

Previous Paper Questions

1. Q.Id: 192742
Products that are formed in the given reaction including by products are
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CONH}_2 + \text{Br}_2 + 4 \text{NaOH} \rightarrow$

- A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 + \text{Na}_2\text{CO}_3 + 2\text{NaBr} + 2\text{H}_2\text{O}$ B) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 + \text{Na}_2\text{CO}_3 + 2\text{NaBr} + 2\text{H}_2\text{O}$
C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 + 2\text{NaHCO}_3 + \text{Br}_2 + 2\text{H}_2\text{O}$ D) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 + 2\text{Na}_2\text{CO}_3 + \text{Br}_2 + 2\text{H}_2\text{O}$

2. Q.Id: 192741
Match the following
Column I - (Acid)
Column II - (pK_a value)

List1

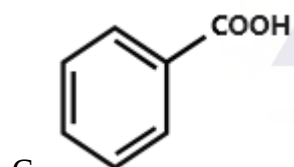
List2

A. CH_3COOH

I. 0.23

B. F_3CCOOH

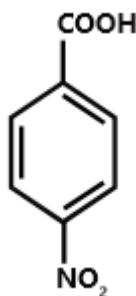
II. 3.41



III. 4.19

IV. 4.76

D.



D.

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

3.

Q.Id: 192738

Match the following.**Column - I (Reaction on carbonyl compound with)****Column - II (product)****List1****List2**

A. Hydroxylamine

I. Hydrazone

B. Alcohol

II. Schiff's base
(Substituted imine)

C. Hydrazine

III. Oxime

D. Amine

IV. Ketal

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

4.

Q.Id: 192737

A message signal of frequency f_m is used to modulate a carrier of frequency f_c **If the side bands are f_1 and f_2 then the ratio $\frac{f_c}{f_m}$ is**

A) $\frac{t_1 + t_2}{t_2 - t_1}$

B) $\frac{(t_1 + t_2)^2}{f_1 f_2}$

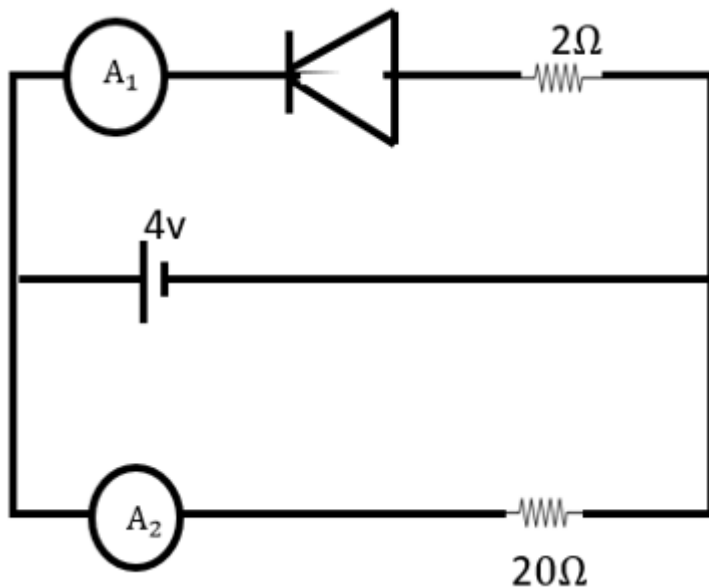
C) $\frac{f_1 - f_2}{f_2 - f_1}$

D) $\frac{f_1 f_2}{(f_2 + f_1)^2}$

5.

Q.Id: 192734

Two ammeters A_1 and A_2 are connected as shown in the given figure, By neglecting the internal resistance of the ammeters, the reading in the ammeter A_1 is



A) 2A

B) 0

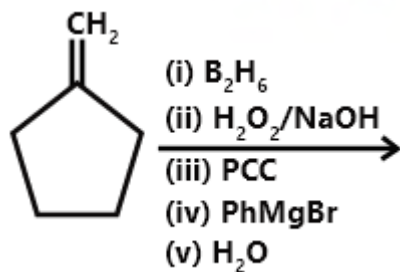
C) 1A

D) 4A

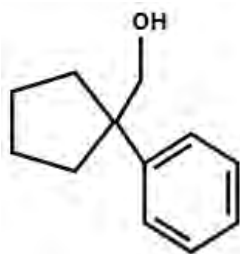
6.

Q.Id: 192733

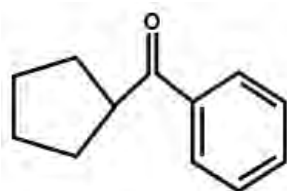
The main product of the following reactions is



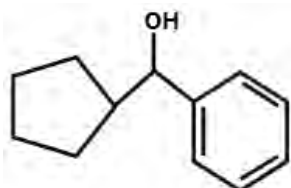
A)



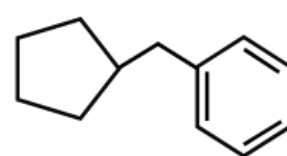
B)



C)



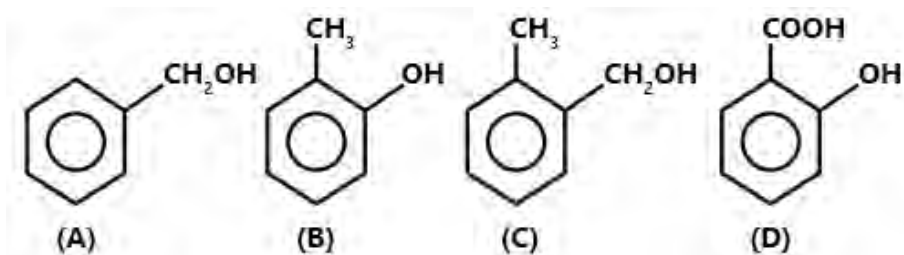
D)



7. Q.Id: 192732
If the temperature of the semi-conductor is increased, which of the following is correct statement?

- A) It's resistance increases. B) The number of electrons in valence band increases
- C) The number of electrons in conduction band increases D) The number of holes in valence band decreases.

