JEE MAIN · FULL PAPER

JEE Main Guess Paper 2027

Time: 3 hours · Maximum marks: 300 · 75 questions

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Section Physics
25 questions · 100 marks

Q1. Match the LIST-I with LIST-II 4 marks

LIST-I: A. Triatomic rigid gas; B. Diatomic non-rigid gas; C. Monoatomic gas; D. Diatomic rigid gas

LIST-II: I. Cp/Cv = 5/3; II. Cp/Cv = 7/5; III. Cp/Cv = 4/3; IV. Cp/Cv = 9/7

Choose the correct answer from the options given below:

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

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

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

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

Q2. An element delta l = delta x i-hat is placed at the origin and carries a large current I = 10 A. The magnetic field on the y-axis at a distance of 0.5 m from the element (delta x of 1 cm length) is: 4 marks

(1) $4x10^{-8}$ T

(2) $8x10^{-8}$ T

(3) $10x10^{-8}$ T

(4) $12x10^{-8}$ T

68019155317. A-IV, B-III, C-II, D-I

68019155318. A-III, B-I, C-II, D-IV

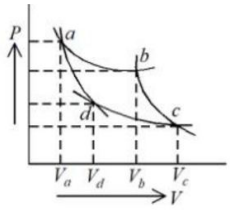
Question Number : 42 Question Id : 68019114105 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A

Minimum Instruction Time : 0

Q3. Two different adiabatic paths for the same gas intersect two isothermal curves as shown in P-V diagram. The relation between the ratio V_a/V_d and the ratio V_b/V_c is: 4 marks

(1) $V_a/V_d = V_b/V_c$
(2) V_a/V_d != V_b/V_c
(3) $V_a/V_d = (V_b/V_c)^{(-1)}$
(4) $V_a/V_d = (V_b/V_c)^2$



Options :

Q4. In the following circuit, the reading of the ammeter will be (Take Zener breakdown voltage = 4 V) 4 marks

(1) 24 mA
(2) 80 mA
(3) 10 mA
(4) 60 mA

3475777495. 5 : 27

3475777496. 27 : 5

3475777497. 5 : 36

Question Number : 43 Question Id : 3475772128 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

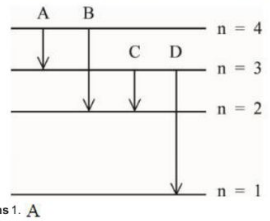
एक हाइड्रोजन परमाणु के लिए, लाइमन श्रेणी की दीर्घतम तरंगदैर्घ्य का, बामर श्रेणी की दीर्घतम तरंगदैर्घ्य के साथ, अनुपात है

Options :

Q5. The energy levels of an hydrogen atom are shown below (arrows A, B, C, D between levels n = 1, 2, 3, 4). The transition corresponding to emission of shortest wavelength is 4 marks

(1) A
(2) C
(3) B
(4) D

corresponding to emission of shortest wavelength is



Options 1. A
2. C
3. B
4. D

Q6. Moment of inertia of a rod of mass 'M' and length 'L' about an axis passing through its center and normal to its length is 'alpha'. Now the rod is cut into two equal parts and these parts are joined symmetrically to form a cross shape. Moment of inertia of cross about an axis passing through its center and normal to plane containing cross is : 4 marks

(1) alpha
(2) alpha/2
(3) alpha/8
(4) alpha/4

Q7. Choose the correct logic circuit for the given truth table having inputs A and B. 4 marks

Truth table (A, B -> Y): 0,0 -> 0 ; 0,1 -> 0 ; 1,0 -> 1 ; 1,1 -> 1

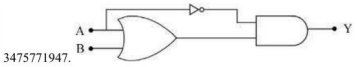
Options: (logic gate circuit diagrams)

(1) A and B into an OR gate, its output inverted (NOT) then fed with A into an AND gate producing Y
(2) A and B into an OR gate whose output feeds an AND gate producing Y
(3) A and B into an OR gate whose output is inverted at the AND gate input, producing Y
(4) A and B into an OR gate whose output feeds an AND gate (with A) producing Y

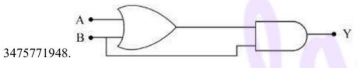
0	0	0
0	1	0
1	0	1
1	1	1

Options :

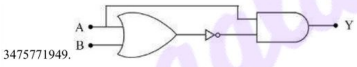
3475771947.



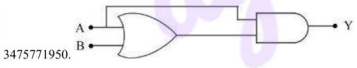
3475771948.



3475771949.



3475771950.



