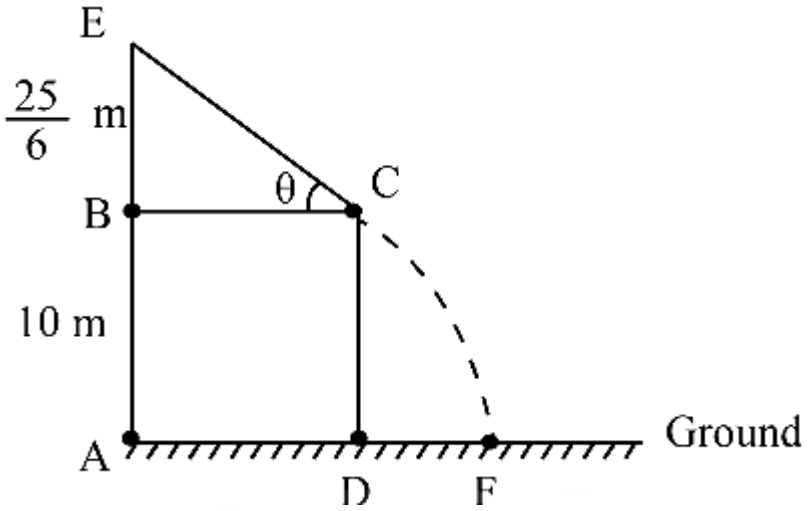
B) 3

C) 4

D) 5

84. Q.Id: 138803

A rough inclined plane BCE of height $\left(\frac{25}{6}\right)m$ is kept on a rectangular wooden block ABCD of height 10 m, as shown in the figure. A small block is allowed to slide down from the top E of the inclined plane. The coefficient of kinetic friction between the block and the inclined plane is $\frac{1}{8}$ and the angle of inclination of the inclined plane is $\sin^{-1}(0.6)$. If the small block finally reaches the ground at point F. then DF =
(Acceleration due to gravity = $10ms^{-2}$)



A) $\frac{5}{3}m$

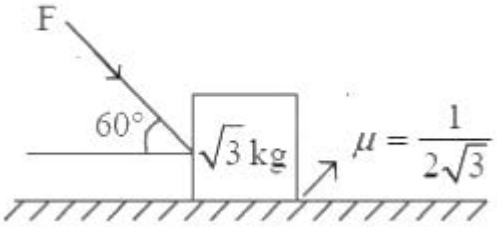
B) $\frac{10}{3}m$

C) $\frac{13}{3}m$

D) $\frac{20}{3}m$

85. Q.Id: 138801

The maximum value of the applied force F such that the block as shown in the arrangement does not move is
(Acceleration due to gravity = $10ms^{-2}$)



A) 20 N

B) 15 N

C) 25 N

D) 10 N

86. Q.Id: 138800

A projectile is thrown in the upward direction making an angle of 60° with the horizontal with a velocity of 140 ms^{-1}. Then, the time after which its velocity makes 45° with the horizontal is
(Acceleration due to gravity = $10ms^{-2}$)

A) 0.5124 s

B) 51.24 s

C) 5.124 s

D) 512.4 s

87. Q.Id: 138799

A gun and a target are at the same horizontal level separated by a distance of 600 m. The bullet is fired from the gun with a velocity of 500ms^{-1}. In order to hit the target, the gun should be aimed to a height h above the target. The value of h is
(Acceleration due to gravity = $10ms^{-2}$)

A) 2.4 m

B) 3.6 m

C) 7.2 m

D) 10.8 m

88. Q.Id: 138797

The velocity of an object moving in a straight line path is given as a function of time by $v = 6t - 3t^2$, where v is in ms^{-1}, t is in s. The average velocity of the object between $t = 0$ and $t = 2$ seconds is

A) $0\ ms^{-1}$

B) $3\ ms^{-1}$

C) $2\ ms^{-1}$

D) $4\ ms^{-1}$

89. Q.Id: 138794

If the charge of electron 'e', mass of electron 'm', speed of light in vacuum is 'c' and Planck's constant 'h' are taken as fundamental quantities, then the permeability of vacuum $'\mu_0'$ can be expressed as