8. Q.Id: 192731
In which of the following compounds deoxygenation is possible when heated with Zn?



- A) A, B and C B) A, C and D
- C) B and D D) B and C

9. Q.Id: 192730
In a nuclear reactor, the main purpose of the moderator is to

- A) initiate that fission process by giving away its neutron B) slow down the fast neutrons
- C) cool down the excess of heat generated in the reactor D) absorb excess of neutrons and control the reaction rate

10. Q.Id: 192728
Hydrogen atom in the ground state absorbs ΔE amount of energy. If the orbital angular momentum of the electron is increased by

$$\frac{h}{2\pi}$$

(h = plank's constant) then the magnitude of ΔE is

- A) 12.09 eV B) 12.75 eV
- C) 10.2eV D) 13.6eV

11. Q.Id: 192725
Which of the following particle has the shortest de-Broglie wavelength?

- A) Proton B) Electron
- C) α -particle D) X-rays

12. Q.Id: 192722

For an EM wave, the electric and magnetic fields are 300 V/m and 7.9 A/m, respectively. The maximum rate of energy flow is

A) $2730 \frac{W}{m^2}$

B) $2790 \frac{W}{m^2}$

C) $2370 \frac{W}{m^2}$

D) $2390 \frac{W}{m^2}$

13. Q.Id: 192721

An alternating current is given by $i=(2 \sin \omega t + 6 \cos \omega t)$ A. The rms current (in A) is

A) $2\sqrt{5}$

B) $2\sqrt{10}$

C) $\sqrt{5}$

D) $10\sqrt{2}$

14. Q.Id: 192720

A long straight solenoid with cross-sectional radius a and number of turns per unit length n has a current varying with time as $i(A s^{-1})$. The magnitude of the electric field as a function of distance r from the solenoid axis is

A) $\frac{n\mu_0 a^2 i}{2r}$

B) $\frac{\mu_0 i n}{2a}$

C) $\frac{n a^2 i}{2\mu_0 r}$

D) $\frac{\mu_0 i a}{2n}$

15. Q.Id: 192719

A solenoid has a core of a material with relative permeability 501. The windings of the solenoid are insulated from the core and carry a current of 2.5 A. If the number of turns are 900 per metre. The magnetisation (in A/m) is (

A) 1.12×10^6

B) 2.8×10^6

C) 225×10^6

D) 1.69×10^6

16. Q.Id: 192717

Two long wires with no contact are placed perpendicular to each other, i_1 and i_2 are currents flowing through these wires, respectively. The magnetic force on a small length dl of the second wire situated at a distance r from first wire is proportional to

A) $i_1 i_2$

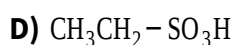
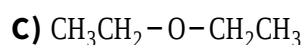
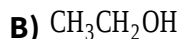
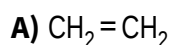
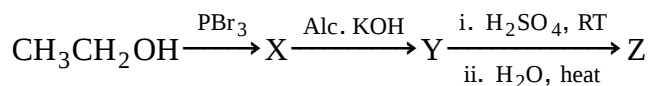
B) i

C) $\frac{1}{i_1 i_2}$

D) i^2

17. Q.Id: 192715

Identify Z in the following reaction



18. Q.Id: 192713

A wire of length 1 carries a current I along the X-axis. The magnetic force acting on the wire is given by $F = IB_0 |(\hat{k} - \hat{j})|$, where B_0 is a constant. The existing magnetic field B is

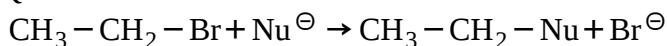
A) $B_0 \hat{i}$

B) $B_0(\hat{i} + \hat{j} - \hat{k})$

C) $B_0(\hat{i} + \hat{j} + \hat{k})$

D) $B_0(\hat{i} - \hat{j} - \hat{k})$

19. Q.Id: 192712



The decreasing order of the reaction rate with nucleophile (Nu^\ominus) is

$\text{Nu}^\ominus =$ (I) PhO^\ominus : (II) $\text{CH}_3\text{COO}^\ominus$: (III) OH^\ominus : (IV) $\text{CH}_3\text{O}^\ominus$

A) $\text{IV} > \text{III} > \text{I} > \text{II}$

B) $\text{IV} > \text{III} > \text{II} > \text{I}$

C) $\text{I} > \text{II} > \text{III} > \text{IV}$

D) $\text{III} > \text{IV} > \text{II} > \text{I}$

20. Q.Id: 192711

A spherical capacitor consists of two concentric spherical conductors. Find the capacitance of the spherical capacitor if the outer radius is $2R$ and the inner radius is R .

A) $4\pi\epsilon_0 R$

B) $8\pi\epsilon_0 R$

C) $\frac{8\pi\epsilon_0}{R}$

D) $\frac{4\pi\epsilon_0}{R}$

21. Q.Id: 192710

Consider the charged cylindrical capacitor. The magnitude of electric field in its annual region