Question Number : 45 Question Id : 347577570 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

निवेशों A और B के साथ दी गयी सत्यमान सारणी के लिए सही तर्क परिपथ चुनें।

निवेश		निर्गत
A	B	Y
0	0	0
0	1	0
1	0	1
1	1	1

Options :

Q8. Four particles A, B, C, D of mass m/2, m, 2m, 4m, have same momentum, respectively. The particle with maximum kinetic energy is: 4 marks

(1) A
(2) B
(3) C
(4) D

Q9. A parallel plate capacitor is filled equally (half) with two dielectrics of dielectric constants epsilon$_1$ and epsilon$_2$, as shown in figures. The distance between the plates is d and area of each plate is A. If capacitance in first configuration and second configuration are C_1 and C_2 respectively, then C_1/C_2 is: (First Configuration: the two dielectric slabs stacked horizontally one above the other; Second Configuration: the two dielectric slabs placed side by side vertically) 4 marks

Options:

(1) epsilon$_0$(epsilon$_1$ + epsilon$_2$)/2

(2) 4 epsilon$_1$ epsilon$_2$/(epsilon$_1$ + epsilon$_2$)^2

(3) epsilon$_1$ epsilon$_2$/(epsilon$_1$ + epsilon$_2$)

(4) epsilon$_1$ epsilon$_2^2$/(epsilon$_1$ + epsilon$_2$)^2

नीचे दिए गए विकल्पों में से **सही** उत्तर चुनें:

Options :

3475771911. केवल A, B, C

3475771912. केवल B, C, D

3475771913. केवल C, D, E

3475771914. केवल A, B, D

Question Number : 37 Question Id : 347577562 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A wire of length 25 m and cross-sectional area 5 mm^2 having resistivity of 2×10^{-6} Ω m is bent into a complete circle. The resistance between diametrically opposite points will be

Options :

3475771915. 25 Ω

3475771916. 50 Ω

3475771917. 100 Ω

3475771918. 12.5 Ω

Q10. A small bob of mass 100 mg and charge +10 microC is connected to an insulating string of length 1 m. It is brought near to an infinitely long non-conducting sheet of charge density 'sigma' as shown in figure. If string subtends an angle of 45 degrees with the sheet at equilibrium the charge density of sheet will be. 4 marks

(Given, epsilon$_0$ = 8.85*10^{-12} F/m and acceleration due to gravity, g = 10 m/s^2)

(1) 1.77 nC/m^2

(2) 0.885 nC/m^2

(3) 17.7 nC/m^2

(4) 885 nC/m^2

6034213175. 5√7

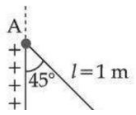
6034213176. 125

6034213177. 175

Question Number : 34 Question Id : 603421934 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

A small bob of mass 100 mg and charge +10 μC is connected to an insulating string of length 1 m. It is brought near to an infinitely long non-conducting sheet of charge density 'σ' as shown in figure. If string subtends an angle of 45° with the sheet at equilibrium the charge density of sheet will be.

(Given, $\epsilon_0 = 8.85 \times 10^{-12} \frac{F}{m}$ and acceleration due to gravity, $g = 10 \frac{m}{s^2}$)



Q11. Match List-I with List-II : 4 marks

List-I (Y vs X)

(A) Y = magnetic susceptibility, X = magnetising field

(B) Y = magnetic field, X = distance from centre of a current carrying wire for x < a (where a = radius of wire)

(C) Y = magnetic field, X = distance from centre of a current carrying wire for x > a (where a = radius of wire)

(D) Y = magnetic field inside solenoid, X = distance from centre

List-II (Shape of Graph)

(I) straight line through origin with positive slope

(II) constant then falling curve

(III) horizontal constant line

(IV) decreasing (inverse) curve

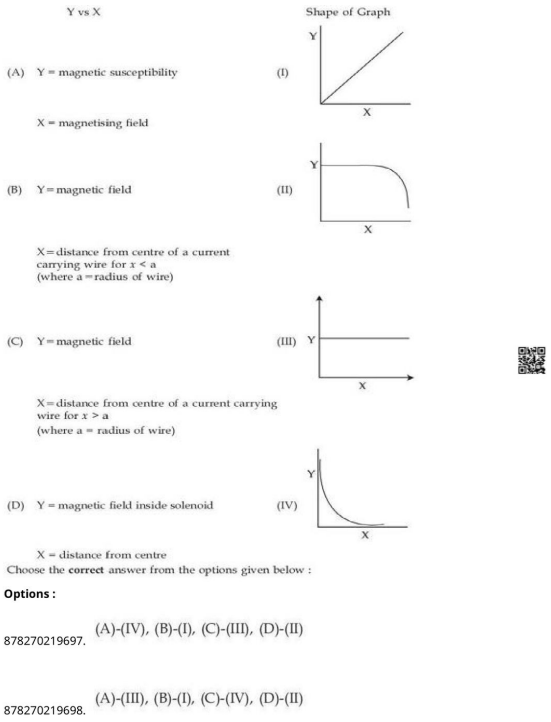
Choose the correct answer from the options given below :

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

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

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

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



Q12. Match List - I with List - II. 4 marks

List - I: (A) Coefficient of viscosity (B) Intensity of wave (C) Pressure gradient (D) Compressibility

List - II: (I) $[M\ L^{0}\ T^{-3}]$ (II) $[M\ L^{-2}\ T^{-2}]$ (III) $[M^{-1}\ L\ T^{2}]$ (IV) $[M\ L^{-1}\ T^{-1}]$

Choose the correct answer from the options given below :

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

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

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

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

Q13. A wire of resistance R is bent into a triangular pyramid as shown in figure with each segment having same length. The resistance between points A and B is R/n. The value of n is: 4 marks

