JEE Main 2025 April 3 Shift 2 Question Paper

Time Allowed :3 Hours	Maximum Marks :300	Total Questions :75

General Instructions

Read the following instructions very carefully and strictly follow them:

1. Multiple choice questions (MCQs)
2. Questions with numerical values as answers.
3. There are three sections: **Mathematics, Physics, Chemistry**.
4. **Mathematics:** 25 (20+5) 10 Questions with answers as a numerical value. Out of 10 questions, 5 questions are compulsory.
5. **Physics:** 25 (20+5) 10 Questions with answers as a numerical value. Out of 10 questions, 5 questions are compulsory..
6. **Chemistry:** 25 (20+5) 10 Questions with answers as a numerical value. Out of 10 questions, 5 questions are compulsory.
7. Total: 75 Questions (25 questions each).
8. 300 Marks (100 marks for each section).
9. **MCQs:** Four marks will be awarded for each correct answer and there will be a negative marking of one mark on each wrong answer.
10. **Questions with numerical value answers:** Candidates will be given four marks for each correct answer and there will be a negative marking of 1 mark for each wrong answer.

Mathematics

Section - A

1. Let $f : R \to R$ be a function defined by $f(x) = ||x + 2| - 2|x||$. If m is the number of points of local maxima of f and n is the number of points of local minima of f, then m + n is

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

2. Each of the angles β and γ that a given line makes with the positive y- and z-axes, respectively, is half the angle that this line makes with the positive x-axis. Then the sum of all possible values of the angle β is

(1) $\frac{3\pi}{4}$
(2) π
(3) $\frac{\pi}{2}$
(4) $\frac{3\pi}{2}$

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3. If the four distinct points $(4, 6)$, $(-1, 5)$, $(0, 0)$ and $(k, 3k)$ lie on a circle of radius r, then $10k + r^2$ is equal to

(1) 32
(2) 33
(3) 34
(4) 35

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4. Let the Mean and Variance of five observations x_i, $i = 1, 2, 3, 4, 5$ be 5 and 10 respectively. If three observations are $x_1 = 1, x_2 = 3, x_3 = a$ and $x_4 = 7, x_5 = b$ with $a > b$, then the Variance of the observations $n + x_n$ for $n = 1, 2, 3, 4, 5$ is

(1) 17
(2) 16.4
(3) 17.4
(4) 16

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5. Consider the lines $x(3\lambda + 1) + y(7\lambda + 2) = 17\lambda + 5$. If P is the point through which all these lines pass and the distance of L from the point $Q(3, 6)$ is d, then the distance of L from the point $(3, 6)$ is d, then the value of d^2 is

(1) 20
(2) 30
(3) 10
(4) 15

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6. Let $A = \{-2, -1, 0, 1, 2, 3\}$. Let R be a relation on A defined by $(x, y) \in R$ if and only if $|x| \leq |y|$. Let m be the number of reflexive elements in R and n be the minimum number of elements required to be added in R to make it reflexive and symmetric relations, respectively. Then $l + m + n$ is equal to

(1) 13
(2) 12
(3) 11
(4) 14

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7. Let the equation $x(x+2)*(12-k)=2$ have equal roots. The distance of the point $\left(k, \frac{k}{2}\right)$ from the line $3x+4y+5=0$ is

(1) 15
(2) $5\sqrt{5}$
(3) $15\sqrt{5}$
(4) 12

---

8. Line L1 of slope 2 and line L2 of slope $\frac{1}{2}$ intersect at the origin O. In the first quadrant, $P_1, P_2, \ldots, P_{12}$ are 12 points on line L1 and $Q_1, Q_2, \ldots, Q_9$ are 9 points on line L2. Then the total number of triangles that can be formed having vertices at three of the 22 points O, $P_1, P_2, \ldots, P_{12}$, $Q_1, Q_2, \ldots, Q_9$, is:

(A) 1080
(B) 1134
(C) 1026
(D) 1188

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9. The integral $\int_0^{\pi} \frac{8x dx}{4\cos^2 x + \sin^2 x}$ is equal to

(A) $2\pi^2$
(B) $4\pi^2$
(C) π^2
(D) $\frac{3\pi^2}{2}$

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10. Let f be a function such that $f(x)+3f\left(\frac{24}{x}\right)=4x$, $x \neq 0$. Then $f(3)+f(8)$ is equal to

(A) 11
(B) 10
(C) 12
(D) 13

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11. The area of the region $\{(x, y) : |x - y| \leq y \leq 4\sqrt{x}\}$ is