A) Varies as $\frac{1}{r}$, where r is the distance from its axis

B) Is Zero

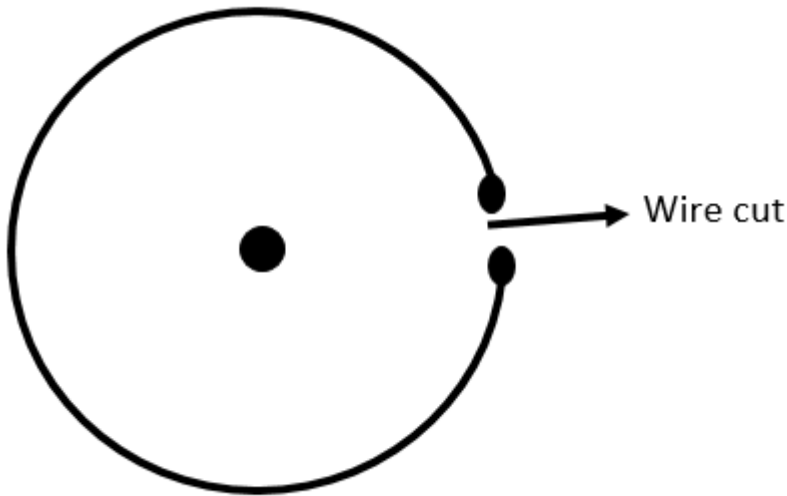
C) is same throughout and $|E| > 0$

D) Varies as $\frac{1}{r^2}$, where r is the distance from its axis

22. Q.Id: 192708

A circular wire loop of radius 10 cm carries a total charge of 10-C distributed uniformly over its length. A small length of $3.14 \times 10^{-6} \text{ m}$ of wire is cut off. The magnitude to electric m field at the centre due to the remaining wire is

(Assume . $\frac{1}{4\pi \epsilon_0} 9 \times 10^9 \text{ Si units}$)



A) 30 / NC

B) 40 / NC

C) 35 / NC

D) 45 / NC

23. Q.Id: 192706

What would be the angular separation between the consecutive bright fringes in Young's double slit experiment with blue-green light of wavelength 400 nm? The separation between the slits is 0.001 m.

A) $4 \times 10^{-4} \text{ rad}$

B) $3 \times 10^{-4} \text{ rad}$

C) $2 \times 10^{-4} \text{ rad}$

D) $1 \times 10^{-4} \text{ rad}$

24. Q.Id: 192704

A screen is placed 90 cm from an object. The image is formed by using a convex lens twice on the screen by putting the lens at two different locations separated by 20 cm. The focal length of the lens is

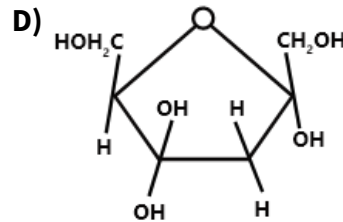
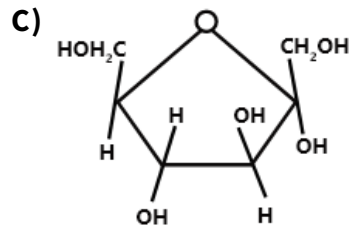
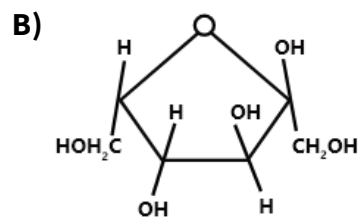
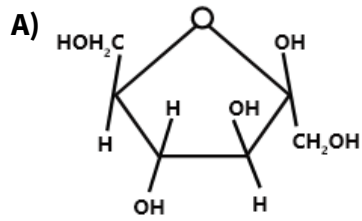
A) 21.38 cm

B) 30.0 cm

C) 35.0 cm

D) 24 cm

25. Q.Id: 192703
The structure of α - D - fructofuranose is



26. Q.Id: 192701
screen placed 90 cm from an object. image formed by using convex on the screen putting the lens two different 20cm. the focal length of the lens is approximately equal to

- A) 21.38 cm B) 30.0 cm
C) 35.0 cm D) 24 cm

27. Q.Id: 192700
A wave represented by the $y = \sin(5\pi x - 20t)$ minimum distance between the particles having the same speed (a) 0.02
(Assume x and t are in SI units)

- A) 0.02m B) 0.4m
C) 0.8 m D) 0.2 m

28. Q.Id: 192699
As per kinetic theory of gases which of following statement(s) is/are Temperature of gas measure average kinetic energy molecule.
(I) Temperature of gas depends on nature of the
(ii) Temperature of gas dependson the nature of the gas
III. Heavier molecule has lower speed.
IV. Lighter molecule has lower speed.

- A) (I) and (II) B) (I) and(III)
C) (I) and(II) D) (II) and (IV)

33. Q.Id: 192683
Complete hydrolysis of XeF_4 and XeF_6 gives its oxides P and Q, respectively. Identify P and Q.

A) P - XeO_2 , Q - XeO_3

B) P - XeO , Q - XeO_2

C) P - XeO_3 , Q - XeO_3

D) P - XeO_2 , Q - XeO_2

34. Q.Id: 192682
Assertion (A): SF_6 is highly stable.
Reason (R): SF_6 is a gas
The correct option among the following is

A) (A) is true, (R) is true and (R) is the correct explanation for (A)

B) (A) is true, (R) is true and (R) is not the correct explanation for (A)

C) (A) is true, but (R) is false

D) (A) is false, but (R) is true

35. Q.Id: 192680
The main products formed when copper metal is reacted with concentrated HNO_3 are

A) $\text{Cu}(\text{NO}_3)_2$: NO

B) $\text{Cu}(\text{NO}_3)_2$: H_2

C) $\text{Cu}(\text{NO}_3)_2$: NO_2

D) $\text{Cu}(\text{NO}_3)_2$: NO

36. Q.Id: 192678
Two rods whose lengths are l_1 and l_2 with heat conductivity coefficients k_1 and k_2 are placed end-to-end. The heat conductivity coefficient of a uniform rod of length l_1 and l_2 whose conductivity is same as that of the system of these two rods is