A) $\frac{h}{mc^2}$

B) $\frac{h}{me^2}$

C) $\frac{h}{ce^2}$

D) $\frac{mc^2}{he^2}$

90. Q.Id: 138793

If $f(x), f'(x), f''(x)$ are positive functions and $f(0) = 1, f'(0) = 2$ then the solution of the differential equation $\begin{vmatrix} f(x) & f'(x) \\ f'(x) & f''(x) \end{vmatrix} = 0$ is

A) e^{2x}

B) $2\sin x + 1$

C) $\sin^2 x + 2x + 1$

D) e^{4x}

91. Q.Id: 138777

If c is a parameter, then the differential equation of the family of curves $x^2=c(y+c)^2$ is

A) $x\left(\frac{dy}{dx}\right)^3+y\left(\frac{dy}{dx}\right)^2-1=0$

B) $x\left(\frac{dy}{dx}\right)^3-y\left(\frac{dy}{dx}\right)^2+1=0$

C) $x\left(\frac{dy}{dx}\right)^3+y\left(\frac{dy}{dx}\right)^2+1=0$

D) $x\left(\frac{dy}{dx}\right)^3-y\left(\frac{dy}{dx}\right)^2-1=0$

92. Q.Id: 138776

If the area of the circle $x^2+y^2=2$ is divided into parts by the parabola $y=x^2$, then the area (in sq. units) of the larger part is

A) $\frac{3\pi}{2}-\frac{1}{3}$

B) $6\pi-\frac{4}{3}$

C) $\frac{4\pi}{3}-\frac{2}{3}$

D) $4\pi-\frac{1}{4}$

93. Q.Id: 138775

$$\int_0^1 \frac{\log_e(1+x)}{1+x^2}dx=$$

A) $\frac{\pi}{4}\log_e 2$

B) $\frac{\pi}{6}\log_e 6$

C) $\frac{\pi}{2}\log_e 8$

D) $\frac{\pi}{8}\log_e 2$

94. Q.Id: 138774

$$\int_{\log_e 2}^{x}\frac{dt}{\sqrt{e^t-1}}=\frac{\pi}{6}\Rightarrow x=$$

A) $2.\log_e 2$

B) $3.\log_e 2$

C) $4.\log_e 2$

D) $8.\log_e 2$

95. Q.Id: 138773

$$\int\frac{dx}{x+\sqrt{x-1}}=$$

A) $\log_e\left|x+\sqrt{x-1}\right|-\frac{1}{\sqrt{3}}Tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right)+c$

B) $\frac{1}{\sqrt{3}}\log_e\left|x+\sqrt{x-1}\right|-Tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right)+c$

C) $\frac{2}{\sqrt{3}}\log_e\left|x+\sqrt{x-1}\right|-Tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right)+c$

D) $\log_e\left|x+\sqrt{x-1}\right|-\frac{2}{\sqrt{3}}Tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right)+c$