(1) 10
(2) 12
(3) 14
(4) 16

3475777461. 1 s

Question Number : 35 Question Id : 3475772120 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
An ac current is represented as

$$i = 5\sqrt{2} + 10\cos\left(650\pi t + \frac{\pi}{6}\right) Amp$$

The r.m.s value of the current is
Options :
3475777462. $5\sqrt{2}\ Amp$

Q14. In series RLC resonator, if the self inductance and capacitance become double, the new resonant frequency (f_2) and new quality factor (Q_2) will be: (f_1 = original resonant frequency, Q_1 = original quality factor) 4 marks

(A) $f_2 = f_1/2$ and $Q_2 = Q_1$
(B) $f_2 = f_1$ and $Q_2 = Q_1/2$
(C) $f_2 = 2f_1$ and $Q_2 = Q_1$
(D) $f_2 = f_1$ and $Q_2 = 2Q_1$

Q15. The work function of a metal is 3 eV. The color of the visible light that is required to cause emission of photoelectrons is. 4 marks

Options:
(1) Yellow
(2) Green
(3) Red
(4) Blue

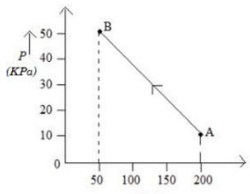
Q16. To find the spring constant (k) of a spring experimentally, a student commits 2% positive error in the measurement of time and 1% negative error in measurement of mass. The percentage error in determining value of k is: 4 marks

(1) 3%
(2) 5%
(3) 1%
(4) 4%

Q17. The pressure of a gas changes linearly with volume from A to B as shown in figure. If no heat is supplied to or extracted from the gas then change in the internal energy of the gas will be (in the P-V graph, B is at (50 cc, 50 kPa) and A is at (200 cc, 10 kPa)). Options: (1) zero (2) 4.5 J (3) 6 J (4) -4.5 J

4 marks

figure. If no heat is supplied to or extracted from the gas then change in the internal energy of the gas will be



Q18. Two coherent sources of light interfere. The intensity ratio of two sources is 1 : 4. For this interference pattern if the value of $(I_{max} + I_{min})/(I_{max} - I_{min})$ is equal to (2 alpha + 1)/(beta + 3), then alpha/beta will be :

4 marks

Option A: 1.5
Option B: 2
Option C: 0.5
Option D: 1

Q19. Pressure inside a soap bubble is greater than the pressure outside by an amount : (given : R = Radius of bubble, S = Surface tension of bubble)

4 marks

(1) 2S/R
(2) 4S/R
(3) S/R
(4) 4R/S

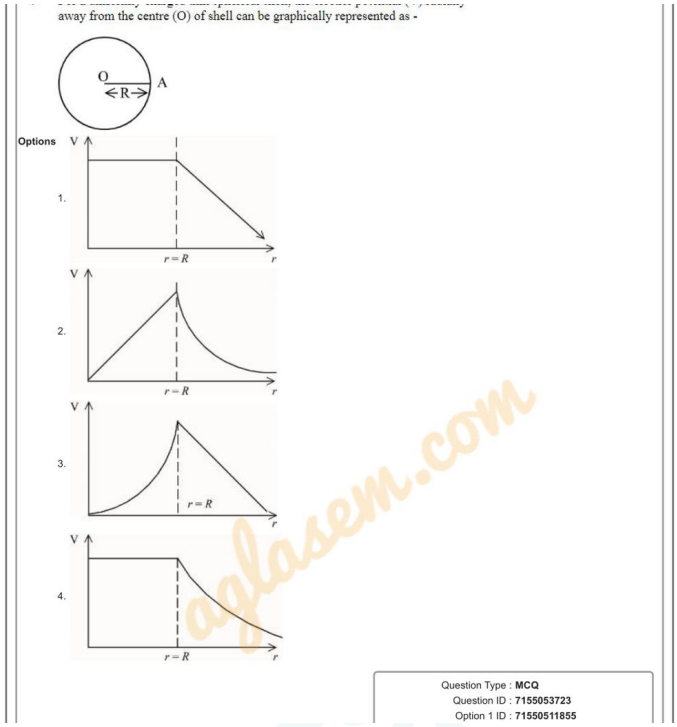
Q20. A sample contains mixture of helium and oxygen gas. The ratio of root mean square speed of helium and oxygen in the sample, is:

4 marks

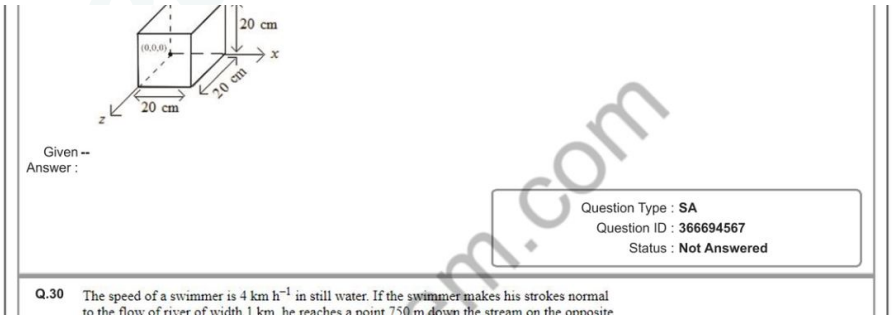
(1) 2 sqrt(2) / 1
(2) 1 / (2 sqrt(2))
(3) 1/32
(4) 1/4