A) $\frac{(l_1 + l_2)k_1k_2}{k_2l_1 + k_1l_2}$

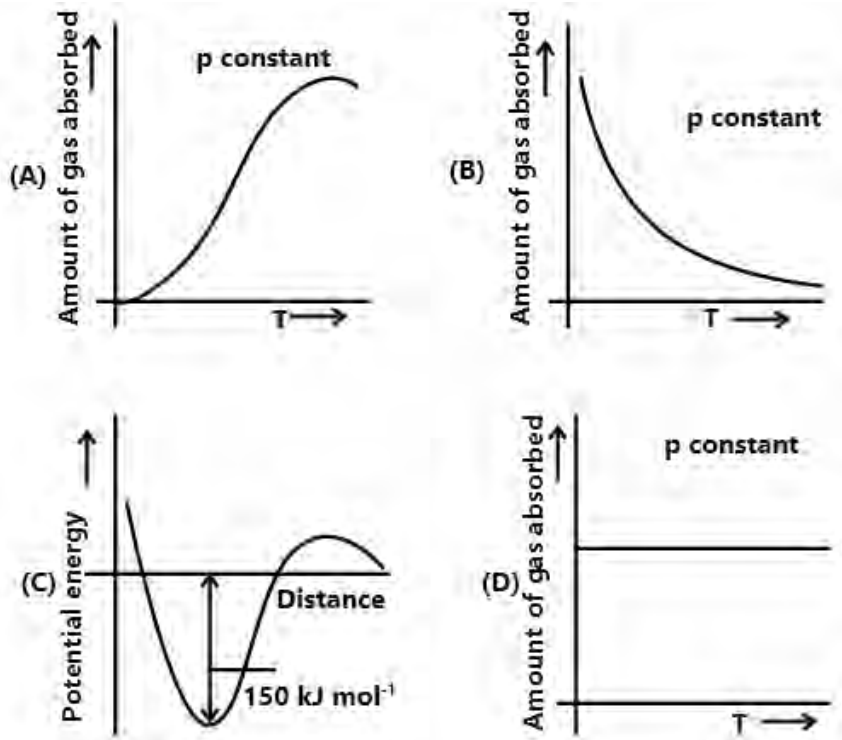
B) $\frac{(l_1 + l_2)k_1k_2}{k_2l_1 + k_2l_2}$

C) $\frac{(l_1 + l_2)k_2k_1}{k_2l_1 + k_1l_2}$

D) $\frac{k_1l_2 + k_2l_1}{(l_1 + l_2)k_1k_2}$

37. Q.Id: 192668

Which of the following options are correct?



A) A and C represents physisorption

B) A and D represents physisorption

C) A and C represents chemisorption

D) B and C represents chemisorption

38. Q.Id: 192667

What will be the overall order of a reaction for which the rate expression is

$$\text{rate} = k[A]^{\frac{1}{2}} [B]^{\frac{3}{2}}$$

A) Second order

B) First order

C) Zero order

D) Third order

39. Q.Id: 192666

Salts of A (atomic weight 8), B (atomic weight 18) and C (atomic weight 50) were electrolysed under identical conditions using the same quantity of electricity. It was found that 2.4 g of A was deposited, the weight of B and C deposited are 1.8 g and 7.5 g. respectively. The valencies of A, B and C are. respectively

A) 3, 1 and 2

B) 1, 2 and 3

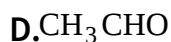
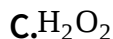
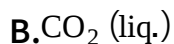
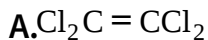
C) 1, 3 and 2

D) 3, 2, and 1

40. Q.Id: 192664
The ratio of linear expansivity to the co-efficient of a real expansion of a rectangular sheet of a solid is
- A) 2
B) 0.5
C) 1
D) 1.5
41. Q.Id: 192663
A U-shaped tube is partially filled with an incompressible liquid of density 1.2 g/cm^3 . Oil which does not mix with the liquid is next poured into left side of the U-tube until the liquid rises by 15 cm on the right side of U-tube. If the density of the oil is 0.9 g/cm^3 , the oil level will stand higher than the liquid level of right side of U-tube by
- A) 15 cm
B) 12cm
C) 10 cm
D) 9 cm
42. Q.Id: 192662
Given,
Sol A Phenol and aniline
Sol B Chloroform and acetone
Which of the following is correct as per Raoult's law?
- A) Sol A shows -ve and B shows +ve deviation
B) Both solutions A and B show -ve deviation
C) Sol A shows +ve and B shows -ve deviation
D) Both solutions A and B show +ve deviation
43. Q.Id: 192661
Water is pumped steadily out of a flooded basement, at the speed of 10 m/s through a hose (tube) of radius 1 cm , passing through a window 3 m above the water level. The power of the pump is
(Assume $g = 10 \text{ m/s}^2$, density of water = 1000 kg/m^3)
- A) $80 \pi \text{ W}$
B) $30 \pi \text{ W}$
C) $50 \pi \text{ W}$
D) $90 \pi \text{ W}$
44. Q.Id: 192660
if the density of a 2M solution of ethylene glycol in water is 1.11 g/mL , the molality (in 'm') of the solution is approximately
- A) 1.92
B) 1.57
C) 2.05
D) 2.15

50. Q.Id: 192652
A small disc of mass 500 g and radius 5 cm rolls down an inclined plane without slipping. Speed of its centre of mass when it reaches the bottom of the inclined plane depends on
- A) mass and radius
B) mass and height of the incline
C) height of the incline
D) height of the incline and acceleration due to gravity
51. Q.Id: 192651
When propyne is passed through a red hot iron tube at 873 K, the reaction gives product having molecular formula of
- A) C_7H_8
B) C_9H_{12}
C) C_8H_{10}
D) C_6H_5
52. Q.Id: 192650
Consider a rocket is being fired. The kinetic energy of the rocket is increased by 16 times whereas its total mass is reduced by half through the burning of fuel. The factor by which its momentum increases is
- A) 8
B) $2\sqrt{2}$
C) 4
D) $4\sqrt{2}$
53. Q.Id: 192648
The number of sp and sp^2 carbon in hepta - 1, 3 - dien - 5 - yne, respectively are
- A) 2, 4
B) 4, 3
C) 2, 2
D) 2, 5
54. Q.Id: 192647
The potential energy of a particle in a central field has the form $U(r) = \frac{1}{r^2} - \frac{1}{r}$, where r is the distance from the centre of the field. The magnitude of the maximum attractive force (in N) is
- A) $\frac{1}{27}$
B) $\frac{1}{9}$
C) $\frac{1}{3}$
D) 1