96. Q.Id: 138772

$$\int \frac{x^5 dx}{(x^2+x+1)(x^6+1)(x^4-x^3+x-1)} =$$

A) $\log_e\left|\frac{x^6-1}{x^6+1}\right|+c$

B) $\frac{1}{12}\log_e\left|\frac{x^6-1}{x^6+1}\right|+c$

C) $\frac{1}{12}\log_e\left|\frac{x^4+1}{x^4-1}\right|+c$

D) $\log_e\left|\frac{x^8+1}{x^6-1}\right|+c$

97. Q.Id: 138771

If $I(x)=\int x^2(\log x)^2 dx$ **and** $I(1)=0$**, then** $I(x)=$

A) $\frac{x^3}{18}\left[8(\log x)^2-3\log x\right]+\frac{7}{18}$

B) $\frac{x^3}{27}\left[9(\log x)^2+6\log x\right]-\frac{2}{27}$

C) $\frac{x^3}{27}\left[9(\log x)^2-6\log x+2\right]-\frac{2}{27}$

D) $\frac{x^3}{27}\left[9(\log x)^2-6\log x-2\right]+\frac{2}{27}$

98. Q.Id: 138770

$$\int \frac{x-1}{(x+1)\sqrt{x^3+x^2+x}}dx =$$

A) $2Tan^{-1}\left(\sqrt{\frac{1+x+x^2}{x}}\right)+c$

B) $Tan^{-1}\left(\sqrt{\frac{1+x+x^2}{x}}\right)+c$

C) $2Tan^{-1}\left(\sqrt{\frac{x}{1+x+x^2}}\right)+c$

D) $Tan^{-1}\left(\sqrt{\frac{1+x^2}{x}}\right)+c$

99. Q.Id: 138769

$$f(x)=\begin{cases} 2^x+1, & x\in[-1,0) \\ 1, & x=0 \\ 2^x-1, & x\in(0,] \end{cases}$$

If the function $f:[1,1]\mathbb{R}$ **defined by then in** $[-1,1], f(x)$ **has**

A) a maximum

B) a minimum

C) both maximum and minimum

D) neither maximum nor minimum

100. Q.Id: 138767

For $m>1, n>1$**, the value of c for which the Rolle's theorem is applicable for the function** $f(x)=x^{2m-1}(a-x)^{2n}$ **in** $(0,a)$ **is**

A) $\frac{2am-1}{m+2n-1}$

B) $\frac{a(m-n+1)}{2m+2n}$

C) $\frac{a(2m-1)}{2m+2n-1}$

D) $\frac{a(2m+1)}{m+n-1}$

101. Q.Id: 138655

Let A, G, H and S respectively denote the arithmetic mean, geometric mean, harmonic mean and the sum of the numbers $a_1, a_2, a_3, \ldots, a_n$. Then the value of x at which the function $f(x) = \sum_{k=1}^{n} (x - a_k)^2$ has minimum is

A) S

B) H

C) G

D) A

102. Q.Id: 138654

The time T of oscillation of a simple pendulum of length L is governed by $T = 2\pi\sqrt{\frac{L}{g}}$, where g is constant. The percentage by which length be changed in order to correct an error of loss equal to 2 minutes of time per day is

A) $-\frac{5}{18}$

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

C) $\frac{1}{6}$

D) $\frac{1}{9}$

103. Q.Id: 138653

If $y = f(x)$ is twice differentiable function such that a point P, $\frac{dy}{dx} = 4, \frac{d^2y}{dx^2} = -3$, then $\left(\frac{d^2x}{dy^2}\right)_P =$

A) $\frac{64}{3}$

B) $\frac{16}{3}$

C) $\frac{3}{16}$

D) $\frac{3}{64}$

104. Q.Id: 138652

If $\sqrt{1-x^6} + \sqrt{1+y^6} = a(x^3 - y^3)$, then $y^2\frac{d^2y}{dx^2} =$

A) $\sqrt{\frac{1-y^6}{1-x^6}}$

B) $x\sqrt{\frac{1-y^6}{1-x^6}}$

C) $x^2\sqrt{\frac{1-y^6}{1-x^6}}$

D) $\frac{1}{x^2}\sqrt{\frac{1-y^6}{1-x^6}}$

105. Q.Id: 138651

Let $[x]$ denote the greatest integer less than or equal to x. Then the number of points where the function $y=[x]+|1-x|,\ 1\le x\le 3$ is not differentiable, is

A) 1 **B)** 2

C) 3 **D)** 4

106. Q.Id: 138650

Let $f:\mathbb{R}\to\mathbb{R}$ be the function defined by

$$f(x)=\begin{cases}5, & if\ x\le 1\\ a+bx, & if\ 1<x<3\\ b+5x, & if\ 3\le <5\\ 30, & if\ x\ge 5\end{cases}$$

then f is

A) continuous if $a=5$ and $b=5$ **B)** continuous if $a=0,\ b=5$

C) continuous if $a=-5,\ b=10$ **D)** not continuous for any value of a and b

107. Q.Id: 138649

For $k>0$, $\sum_{x=0}^{\infty}\frac{k^x}{x!}\lim_{x\to\infty}\frac{n!}{(n-x)!}\left(1-\frac{k}{n}\right)^{n-x}\left(\frac{1}{n}\right)^x=$