Q21. For a uniformly charged thin spherical shell, the electric potential (V) radially away from the centre (O) of shell can be graphically represented as - (options are four V vs r graphs) 4 marks

(1) V constant for r < R, then decreasing linearly to zero
(2) V rising (concave) to a cusp at r = R, then decaying
(3) V rising to a peak at r = R, then decaying on both sides
(4) V constant for r < R, then decaying as 1/r for r > R



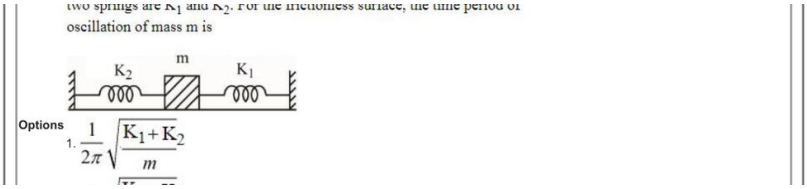
Q22. Expression for an electric field is given by $E = 4000\ x^2\ i$ V/m. The electric flux through the cube of side 20 cm when placed in electric field (as shown in the figure) is _____ V cm. (Cube of side 20 cm with one corner at origin (0,0,0).) 4 marks



Q23. A mass m is attached to two strings as shown in figure. The spring constants of two springs are K_1 and K_2. For the frictionless surface, the time period of oscillation of mass m is

4 marks

(1) (1/2 pi) sqrt((K_1 + K_2)/m)
(2) (1/2 pi) sqrt((K_1 - K_2)/m)
(3) 2 pi sqrt(m/(K_1 - K_2))
(4) 2 pi sqrt(m/(K_1 + K_2))



Q24. Two wires each of radius 0.2 cm and negligible mass, one made of steel and the other made of brass are loaded as shown in the figure. The elongation of the steel wire is ____ × 10^{-6} m. [Young's modulus for steel = 2 × 10^{11} N m^{-2} and g = 10 m s^{-2}] (figure: 1.6 m steel wire with 2 kg load, 1 m brass wire with 1.14 kg load)

4 marks



Q25. Considering Bohr's atomic model for hydrogen atom :

4 marks

(A) the energy of H atom in ground state is same as energy of He^+ ion in its first excited state.
(B) the energy of H atom in ground state is same as that for Li^++ ion in its second excited state.
(C) the energy of H atom in its ground state is same as that of He^+ ion for its ground state.
(D) the energy of He^+ ion in its first excited state is same as that for Li^++ ion in its ground state.
Choose the correct answer from the options given below :
(1) (A), (B) only
(2) (A), (C) only
(3) (B), (D) only
(4) (A), (D) only

Section Chemistry
25 questions · 100 marks

Q26. The metal ions that have the calculated spin-only magnetic moment value of 4.9 B.M. are: 4 marks

A. Cr^{2+}
B. Fe^{2+}
C. Fe^{3+}
D. Co^{2+}
E. Mn^{3+}

Choose the correct answer from the options given below:

Options:

(1) A, B and E Only
(2) A, D and E Only
(3) B and E Only
(4) A, C and E Only

Q27. Choose the correct tests with respective observations. 4 marks

(A) $CuSO_4$ (acidified with acetic acid) + $K_4[Fe(CN)_6]$ -> Chocolate brown precipitate.
(B) $FeCl_3$ + $K_4[Fe(CN)_6]$ -> Prussian blue precipitate.
(C) $ZnCl_2$ + $K_4[Fe(CN)_6]$, neutralised with NH_4OH -> White or bluish white precipitate.
(D) $MgCl_2$ + $K_4[Fe(CN)_6]$ -> Blue precipitate.
(E) $BaCl_2$ + $K_4[Fe(CN)_6]$, neutralised with NaOH -> White precipitate.

Choose the correct answer from the options given below :

(1) A, B and C only
(2) B, D and E only
(3) C, D and E only
(4) A, D and E only

Q28. Given below are two statements : 4 marks

Statement (I) : In octahedral complexes, when $Delta_0$ < P high spin complexes are formed. When $Delta_0$ > P low spin complexes are formed.
Statement (II) : In tetrahedral complexes because of $Delta_t$ < P, low spin complexes are rarely formed.

In the light of the above statements, choose the most appropriate answer from the options given below :

(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct

Q29. Match List - I with List - II. 4 marks

List - I (Complex ion) — List - II (Spin only magnetic moment in B.M.)