55. Q.Id: 192645
Which of the following chemicals can be used as dry cleaning agents?



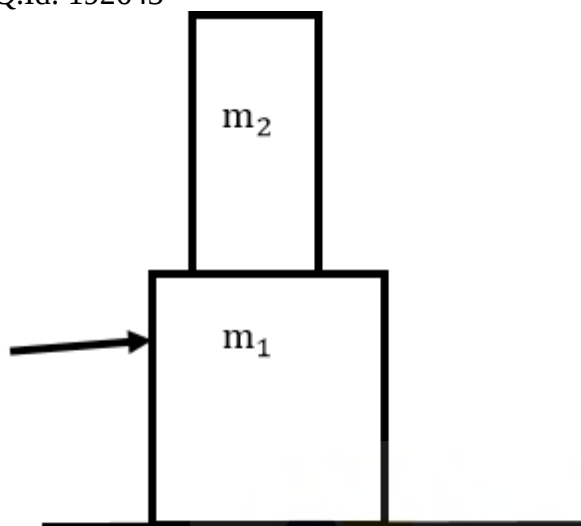
A) A, B, C and D

B) A, B and C

C) B, C and D

D) A and B

56. Q.Id: 192643



What is the maximum force F that can be applied on block m_1 so that both m_1 and m_2 will move together? There is no friction between m_1 and m_2 the horizontal table. The coefficient of friction between m_1 and m_2 is μ

A) $\mu m_2 g$

B) $\mu(m_1 + m_2)g$

C) $\mu \frac{m_1 m_2}{(m_1 + m_2)} g$

D) $\mu m_1 g$

57. Q.Id: 192642

Which of the following statements are correct?

A. The isotope of carbon containing 7 neutrons has natural abundance of 1.1%

B. Among the IV A group elements, Sn has the lowest melting point

C. Silicon is the 2nd (by mass) most abundant element in the Earth's crust.

D. Element carbon shows the highest electrical resistivity among the 4 group elements.

A) A, C and D

B) A, B and C

C) B, C and D

D) A, B, C and D

58. Q.Id: 192641
Block A of mass 3 kg rests on another block B of mass 7 kg. The coefficient of friction between A and B is 0.4, while the coefficient of friction between B and the horizontal floor on which it rests is 0.55. Find the force of friction between A and B, when a horizontal force of 50 N is applied on the block B. (Use $g = 10 \text{ m/s}^2$)
- A) 0** **B) 5N**
C) 4N **D) 12N**
59. Q.Id: 192639
Which of the following complex ions does not exist?
- A) $[\text{B}(\text{H}_2\text{O})_6]^{3+}$** **B) $[\text{Al}(\text{H}_2\text{O})_6]^{3+}$**
C) $[\text{Ga}(\text{H}_2\text{O})_6]^{3+}$ **D) $[\text{In}(\text{H}_2\text{O})_6]^{3+}$**
60. Q.Id: 192637
The correct order of electrical conductivity of alkali metals ions in their aqueous solution for Cs^+ , K^+ , Na^+ & Li^+ is
- A) $\text{Cs}^+ > \text{K}^+ > \text{Na}^+ > \text{Li}^+$** **B) $\text{K}^+ > \text{Cs}^+ > \text{Li}^+ > \text{Na}^+$**
C) $\text{Cs}^+ > \text{K}^+ > \text{Li}^+ > \text{Na}^+$ **D) $\text{Li}^+ > \text{Na}^+ > \text{K}^+ > \text{Cs}^+$**
61. Q.Id: 192636
 $\text{H}_2 + \text{CO} + \text{Alkene} \xrightarrow{\text{Catalyst}} 1^\circ \text{ alcohol}$
What is the stable intermediate and the nature of the reaction?
- A) Acid, reduction** **B) Aldehyde, Oxidation**
C) Aldehyde, Reduction **D) Alcohol, Oxidation**
62. Q.Id: 192635
A particle moves over an xy-plane with a constant acceleration $\mathbf{a} = (4\hat{i} + 4\hat{j}) \text{ m/s}^2$. At time $t=0$, the velocity is $(4\hat{i}) \text{ m/s}$. The speed of the particle when it is displaced by 6.0 m parallel to the X-axis is
- A) $4\sqrt{5} \text{ m/s}$** **B) $\sqrt{60} \text{ m/s}$**
C) $3\sqrt{10} \text{ m/s}$ **D) $\sqrt{20} \text{ m/s}$**

63. Q.Id: 192634
If the molar concentrations of base and its conjugate acid are same, then pOH of the buffer solution is

- A) Same as pK_b of base B) Same as pK_a of base
C) Same as pK_a of acid D) Same as pK_b of acid

64. Q.Id: 192633
Find the angle between the two vectors $a = 3\hat{i} + 2\hat{j} + 5\hat{k}$, $b = 5\hat{i} + 3\hat{j} + \hat{k}$

- A) $\cos^{-1}\left(\frac{26}{\sqrt{1330}}\right)$ B) $\sin^{-1}\left(\frac{26}{\sqrt{1330}}\right)$
C) $\cos^{-1}\left(\frac{26}{\sqrt{1335}}\right)$ D) $\tan^{-1}\left(\frac{26}{\sqrt{1330}}\right)$