A) 0 **B)** k

C) x **D)** 1

108. Q.Id: 138648

If $\lim_{x\to\infty}\left\{\frac{x^3+1}{x^2+1}-(\alpha x+\beta)\right\}$ exist and equal to 2 then the ordered pair (α,β) of real numbers is

A) $(1,-1)$ **B)** $(-2,1)$

C) $(-1,1)$ **D)** $(1,-2)$

109. Q.Id: 138647

The plane $3x+4y+6z+7=0$ is rotated about the line $\bar{r}=(\bar{i}+2\bar{j}-3\bar{k})+t(2\bar{i}-3\bar{j}+\bar{k})$ until the plane passes through the origin. The equation of the plane in new position is

A) $x+y+z=0$ **B)** $6x+3y-4z=0$

C) $4x-5y-2z=0$ **D)** $x+2y+4z=0$

110. Q.Id: 138646

$A(2,3,5)$, $B(\alpha,3,3)$ and $C(7,5,\beta)$ are the vertices of a triangle. If the median through A is equally inclined with the coordinate axes then $\cos^{-1}\left(\frac{\alpha}{\beta}\right)=$

A) $\cos^{-1}\left(\frac{1}{9}\right)$

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

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

D) $\cos^{-1}\left(\frac{2}{5}\right)$

111. Q.Id: 138645

If $P(0,7,10)$, $Q(-1,6,6)$ and $R(-4,9,6)$ are three points in the space, then PQR is

A) Right angled isosceles triangle

B) Equilateral triangle

C) Isosceles but not right angled triangle

D) Scalene triangle

112. Q.Id: 138644

The equation of a tangent to the hyperbola $16x^2-25y^2-96x+100y-356=0$ which makes an angle 45^0 with its transverse axis is

A) $x-y+2=0$

B) $x-y+4=0$

C) $x+y+2=0$

D) $x+y+4=0$

113. Q.Id: 138643

If the line joining the points $A(\alpha)$ and $B(\beta)$ on the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ is a focal chord, then one possible value of $cot\frac{\alpha}{2}cot\frac{\beta}{2}$ is

A) -3

B) 3

C) -9

D) 9

114. Q.Id: 138642

P is a variable point on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ with foci F_1 and F_2. If A is the area of the triangle PF_1F_2, then the maximum value of A is

A) $\frac{e}{ab}$

B) $\frac{ae}{b}$

C) aeb

D) $\frac{ab}{e}$

115. Q.Id: 138627

The locus of the point of intersection of perpendicular normals to the parabola $y^2 = 4ax$ is

A) $y^2 - 2ax + a^2 = 0$

B) $y^2 + ax + 2a^2 = 0$

C) $y^2 - ax + 2a^2 = 0$

D) $y^2 - ax + 3a^2 = 0$

116. Q.Id: 138626

The parabola $x^2 = 4ay$ makes an intercept of length $\sqrt{40}$ units on the line $y = 1 + 2x$ then a value of $4a$ is

A) 2

B) -2

C) -1

D) 2

117. Q.Id: 138625

If the radical axis of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ and $2x^2 + 2y^2 + 3x + 8y + 2c = 0$ touches the circle $x^2 + y^2 + 2x + 2y + 1 = 0$ then $(4g - 3)(f - 2) =$

A) 0

B) -1

C) 1

D) 2

118. Q.Id: 138623

Suppose that the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ has its centre on $2x + 3y - 7 = 0$ and cut the circles $x^2 + y^2 - 4x - 6y + 11 = 0$ and $x^2 + y^2 - 10x - 4y + 21 = 0$ orthogonally. Then $5g - 10f + 3c =$

A) 0

B) 1

C) 3

D) 9

119. Q.Id: 138620

The equation of the circle whose radius is 3 and which touches internally the circle $x^2 + y^2 - 4x - 6y - 12 = 0$ at the point $(-1, -1)$ is

A) $5x^2 + 5y^2 + 9x - 6y - 7 = 0$

B) $5x^2 + 5y^2 - 8x - 14y - 32 = 0$

C) $5x^2 + 5y^2 - 6x + 8y - 8 = 0$

D) $5x^2 + 5y^2 + 6x - 8y - 12 = 0$

120. Q.Id: 138616

If the angle between a pair of tangents drawn from a point P to the circle $x^2 + y^2 + 4x - 6y + 9\sin^2\alpha + 13\cos^2\alpha = 0$ is 2α, then the equation of the locus of P is