(A) $[Cr(NH_3)_6]^{3+}$ (I) 4.90

(B) $[NiCl_4]^{2-}$ (II) 3.87

(C) $[CoF_6]^{3-}$ (III) 0.0

(D) $[Ni(CN)_4]^{2-}$ (IV) 2.83

Choose the correct answer from the options given below:

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

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

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

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

Q30. The density of 'x' M solution ('x' molar) of NaOH is 1.12 g mL^{-1}, while in molality, the concentration of the solution is 3 m (3 molal). Then x is 4 marks

(Given: Molar mass of NaOH is 40 g/mol)

(1) 3.5

(2) 3.8

(3) 3.0

(4) 2.8

Q31. Match the LIST-I with LIST-II 4 marks

LIST-I (Molecules/ion) | LIST-II (Hybridisation of central atom)

A. PF_5 | I. dsp^2

B. SF_6 | II. sp^3d

C. $Ni(CO)_4$ | III. sp^3d^2

D. $[PtCl_4]^{2-}$ | IV. sp^3

Choose the correct answer from the options given below:

Options:

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

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

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

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

LIST-I (Molecules/ ion)		LIST-II (Hybridisation of central atom)	
A.	PF_5	I.	dsp^2
B.	SF_6	II.	sp^3d
C.	$Ni(CO)_4$	III.	sp^3d^2
D.	$[PtCl_4]^{2-}$	IV.	sp^3

Choose the ***correct*** answer from the options given below:

Options :

3475771988. A-I, B-II, C-III, D-IV

3475771989. A-II, B-III, C-IV, D-I

3475771990. A-III, B-I, C-IV, D-II

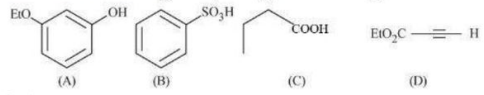
Q32. On complete combustion 1.0 g of an organic compound (X) gave 1.46 g of CO_2 and 0.567 g of H_2O. The empirical formula mass of compound (X) is _____ g. (Given molar mass in g mol^{-1} C : 12, H : 1, O : 16) 4 marks

(1) 15
(2) 30
(3) 45
(4) 60

Q33. The least acidic compound, among the following is: 4 marks

(A) 3-ethoxyphenol (EtO-C_6H_4-OH)
(B) benzenesulfonic acid (C_6H_5-SO_3H)
(C) butanoic acid ($CH_3CH_2CH_2$-COOH)
(D) ethyl propiolate (EtO_2C-C(triple bond)C-H, a terminal alkyne ester)
Options:
(1) B
(2) D
(3) C
(4) A

Question Number : 67 Question Id : 347577592 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
The least acidic compound, among the following is:



(A) (B) (C) (D)

Options :
3475772020. B

3475772021. D

3475772022. C

3475772023. A

Q34. Match the LIST-I with LIST-II 4 marks
LIST-I (Molecule / ion): A. ICl_2^-; B. H_2O; C. SO_2; D. XeF_4
LIST-II (Bond pair : lone pair on the central atom): I. 4 : 2; II. 4 : 1; III. 2 : 3; IV. 2 : 2
Choose the correct answer from the options given below:
(1) A-III, B-IV, C-I, D-II
(2) A-IV, B-III, C-II, D-I
(3) A-III, B-IV, C-II, D-I
(4) A-II, B-I, C-IV, D-III

Q35. At -20 degrees C and 1 atm pressure, a cylinder is filled with equal number of H_2, I_2 and HI molecules for the reaction $H_2(g) + I_2(g) <=> 2HI(g)$, the K_p for the process is x x 10^{-1}. x = _____. 4 marks
[Given: R = 0.082 L atm K^{-1} mol^{-1}]
(1) 1
(2) 10
(3) 0.01
(4) 2

Q36. The emf of cell Tl | Tl^+ (0.001M) || Cu^{2+} (0.01M) | Cu is 0.83 V at 298 K. It could be increased by: 4 marks

(1) increasing concentration of Tl^+ ions
(2) increasing concentration of Cu^{2+} ions
(3) increasing concentration of both Tl^+ and Cu^{2+} ions
(4) decreasing concentration of both Tl^+ and Cu^{2+} ions

Q37. Which compound would give 3-methyl-6-oxoheptanal upon ozonolysis? 4 marks

Options: (four cyclohexene structures bearing methyl substituents at different ring positions; select the alkene whose reductive ozonolysis of the ring C=C yields 3-methyl-6-oxoheptanal)

(1) 1,6-dimethylcyclohexene
(2) 1-methyl-4-methylcyclohexene (1-methyl, methyl at position 4/5)
(3) 1,4-dimethylcyclohexene
(4) 1,3-dimethylcyclohexene

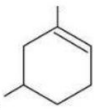
3475772009. [illegible]

3475772010. केवल C एवं D

3475772011. केवल A एवं B

Question Number : 65 Question Id : 347577590 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
Which compound would give 3-methyl-6-oxoheptanal upon ozonolysis?
Options :

3475772012. 

3475772013. 