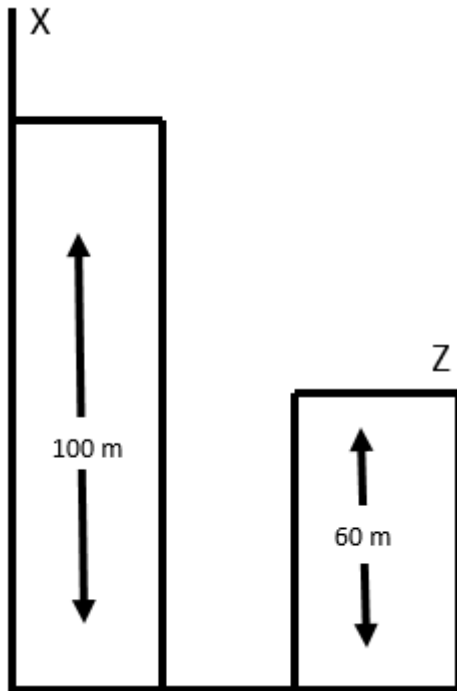
65. Q.Id: 192632
A car driver is trying to jump across a path as shown in figure by driving horizontally off a cliff X at the speed 10 m/s. When he touches peak Z (ignore air resistance) What would be speed?user $g = 10 \text{ m/s}^2$

- A) 30 m/s B) 40m/s
C) 15 m/s D) 50 m/s



66. Q.Id: 192631

A car travels in a straight line along a road. Its distance from a stop sign is given as a function of t by the equation $x(t) = \alpha t + \beta t^3$, where $\alpha = 2.0 \text{ m/s}$, $\beta = 0.01 \text{ m/s}^3$. Calculate the average velocity of the car in the time interval $t = 2.00 \text{ s}$ to 4.00 s .



A) 2.28 m/s

B) 4.94 m/s

C) 3.34 m/s

D) 4.12 m/s

67. Q.Id: 192630

The dimensions of σb^4 , where a is Stefan's constant and b is Wien's constant are

A) $[M^0L^0T^0]$

B) $[ML^4T^3]$

C) $[ML^{-2}T]$

D) $[ML^6T^{-3}]$

68. Q.Id: 192629
Match the following columns.
Column - I (Acid)
Column - II (K_a (Ionisation constant))

List1

List2

A. HCN	I. 6.8×10^{-4}
B. $H_2C_2O_4$	II. 8.9×10^{-8}
C. H_2S	III. 4.9×10^{-10}
D. Niacin	IV. 5.6×10^{-2}
E. .	V. 1.5×10^{-5}

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

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

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

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

69. Q.Id: 192628
Which of the following statement is incorrect?

A) Conservation laws have deep connection with symmetries of nature.

B) Weak nuclear force is weakest among all fundamental forces of nature

C) A conservation law is hypothesis based on observations and experiments

D) in a nuclear process mass gets converted to energy of vice-versa

70. Q.Id: 192627
Enthalpy of hydrogenation of one mole of benzene to cyclohexane is [resonance energy of benzene = - 150.4 kJ/mol, enthalpy of hydrogenation of cyclohexane = - 119.5 kJ/mol]

A) - 208.1 kJ/mol

B) - 358.1 kJ/mol

C) + 150.4 kJ/mol

D) - 269.9 kJ/mol

71. Q.Id: 192626
The number of grams of oxygen is 32.2 g of $Na_2SO_4 \cdot 10H_2O$ is approximately

A) 32.2 g

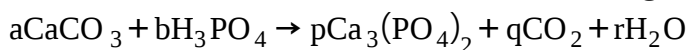
B) 22.4 g

C) 11.2 g

D) 64.4 g

72. Q.Id: 192625

In the balanced equation of the following reaction, the ratio of $\frac{a}{b}$ is a



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

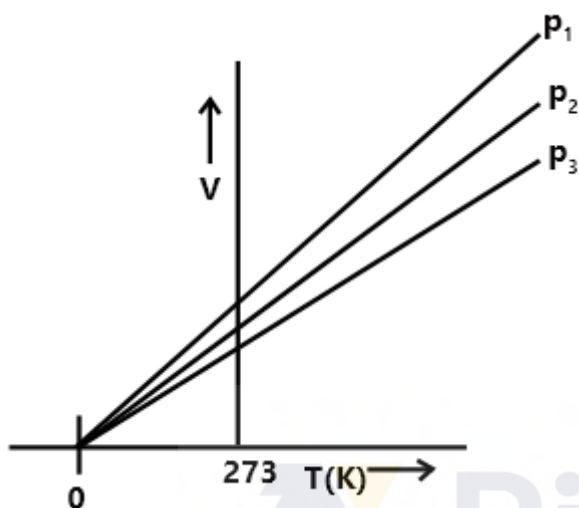
B) $\frac{3}{2}$

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

D) $\frac{7}{5}$

73. Q.Id: 192624

A plot of volume of the gas versus T (K) is shown below. Which of the option is correct for the plot?



A) $p_1 < p_2 < p_3$

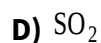
B) $p_3 < p_2 < p_1$

C) $p_1 = p_2 \neq p_3$

D) $p_1 = p_2 = p_3 = 0$ at 273 K

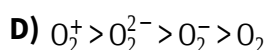
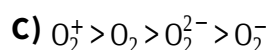
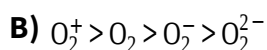
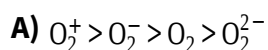
74. Q.Id: 192623

The most probable velocity of a gas at 200 K is equal to the RMS velocity of He gas at 27°C. The gas is



75. Q.Id: 192622

The correct sequence of bond order is



81. Q.Id: 192552

$$\int_{-1}^1 \frac{\log(1+x)}{1+x^2} dx = \int_{-1}^1 \frac{\log(1+x)}{1+x^2} dx + \int_0^1 f(x) dx$$
 then $f(x) =$