A) $x^2 + y^2 + 4x - 6y + 4 = 0$

B) $x^2 + y^2 + 4x - 6y - 9 = 0$

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

D) $x^2 + y^2 + 4x - 6y + 9 = 0$

121. Q.Id: 138615

The abscissae of two points P, Q are the roots of the equation $2x^2+4x-7=0$ and their ordinates are the roots of the equation $3x^2-12x-1=0$. Then the centre of the circle with PQ as a diameter is

A) $(-1,2)$ **B)** $(-2,6)$

C) $(1,-2)$ **D)** $(2,-6)$

122. Q.Id: 138614

Variable straight lines $y=mx+c$ make intercepts on the curve $y^2-4ax=0$ which subtend a right angle at the origin. Then the point of concurrence of these lines $y=mx+c$ is

A) $(4a,0)$ **B)** $(2a,0)$

C) $(-4a,0)$ **D)** $(-2a,0)$

123. Q.Id: 138613

If each line of a pair of lines original line passing through origin is at a perpendicular distance of 4 units from the point $(3,4)$, then the equation of the pair of lines is

A) $7x^2+24xy=0$ **B)** $7y^2+24xy=0$

C) $7y^2-24xy=0$ **D)** $7x^2-24xy=0$

124. Q.Id: 138612

The equation of the perpendicular bisector of the sides AB and AC of a ΔABC are $x-y=5$ and $x+2y=0$ respectively. If A is $(1,-2)$ then the equation of straight line BC is

A) $14x+23y-40=0$ **B)** $12x+17y-28=0$

C) $14x-29y-30=0$ **D)** $7x-12y+15=0$

125. Q.Id: 138611

The line through $P(a,2)$ where $a\neq 0$, making an angle 45^0 with positive X-axis meets the curve $\frac{x^2}{9}+\frac{y^2}{4}=1$ at A and D and the coordinate axis at B and C. If PA, PB, PC and PD are in geometric progression then $2a=$

A) 13 **B)** 7

C) 1 **D)** -13

126. Q.Id: 138610

The equation of the line through the point of intersection of the lines $3x-4y+1=0$ and $5x+y-1=0$ and making equal non- zero intercepts on the coordinate axes is

A) $2x+2y=3$

B) $23x+23y=6$

C) $23x+23y=11$

D) $2x+2y=7$

127. Q.Id: 138609

When the coordinate axes are rotated around the origin in the positive direction through an angle $\frac{\pi}{4}$, if the equation $25x^2+9y^2=225$ is transformed to $\alpha x^2+\beta xy+yy^2=\delta$ the $\alpha+\beta+y-(\sqrt{\delta})^2=$

A) 3

B) 9

C) 4

D) 16

128. Q.Id: 138608

Two straight rods of length 2a and 2b move along the coordinate axis in such a way that their extremities are always concyclic. Then the locus of center of such circles is

A) $2(x^2+y^2)=a^2+b^2$

B) $2(x^2-y^2)=a^2+b^2$

C) $x^2+y^2=a^2+b^2$

D) $x^2-y^2=a^2-b^2$

129. Q.Id: 138607

In a Poisson distribution with mean $\sum_{x=0}^{\infty}|x-\bar{x}|P(X=x)=$

A) e

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

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

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

130. Q.Id: 138606

A random variable X has the probability distribution,

$X=x_i$ **1 2 3 4 5 6**

$P(X=x_i)$ **0.2 0.3 0.12 0.1 0.2 0.08**

If $A=\{x_i/x_i$ is a prime number$\}$, $B=\{x_i/x_i<4\}$ **are two events then** $P(A\cup B)=$

A) 0.31

B) 0.62

C) 0.82

D) 0.41

131. Q.Id: 138605

Bag A contains 6 Green and 8 Red balls and bag B contains 9 Green and 5 Red balls. A card is drawn at random from a well shuffled pack of 52 playing cards. If it is a spade, two balls are drawn at random from bag A, otherwise two balls are drawn at random from bag B. If the two balls drawn are found to be of the same colour, then the probability that they are drawn from bag A is