Q38. In a reaction A + B -> C, initial concentrations of A and B are related as $[A]_0 = 8[B]_0$. The half lives of A and B are 10 min and 40 min, respectively. If they start to disappear at the same time, both following first order kinetics, after how much time will the concentration of both the reactants be same? 4 marks

Options:

(1) 20 min
(2) 40 min
(3) 60 min
(4) 80 min

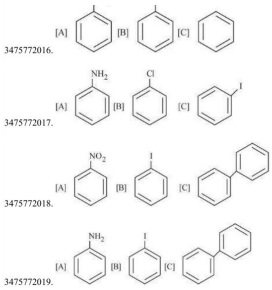
Q39. Given below are two statements: 4 marks
Statement (I): Fusion of MnO_2 with KOH and an oxidising agent gives dark green K_2MnO_4.
Statement (II): Manganate ion on electrolytic oxidation in alkaline medium gives permanganate ion.
In the light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false
(4) Statement I is false but Statement II is true

Q40. In the depression of freezing point experiment A. Vapour pressure of the solution is less than that of pure solvent B. Vapour pressure of the solution is more than that of pure solvent C. Only solute molecules solidify at the freezing point D. Only solvent molecules solidify at the freezing point. Choose the most appropriate answer from the options given below: Options: 1) B and C only 2) A and D only 3) A and C only 4) A only 4 marks

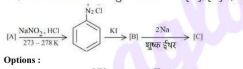
Q41. Correct order of limiting molar conductivity for cations in water at 298 K is: 4 marks
Options:
(1) Mg^{2+} > H^+ > Ca^{2+} > K^+ > Na^+
(2) H^+ > Na^+ > K^+ > Ca^{2+} > Mg^{2+}
(3) H^+ > Na^+ > Ca^{2+} > Mg^{2+} > K^+
(4) H^+ > Ca^{2+} > Mg^{2+} > K^+ > Na^+

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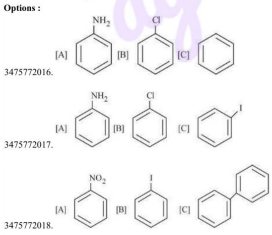
Q42. Identify [A], [B] and [C], respectively in the following reaction sequence: 4 marks
[A] --$NaNO_2$, HCl (273-278 K)--> $C_6H_5N_2$^+Cl^- (benzenediazonium chloride) --KI--> [B] --2Na / Dry ether--> [C]
Options:
(1) [A] aniline ($C_6H_5NH_2$), [B] chlorobenzene (C_6H_5Cl), [C] benzene (C_6H_6)
(2) [A] aniline ($C_6H_5NH_2$), [B] chlorobenzene (C_6H_5Cl), [C] iodobenzene (C_6H_5I)
(3) [A] nitrobenzene ($C_6H_5NO_2$), [B] iodobenzene (C_6H_5I), [C] biphenyl (C_6H_5-C_6H_5)
(4) [A] aniline ($C_6H_5NH_2$), [B] iodobenzene (C_6H_5I), [C] biphenyl (C_6H_5-C_6H_5)



Question Number : 66 Question Id : 347577591 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1
निम्नलिखित अभिक्रिया अनुक्रम में क्रमशः [A], [B] एवं [C] को पहचानिए:



Options :



Q43. Given 4 marks
(A) 2CO(g) + O_2(g) -> 2CO_2(g), $\Delta H_1°$ = -x kJ mol^{-1}
(B) C(graphite) + O_2(g) -> CO_2(g), $\Delta H_2°$ = -y kJ mol^{-1}
The $\Delta H°$ for the reaction C(graphite) + 1/2 O_2(g) -> CO(g) is
(1) (2x - y)/2
(2) (x + 2y)/2
(3) (x - 2y)/2
(4) 2y - x

Q44. An aqueous solution of HCl with pH 1.0 is diluted by adding equal volume of water (ignoring dissociation of water). The pH of HCl solution would (Given log 2 = 0.30) 4 marks
(1) remain same
(2) reduce to 0.5
(3) increase to 2
(4) increase to 1.3

Q45. $CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$ 4 marks
Consider the above reaction, what mass of $CaCl_2$ will be formed if 250 mL of 0.76 M HCl reacts with 1000 g of $CaCO_3$?
(Given : Molar mass of Ca, C, O, H and Cl are 40, 12, 16, 1 and 35.5 g mol^{-1}, respectively)
(1) 5.272 g
(2) 2.636 g
(3) 3.908 g
(4) 10.545 g

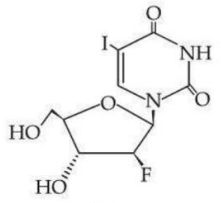
Q46. Number of compounds with one lone pair of electrons on central atom amongst following is _____ . 4 marks
O_3, H_2O, SF_4, ClF_3, NH_3, BrF_5, XeF_4

Q47. For a reaction taking place in three steps at same temperature, overall rate constant $K = (K_1 K_2)/K_3$. If Ea_1, Ea_2 and Ea_3 are 40, 50 and 60 kJ/mol respectively, the overall Ea is _____ kJ/mol. 4 marks

Q48. Number of molecules having bond order 2 from the following molecules is _____. C_2, O_2, Be_2, Li_2, Ne_2, N_2, He_2 4 marks

Q49. 0.1 mol of the given antiviral compound (P) will weigh _____ $*10^{-1}$ g (nearest integer). Compound P is an iodinated, fluorinated pyrimidine nucleoside (a uracil base bearing an iodine, N-linked to a deoxyribose-type sugar ring carrying two OH groups and a ring F substituent) as shown. 4 marks
(Given : molar mass in g mol^{-1} H : 1, C : 12, N : 14, O : 16, F : 19, I : 127)

(nearest integer).