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

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

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

D) 0

82. Q.Id: 192551

$$\int_5^9 \frac{\log 3x^2}{\log 3x^2 + \log(588 - 84x + 3x^2)} dx =$$

A) 2

B) 1

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

D) 4

83. Q.Id: 192550

$$\int \frac{(1 - \cos x)^{2/7}}{(1 + \cos x)^{9/7}} dx =$$

A) $\frac{7}{11} \left(\tan \frac{x}{2} \right)^{\frac{11}{7}} + C$

B) $\frac{7}{11} \left(\tan \frac{x}{2} \right)^{\frac{7}{11}} + C$

C) $\frac{7}{11} \left(\cot \frac{x}{2} \right)^{\frac{11}{7}} + C$

D) $\frac{11}{7} \left(\cot \frac{x}{2} \right)^{\frac{7}{11}} + C$

84. Q.Id: 192549

$$\int (x+2)\sqrt{x+3} dx =$$

A) $\frac{2}{15}\sqrt{x+3}(3x^2 - 13x + 12) + C$

B) $\frac{2}{15}\sqrt{x+3}(3x^2 + 13x + 12) + C$

C) $\frac{2}{5}\sqrt{x+3}(3x^2 - 12x + 13) + C$

D) $\frac{2}{5}\sqrt{x+3}(3x^2 + 12x + 13) + C$

85. Q.Id: 192548

$$\int \frac{dx}{\sin x + \cos x} =$$

A) $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{x}{2} + \frac{\pi}{8} \right) \right| + C$

B) $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{x}{2} + \frac{\pi}{4} \right) \right| + C$

C) $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{x}{4} + \frac{\pi}{2} \right) \right| + C$

D) $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{x}{8} + \frac{\pi}{2} \right) \right| + C$

91. Q.Id: 192542

Consider the following statements.

- a) If a function is differentiable at a point 'p' then it is not continuous at 'p'
- b) If a function is not continuous at $x = a$, then it is not differentiable at $x = a$
- c) If $f(x) = |x|$ then $f(x)$ is not differentiable but continuous on \mathbb{R}
- d) If $f(1) = x - \{x\}$, then $f'(1) = 1$

Which of the above statements are (is) correct?

- A) Only (b)
- B) (b) and (c)
- C) Only (c)
- D) (c) and (d)

92. Q.Id: 192541

Let $g : [-2, 2] \rightarrow \mathbb{R}$ and $f : [-2, 2] \rightarrow \mathbb{R}$ are two functions defined as

$g(x) = \begin{cases} -1, & \text{if } -2 < x < 0 \\ x^2 - 1, & \text{if } 0 \leq x \leq 2 \end{cases}$ and $f(x) = |g(x)| + g(|x|) + 2$. In the interval $(-2, 2)$, f is not differentiable at $x =$

- A) 0
- B) 1
- C) $\frac{1}{2}$
- D) -1

93. Q.Id: 192540

If $x = 5(1 - \sin t)$, $y = 5(t + \cos t)$, then $\frac{dx}{dy} =$

- A) $\frac{\sin t - 1}{\cos t}$
- B) $\frac{\cos t}{\sin t - 1}$
- C) $\tan \frac{t}{2}$
- D) $\frac{\cos \frac{t}{2} - \sin \frac{t}{2}}{\cos \frac{t}{2} + \sin \frac{t}{2}}$

94. Q.Id: 192539

$f(x) = \begin{cases} 1 + \cos x, & x \leq 0 \\ a - x, & 0 < x \leq 2 \\ x^2 - b^2, & x > 2 \end{cases}$ is continuous everywhere, then $a^2 + b^2 =$

- A) 4
- B) 8
- C) 6
- D) 12

100. Q.Id: 192533
Which of the following is correct, if the wavelength (λ) is equal to the distance travelled by the electron in one second ?

A) $\lambda = h/p$

B) $\lambda = h/m$

C) $\lambda = \sqrt{h/p}$

D) $\lambda = \sqrt{h/m}$

101. Q.Id: 192531

The lines $x \cos \alpha + y \sin \alpha = P$, $\alpha \in \mathbb{R}$ are chords of the hyperbola $\frac{x^2}{9} - \frac{y^2}{36} = 1$ and they subtend a right angle at the centre of the hyperbola. The locus of the poles of these lines with respect to the given hyperbola is

A) $x^2 - 16y^2 = 108$

B) $16x^2 - y^2 = 108$

C) $16x^2 + y^2 = 108$

D) $x^2 + 16y^2 = 108$

102. Q.Id: 192530

The area (in square units) of the quadrilateral formed by joining the focii of the two ellipses $\frac{x^2}{9} + \frac{y^2}{5} = 1$ and $\frac{x^2}{5} + \frac{y^2}{9} = 1$ is

A) 4

B) 2

C) 6

D) 8

103. Q.Id: 192529

A focus of an ellipse having eccentricity $\frac{1}{2}$ is at (0, 0) and a directrix is the line $x = 4$. Then the equation of one such ellipse is