A) $\frac{43}{181}$

B) $\frac{1}{4}$

C) $\frac{48}{131}$

D) $\frac{43}{138}$

132. Q.Id: 138604

A bag contains 2n coins out of which n-1 are unfair with head on both sides and remaining are fair. One coin is picked from a bag at random and tossed. If the probability that head falls in the toss is $\frac{41}{56}$ then the number of unfair coins in the bag is

A) 18

B) 15

C) 13

D) 14

133. Q.Id: 138603

If two sections of strength 30 and 45 are formed from 75 students who are admitted in a school, then the probability that two particular students are always together in the same section is

A) $\frac{66}{185}$

B) $\frac{19}{37}$

C) $\frac{29}{185}$

D) $\frac{18}{37}$

134. Q.Id: 138602

The variance of the following continuous frequency distribution is

Class Interval 0-10 10-20 20-30 30-40

Frequency 2 3 4 1

A) 201

B) 62

C) 19

D) 84

135. Q.Id: 138601

If $a_0, a_1, \ldots, a_{11}$ are in an arithmetic progression with common difference d, then their mean deviation from arithmetic mean is

A) $\frac{30}{11}|d|$

B) $2|d|$

C) $3|d|$

D) $12|d|$

136. Q.Id: 138599

Let $\overline{A} = 2\bar{i} + \bar{j} - 2\bar{k}$ and $\overline{B} = \bar{i} + \bar{j}$ is such that $\overline{A}.\overline{C} = |\overline{C}|, |\overline{C} - \overline{A}| = 2\sqrt{2}$ and the angle between $\overline{A} \times \overline{B}$ and $\overline{C}$ is 30^0 then the value of $|(\overline{A} \times \overline{C}) \times \overline{C}|$ is

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

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

C) 3

D) 2

137. Q.Id: 138596

A new tetrahedron is formed by joining the faces of a given tetrahedron OABC. Then the ratio of volume of new tetrahedron to that of given tetrahedron is

A) $\frac{3}{25}$

B) $\frac{1}{27}$

C) $\frac{5}{62}$

D) $\frac{1}{162}$

138. Q.Id: 138595

If the position vector of the vertices of ΔABC are $\overline{OA} = 3\bar{i} + \bar{j} + 2\bar{k}$, $\overline{OB} = i + 2\bar{j} + 3\bar{k}$ and $\overline{OC} = 2\bar{i} + 3\bar{j} + \bar{k}$ then the length of altitude of triangle ABC drawn from A is

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

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

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

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

139. Q.Id: 138592

If the position vector of the vertices, A, B and C of ΔABC are $\bar{i} + 2\bar{j} - 5\bar{k}$, $-2\bar{i} + 2\bar{j} + \bar{k}$ and $2\bar{i} + \bar{j} - \bar{k}$ respectively then $\angle B =$

A) $\cos^{-1}\left(\frac{7}{3\sqrt{10}}\right)$

B) $\cos^{-1}\left(\frac{8}{\sqrt{105}}\right)$

C) $\cos^{-1}\left(\frac{1}{\sqrt{42}}\right)$

D) $\cos^{-1}\left(-\frac{7}{3\sqrt{10}}\right)$

140. Q.Id: 138590

The equation of the plane passing through the points $\bar{i}+2\bar{j}-\bar{k}$ and perpendicular to the line of intersection of the plane $\bar{r}.(3\bar{i}-\bar{j}+\bar{k})=1$ and $\bar{r}.(\bar{i}+4\bar{j}-2\bar{k})=2$ is

A) $\bar{r}.(-2\bar{i}-5\bar{j}+\bar{k})=0$

B) $\bar{r}.(\bar{i}+7\bar{j}+4\bar{k})=0$

C) $\bar{r}.(2\bar{i}-7\bar{j}-13\bar{k})=1$

D) $\bar{r}.(-2\bar{i}+7\bar{j}+13\bar{k})=0$

141. Q.Id: 138588

If $4\bar{i}+7\bar{j}+8\bar{k}$, $2\bar{i}+3\bar{j}+4\bar{k}$, $2\bar{i}+5\bar{j}+7\bar{i}$ are respectively the positions vectors of vertices A,B,C of triangle ABC, then the position vectors of the point where the bisector of angle meets $\overline{BC}$ is