(P)

(Given : molar mass in g mol^{-1} H : 1, C : 12, N : 14, O : 16, F : 19, I : 127)

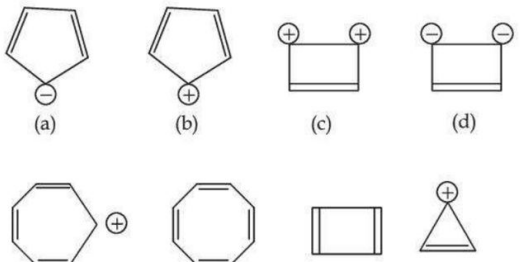
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Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Q50. Designate whether each of the following compounds is aromatic or not aromatic. The structures shown are: (a) cyclopentadienyl anion, (b) cyclopentadienyl cation, (c) cyclobutadiene dication, (d) cyclobutadiene dianion, (e) cycloheptatrienyl (tropylium) cation, (f) cyclooctatetraene, (g) cyclobutadiene, (h) cyclopropenyl cation. 4 marks

(1) b, e, f, g aromatic and a, c, d, h not aromatic
(2) a, c, d, e, h aromatic and b, f, g not aromatic
(3) a, b, c, d aromatic and e, f, g, h not aromatic
(4) e, g aromatic and a, b, c, d, f, h not aromatic

Question Number : 65 Question Id : 603421965 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

Designate whether each of the following compounds is aromatic or not aromatic.



Section Mathematics
25 questions · 100 marks

Q51. Let the shortest distance between the lines (x - 3)/3 = (y - alpha)/(-1) = (z - 3)/1 and (x + 3)/(-3) = (y + 7)/2 = (z - beta)/4 be 3 sqrt(30). Then the positive value of 5 alpha + beta is (1) 40 (2) 42 (3) 46 (4) 48 4 marks

Q52. If the system of linear equations 4 marks
3x + y + beta*z = 3
2x + alpha*y - z = -3
x + 2y + z = 4
has infinitely many solutions, then the value of 22*beta - 9*alpha is :
(1) 49
(2) 43
(3) 37
(4) 31

Q53. Let a belongs to R and A be a matrix of order 3x3 such that det(A) = -4 and A + I = [[1, a, 1], [2, 1, 0], [a, 1, 2]], where I is the identity matrix of order 3x3. If det((a + 1)*adj((a - 1)*A)) is $2^m * 3^n$, m, n belongs to {0, 1, 2, ..., 20}, then m + n is equal to : 4 marks
(1) 14
(2) 15
(3) 16
(4) 17

Q54. Let y = y(x) be the solution curve of the differential equation $x(x^2 + e^x)\,dy + (e^x(x - 2)y - x^3)\,dx = 0$, $x > 0$, passing through the point (1, 0). Then y(2) is equal to 4 marks

(1) $4/(4 - e^2)$
(2) $2/(2 - e^2)$
(3) $4/(4 + e^2)$
(4) $2/(2 + e^2)$

Q55. If the area of the region bounded by the curves $y = 4 - x^2/4$ and $y = (x - 4)/2$ is equal to alpha, then 6 alpha equals 4 marks

(1) 210
(2) 220
(3) 240
(4) 250

Q56. Let the vertices Q and R of the triangle PQR lie on the line $(x + 3)/5 = (y - 1)/2 = (z + 4)/3$, QR = 5 and the coordinates of the point P be (0, 2, 3). If the area of the triangle PQR is m/n then : 4 marks

(1) 5*m - 21*sqrt(2)*n = 0
(2) 5*m - 2*sqrt(21)*n = 0
(3) m - 5*sqrt(21)*n = 0
(4) 2*m - 5*sqrt(21)*n = 0

Q57. Let z be a complex number such that |z| = 1. If $(2 + k^2 z)/(k + z_{bar}) = k z$, k belongs to R, then the maximum distance of $k + ik^2$ from the circle $|z - (1 + 2i)| = 1$ is : 4 marks

(1) sqrt(3) + 1
(2) 2
(3) sqrt(5) + 1
(4) 3

Q58. Let A be the set of all functions f: Z -> Z and R be a relation on A such that $R = \{(f, g) : f(0) = g(1) \text{ and } f(1) = g(0)\}$. Then R is : 4 marks

(1) Reflexive but neither symmetric nor transitive
(2) Symmetric but neither reflexive nor transitive
(3) Transitive but neither reflexive nor symmetric
(4) Symmetric and transitive but not reflexive

Q59. The value of integral from -1 to 1 of [(1 + sqrt(|x| - x)) e^x + (sqrt(|x| - x)) e^(-x)] / (e^x + e^(-x)) dx is equal to (1) 2 + 2 sqrt(2)/3 (2) 3 - 2 sqrt(2)/3 (3) 1 - 2 sqrt(2)/3 (4) 1 + 2 sqrt(2)/3 4 marks