A) $\frac{9x^2}{64} + \frac{3y^2}{16} = 1$

B) $\frac{(2x+1)^2}{32} + \frac{y^2}{16} = 1$

C) $\frac{(3x+4)^2}{64} + \frac{y^2}{32} = 1$

D) $(3x+4)^2 + 12y^2 = 64$

104. Q.Id: 192528

The parametric equations of the parabola $y^2 - 4x - 8y - 12 = 0$ are

A) $x = 7 + 2t, y = -4 + t^2$

B) $x = -7 + 2t, y = 4 + 2t$

C) $x = -7 + t^2, y = -4 + 2t$

D) $x = -7 + t^2, y = 4 + 2t$

111. Q.Id: 192521
If $9x^2 - 24xy + 16y^2 + \alpha x + \beta y + 6$ represents a pair of parallel lines of 1 unit apart and one of those lines passes through (1, 1) then $\frac{\alpha}{\beta} =$
- A) $\frac{2}{3}$ B) 1
C) $\frac{-3}{2}$ D) $\frac{-3}{4}$
112. Q.Id: 192520
The combined equation of the two diameters of a circle which divide the circle into 4 sectors is $ax^2 + 2hcy + by^2 = 0$. If the area of the bigger sector is 5 times the area of the smaller sector, then $\frac{|a+b|}{\sqrt{(a-b)^2 + 4h^2}} =$
- A) $\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$
C) $\frac{1}{\sqrt{2}}$ D) 1
113. Q.Id: 192519
If the vertices of a triangle ABC are A(1, 7), B(-5, -1) and C(7, 4), then the equation of a bisector of $\angle ABC$ is
- A) $7x - 9y + 26 = 0$ B) $9x - 7y + 38 = 0$
C) $7x + 9y + 44 = 0$ D) $9x + 7y + 52 = 0$
114. Q.Id: 192518
If P'(a,b) is the image of the point P(-1, 2) with respect to the line $x - 2y + 3 = 0$, then the length of the perpendicular from P' on to the line $2x + y - 7 = 0$ is
- A) $\frac{3}{\sqrt{5}}$ B) 5
C) $\frac{7}{\sqrt{5}}$ D) 7
115. Q.Id: 192517
The incentre of the triangle having the vertices $(1, \sqrt{3})$, (0, 0) and (2, 0) is
- A) $\left(1, \frac{\sqrt{3}}{2}\right)$ B) $\left(\frac{2}{3}, \frac{1}{\sqrt{3}}\right)$
C) $\left(\frac{2}{3}, \frac{\sqrt{3}}{2}\right)$ D) $\left(1, \frac{1}{\sqrt{3}}\right)$

136. Q.Id: 192496
If $\sin^{-1}x < \cos^{-1}x$, then

A) $-1 \leq x < \frac{1}{\sqrt{2}}$

B) $-\sqrt{3} \leq x < -1$

C) $\frac{1}{\sqrt{2}} < x \leq 1$

D) $1 < x < \sqrt{3}$

137. Q.Id: 192495
If $\cos \theta = \frac{1}{\sqrt{2}}$ and $\tan \theta = 1$, then the general value of θ is

A) $2n\pi + \frac{\pi}{4}, n = 0, 1, 2, 3, \dots$

B) $(2n+1)\pi + \frac{\pi}{4}, n = 0, 1, 2, 3, \dots$

C) $n\pi + \frac{\pi}{4}, n = 0, 1, 2, 3, \dots$

D) $n\pi \pm \frac{\pi}{4}, n = 0, 1, 2, 3, \dots$

138. Q.Id: 192494
Let $y = 4\sin^2\theta - \cos 2\theta$. If l and m are the minimum and maximum values of y respectively, then

A) $lm = \frac{m}{l}$

B) $lm = \frac{l}{m}$

C) $l+m = \frac{l}{m}$

D) $\frac{lm}{l-m} = 1+m$

139. Q.Id: 192493
 $\frac{1 - \cos 2\theta + \sin 2\theta}{1 + \cos 2\theta + \sin 2\theta} =$

A) $\cot \theta$

B) $\cos 2\theta$

C) $\tan \theta$

D) $\tan 2\theta$

140. Q.Id: 192492
Let $\triangle ACB$ be a triangle with right-angle at C . Let $AB = 29$ units, $BC = 21$ units and $\angle ABC = \theta$. Then $\cos^2 \theta - \sin^2 \theta =$

A) 1

B) $\frac{41}{841}$

C) $\frac{40}{441}$

D) $\frac{41}{800}$

141. Q.Id: 192491

$$\cot \frac{\pi}{16} \cdot \cot \frac{2\pi}{16} \cdot \cot \frac{3\pi}{16} \cdot \cot \frac{4\pi}{16} \cdot \cot \frac{5\pi}{16} \cdot \cot \frac{6\pi}{16} \cdot \cot \frac{7\pi}{16} =$$

- A) 0
B) 1
C) $\frac{1}{2}$
D) 2

142. Q.Id: 192490

For any quadratic polynomial $f(x)$, it is true that $f(x) = f(a) + f'(a)(x - a) + \frac{f''(a)}{2!}(x - a)^2$, where a is any real number. If

$$\frac{3x^2 + 4x + 7}{(x-2)^3} = \frac{A}{(x-2)^3} + \frac{B}{(x-2)^2} + \frac{C}{(x-2)} \text{ and } g(x) = 3x^2 + 4x + 7 \text{ then } A + B + C =$$

- A) $g(2) + g'(2) + g''(2)$
B) $g''(2) + 2g(2) + \frac{g'(1)}{2!}$
C) $g(2) + g'(2) + \frac{g''(2)}{2!}$
D) $2g(2) + 2g'(2) + \frac{g''(2)}{2!}$

143. Q.Id: 192489

The sum of the coefficients in the expansion of $\left(1 + \frac{x}{2}\right)^{12}$ is

- A) 0
B) 2^{11}
C) $\left(\frac{3}{2}\right)^{12}$
D) 2^{12}

144. Q.Id: 192488

The coefficient of x^4 in the expansion of $(1 - x - x^2 + x^3)^6$ is

- A) 120
B) 15
C) -75
D) -60

145. Q.Id: 192487

The value of the numerically greatest term in the expansion if

$$(2x + 3y)^{11} \text{ when } x = \frac{1}{2} \text{ and } y = \frac{1}{3} \text{ is}$$

- A) 462
B) ${}^{11}C_5 \left(\frac{2}{3}\right)^6$
C) ${}^{11}C_6 \left(\frac{3}{2}\right)^5$
D) 576