A) $2\bar{i}+\frac{13}{3}\bar{j}+2\bar{k}$

B) $2\bar{i}-\frac{13}{3}\bar{j}+6\bar{k}$

C) $2\bar{i}+13\bar{j}+6\bar{k}$

D) $2\bar{i}+\frac{13}{3}\bar{j}+6\bar{k}$

142. Q.Id: 138585

If a,b, c are the sides of ΔABC for which $r_1=8$, $r_2=12$ and $r_3=24$ then the ordered triad $(a,b,c)=$

A) $(12,20,16)$

B) $(12,16,20)$

C) $(16,12,20)$

D) $(20,16,12)$

143. Q.Id: 138583

In triangle ABC, with usual notation, match the items in list I with the items in list II and choose the correct option

List1	List2
A. $r_1 r_2 \sqrt{\left(\frac{4R - r_1 - r_2}{r_1 + r_2}\right)}$	I. b
B. $\frac{r_2(r_3 + r_2)}{\sqrt{r_1 r_2 + r_2 r_3 + r_3 r_1}}$	II. a^2, b^2, c^2 are in A.P
C. $\frac{a}{c} = \frac{\sin(A - B)}{\sin(B - C)}$	III. Δ
D. $bc\cos^2\frac{A}{2}$	IV. $Rr_1 r_2 r_3$
E. .	V. $s(s - a)$

A) A->IV; B->III; C->I; D->V

B) A->V; B->IV; C->III: D->II

C) A->III; B->I; C->II; D->V

D) A->IV; B->V; C->II; D->I

144. Q.Id: 138577

In triangle ABC, **if** $\frac{b+c}{9} = \frac{c+a}{10} = \frac{a+b}{11} = k$ **then** $\frac{\cos A + \cos B}{\cos C} =$

A) $\frac{9}{10}$

B) $\frac{10}{11}$

C) $\frac{11}{12}$

D) $\frac{12}{13}$

145. Q.Id: 138576

If $\sin x \cosh y = \cos\theta, \cos x \sinh y = \sin\theta$ **and** $4\tan x = 3$**. Then** $\sinh^2 y =$

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

B) $\frac{9}{16}$

C) $\frac{9}{25}$

D) $\frac{16}{25}$

146. Q.Id: 138560

$$\cot\left[\sum_{n=3}^{32}\cot^{-1}\left(1+\sum_{k=1}^{n}2k\right)\right]=$$

A) $\frac{10}{3}$ **B)** $\frac{8}{3}$

C) $\frac{14}{3}$ **D)** $\frac{16}{3}$

147. Q.Id: 138556

If $\cos\theta\neq 0$ **and** $sec\theta-1=(\sqrt{2}-1)\tan\theta$ **then** $\theta=$

A) $n\pi+\frac{\pi}{8},n\in Z$ **B)** $2n\pi+\frac{\pi}{4}(or)2n\pi,n\in Z$

C) $2n\pi+\frac{\pi}{8},n\in Z$ **D)** $2n\pi-\frac{\pi}{4}(or)2n\pi,n\in Z$

148. Q.Id: 138548

$\cos^2 5^0-\cos^2 15^0-\sin^2 15^0+\sin^2 35^0+\cos 15^0\sin 15^0-\cos 5^0\sin 35^0=$

A) 0 **B)** 1

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

149. Q.Id: 138545

If $\cos A=-\frac{60}{61}$ **and** $\tan B=-\frac{7}{24}$ **and neither A nor B is in the second quadrant, then the angle** $A+\frac{B}{2}$ **lies in the quadrant**

A) 1 **B)** 2

C) 3 **D)** 4

150. Q.Id: 138539

Let M and m respectively denote the maximum and minimum values of $[f(\theta)]^2$ **where** $f(\theta)=\sqrt{a^2\cos^2\theta+b^2\sin^2\theta}+\sqrt{a^2\sin^2\theta+b^2\cos^2\theta}$ **. Then** $M-m=$