Q60. Let f, g : (1, infinity) -> R be defined as f(x) = (2x + 3)/(5x + 2) and g(x) = (2 - 3x)/(1 - x). If the range of the function fog : [2, 4] -> R is [alpha, beta], then 1/(beta - alpha) is equal to (1) 2 (2) 29 (3) 56 (4) 68 4 marks

Q61. Let vector a = 4i - j + k, vector b = 11i - j + k and vector c be a vector such that (a + b) x c = c x (-2a + 3b). If (2a + 3b) . c = 1670, then $|c|^2$ is equal to : 4 marks

(1) 1609
(2) 1600
(3) 1618
(4) 1627

Q62. In an increasing geometric progression of positive terms, the sum of the second and sixth terms is 70/3 and the product of the third and fifth terms is 49. Then the sum of the 4th, 6th and 8th terms is equal to : 4 marks

(1) 78
(2) 84
(3) 91
(4) 96

Q63. Let $P_n = alpha^n + beta^n$, n belongs to N. If $P_{10} = 123$, $P_9 = 76$, $P_8 = 47$ and $P_1 = 1$, then the quadratic equation having roots 1/alpha and 1/beta is : 4 marks

(1) $x^2 - x + 1 = 0$
(2) $x^2 + x - 1 = 0$
(3) $x^2 - x - 1 = 0$
(4) $x^2 + x + 1 = 0$

Q64. $\lim_{x->0^+}$ [tan(5 (x)^(1/3)) $\log_e(1 + 3x^2)$] / [$(\tan^{-1}(3 \sqrt{x}))^2$ (e^(5 (x)^(4/3)) - 1)] is equal to 4 marks

(1) 1
(2) 1/3
(3) 5/3
(4) 1/15

Q65. Let y = y(x) be the solution of the differential equation $(1 + y^2)$ e^(tan x) dx + $\cos^2 x$ (1 + e^(2 tan x)) dy = 0, y(0) = 1. Then y(pi/4) is equal to 4 marks

(1) $1/e^2$
(2) 1/e
(3) 2/e
(4) $2/e^2$

Q66. If the function $f(x) = 2*x^3 - 9*a*x^2 + 12*a^2*x + 1$, where a > 0, attains its local maximum and local minimum values at p and q, respectively, such that $p^2 = q$, then f(3) is equal to : 4 marks

(1) 37
(2) 55
(3) 10
(4) 23

Q67. The term independent of x in the expansion of $((x + 1)/(x^{2/3} + 1 - x^{1/3}) - (x - 1)/(x - x^{1/2}))^{10}$, x > 1, is : 4 marks

(1) 150
(2) 210
(3) 120
(4) 240

Q68. Considering the principal values of the inverse trigonometric functions, $\sin^{-1}$((sqrt(3)/2) x + (1/2) sqrt(1 - x^2)), -1/2 < x < 1/sqrt(2), is equal to (1) pi/4 + $\sin^{-1}$ x (2) pi/6 + $\sin^{-1}$ x (3) 5pi/6 - $\sin^{-1}$ x (4) -5pi/6 - $\sin^{-1}$ x 4 marks

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Q69. If all the words with or without meaning made using all the letters of the word "NAGPUR" are arranged as in a dictionary, then the word at 315th position in this arrangement is : 4 marks

(1) NRAGPU
(2) NRAPGU
(3) NRAGUP
(4) NRAPUG

Q70. A company has two plants A and B to manufacture motorcycles. 60% motorcycles are manufactured at plant A and the remaining are manufactured at plant B. 80% of the motorcycles manufactured at plant A are rated of the standard quality, while 90% of the motorcycles manufactured at plant B are rated of the standard quality. A motorcycle picked up randomly from the total production is found to be of the standard quality. If p is the probability that it was manufactured at plant B, then 126p is 4 marks

(1) 56
(2) 64
(3) 66
(4) 54

Q71. Let m and n be the number of points at which the function f(x) = max{ x, x^3, x^5, ..., x^{21} }, x in R, is not differentiable and not continuous, respectively. Then m + n is equal to _____ 4 marks

Q72. Let A = [[alpha, -1], [6, beta]], alpha > 0, such that det(A) = 0 and alpha + beta = 1. If I denotes 2x2 identity matrix, then the matrix $(I + A)^8$ is : 4 marks

(1) [[4, -1], [6, -1]]
(2) [[257, -64], [514, -127]]
(3) [[766, -255], [1530, -509]]
(4) [[1025, -511], [2024, -1024]]

Q73. If the area of the region {(x, y): |4 - x^2| <= y <= x^2, y <= 4, x >= 0} is (80*sqrt(2)/alpha - beta), alpha, beta belongs to N, then alpha + beta is equal to _____. 4 marks

Q74. Let [.] denote the greatest integer function. If integral from 0 to e^3 of [$1/e^{x-1}$] dx = alpha - $\log_e(2)$, then $alpha^3$ is equal to _____. 4 marks

Q75. The number of relations on the set A = {1, 2, 3}, containing at most 6 elements including (1, 2), which are reflexive and transitive but not symmetric, is _____ 4 marks

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