A) a^2+b^2 **B)** $(a-b)^2$

C) a^2b^2 **D)** $(a+b)^2$

151. Q.Id: 138538

If $\frac{3}{(x-1)(x^2+x+1)}=\frac{1}{x-1}-\frac{x+2}{(x^2+x+1)}=f_1(x)-f_2(x)$ and $\frac{x+1}{(x-1)^2(x^2+x+1)}=Af_1(x)+\left(B+\frac{D}{x-1}\right)f_2(x)+\frac{C}{(x-1)^2}$ then $A+B+C+D=$

A) 1

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

C) 0

D) $\frac{1}{3}$

152. Q.Id: 138535

If $\frac{(1-px)^{-1}}{1-qx}=a_0+a_1x+a_2x^2+a_3x^3+....,$ then $a_n=$

A) $\frac{p^{n+1}-q^{n+1}}{q-p}$

B) $\frac{p^{n+1}-q^{n+1}}{p-q}$

C) $\frac{p^n-q^n}{q-p}$

D) $\frac{p^n-q^n}{p-q}$

153. Q.Id: 138089

The sum of all the coefficients in the binomial expansion of $(1+2x)^n$ is 6561.

Let $R=(1+2x)^n=I+F$ where $I\in N$ and $0<F<1$. If $x=\frac{1}{\sqrt{2}}$, then $1-\frac{F}{1+(\sqrt{2}-1)^4}=$

A) $(3\sqrt{2}-4)$

B) $4(3\sqrt{2}+4)$

C) $(\sqrt{2}-1)^4$

D) 1

154. Q.Id: 138086

A student is allowed to choose atmost n books from a collection of $2n+1$ books. If the total number of ways in which he can select atleast one book is 255, then the value of n is

A) 4

B) 5

C) 6

D) 7

155. Q.Id: 138083

All letters of the word ANIMAL are permitted in all possible ways and the permutations thus formed are arranged in dictionary order. If the rank of word ANIMAL is x. Then the permutation with rank x, among the permutation obtained by permuting the letter of the word PERSON and arranging the permutations thus formed in the dictionary order is

A) ENOPRS

B) NOSPRE

C) NOEPRS

D) ESORNP

156. Q.Id: 138078

The polynomial equation of degree 4 having real coefficients with three of its roots as $2\pm\sqrt{3}$ **and** $1+2i$ **is**

A) $x^4-6x^3-14x^2+22x+15=0$

B) $x^4-6x^3-19x+22x-15=0$

C) $x^4-6x^3+19x-22x+5=0$

D) $x^4-6x^3+14x^3-22x+5=0$

157. Q.Id: 138077

Let a,b,c **be the sides of scalane triangle. If** λ **is a real number such that root of the equation** $x^2+2(a+b+c)x+3\lambda(ab+bc+ca)=0$ **are real then the interval in which** λ **lies is**

A) $\left(-\infty,\frac{4}{3}\right)$

B) $\left(\frac{5}{3},\infty\right)$

C) $\left(\frac{1}{3},\frac{5}{3}\right)$

D) $\left(\frac{4}{3},\infty\right)$

158. Q.Id: 136646

$A=\begin{bmatrix}1 & 0\\ 0 & -1\end{bmatrix}, P=\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}$ *and* $X=APA^T$ *then* $A^TX^{50}A=$

If

A) $\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$

B) $\begin{bmatrix}2 & 1\\ 0 & -1\end{bmatrix}$

C) $\begin{bmatrix}25 & 1\\ 1 & -25\end{bmatrix}$

D) $\begin{bmatrix}1 & 50\\ 0 & 1\end{bmatrix}$

159. Q.Id: 136642

Assertion (A):

$(1+2+4)+(4+6+9)+(9+12+16)+.....+(81+90+100)=10000$

Reason (R): $\sum_{r=1}^{10}(r^3-(r-1)^3)=n^3$ **for any natural number n.**

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.

160. Q.Id: 136578

$f(x)=\frac{x}{e^x-1}+\frac{x}{2}+2\cos^3\frac{x}{2}$ *on* $R-\{0\}$ *is*

A) One one function

B) Bijection

C) Algebraic function

D) Even function