(A) 512
(B) $\frac{1024}{3}$
(C) $\frac{512}{3}$
(D) $\frac{2048}{3}$

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12. If the domain of the function $f(x) = \log_7(1 - \log_4(x^2 - 9x + 18))$ is $(\alpha, \beta) \cup (\gamma, \delta)$, then $\alpha + \beta + \gamma + \delta$ is equal to

(A) 18
(B) 16
(C) 15
(D) 17

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13. If the probability that the random variable X takes the value x is given by $P(X = x) = k(x + 1)3^{-x}$, $x = 0, 1, 2, 3, \ldots$, where k is a constant, then $P(X \geq 3)$ is equal to

(A) $\frac{7}{27}$
(B) $\frac{4}{9}$
(C) $\frac{8}{27}$
(D) $\frac{1}{9}$

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14. Let $y = y(x)$ be the solution of the differential equation $\frac{dy}{dx} + 3(\tan^2 x)y + 3y = \sec^2 x$, with $y(0) = \frac{1}{3} + e^3$. Then $y\left(\frac{\pi}{4}\right)$ is equal to

(A) $\frac{2}{3}$
(B) $\frac{4}{3}$
(C) $\frac{4}{3} + e^3$
(D) $\frac{2}{3} + e^3$

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15. If $z_1, z_2, z_3 \in C$ are the vertices of an equilateral triangle, whose centroid is z_0, then $\sum_{k=1}^{3}(z_k - z_0)^2$ is equal to

(A) 0
(B) 2
(C) $3i$
(D) $-i$

16. The number of solutions of the equation $(4-\sqrt{3})\sin x - 2\sqrt{3}\cos^2 x = \frac{-4}{1+\sqrt{3}}$, $x \in \left[-2\pi, \frac{5\pi}{2}\right]$ is

(A) 4
(B) 3
(C) 6
(D) 5

---

17. Let C be the circle of minimum area enclosing the ellipse E: $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with eccentricity $\frac{1}{2}$ and foci $(\pm 2, 0)$. Let PQR be a variable triangle, whose vertex P is on the circle C and the side QR of length 29 is parallel to the major axis and contains the point of intersection of E with the negative y-axis. Then the maximum area of the triangle PQR is:

(A) $6(3+\sqrt{2})$
(B) $8(3+\sqrt{2})$
(C) $6(2+\sqrt{3})$
(D) $8(2+\sqrt{3})$

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18. The shortest distance between the curves $y^2 = 8x$ and $x^2 + y^2 + 12y + 35 = 0$ is:

(A) $2\sqrt{3} - 1$
(B) $\sqrt{2}$
(C) $3\sqrt{2} - 1$
(D) $2\sqrt{2} - 1$

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19. The distance of the point (7, 10, 11) from the line $\frac{x-4}{1} = \frac{y-4}{0} = \frac{z-2}{3}$ along the line $\frac{x-7}{2} = \frac{y-10}{3} = \frac{z-11}{6}$ is

(A) 18
(B) 14
(C) 12
(D) 16

---

20. The sum $1 + \frac{1+3}{2!} + \frac{1+3+5}{3!} + \frac{1+3+5+7}{4!} + \ldots$ upto ∞ terms, is equal to

(A) $6e$

(B) $4e$
(C) $3e$
(D) $2e$

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21. Let I be the identity matrix of order 3×3 and for the matrix $A = \begin{pmatrix} \lambda & 2 & 3 \\ 4 & 5 & 6 \\ 7 & -1 & 2 \end{pmatrix}$, $|A| = -1$. Let B be the inverse of the matrix $\text{adj}(A \cdot \text{adj}(A^2))$. Then $|(\lambda B + I)|$ is equal to

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22. Let $(1 + x + x^2)^{10} = a_0 + a_1 x + a_2 x^2 + \cdots + a_{20} x^{20}$. If $(a_1 + a_3 + a_5 + \cdots + a_{19}) - 11a_2 = 121k$, then k is equal to

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23. If $\lim_{x \to 0} \left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}} = p$, then $96 \log_e p$ is equal to

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24. Let $\vec{a} = \hat{i} + 2\hat{j} + \hat{k}$, $\vec{b} = 3\hat{i} - 3\hat{j} + 3\hat{k}$, $\vec{c} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{d}$ be a vector such that $\vec{b} \times \vec{d} = \vec{c} \times \vec{d}$ and $\vec{a} \cdot \vec{d} = 4$. Then $|\vec{a} \times \vec{d}|^2$ is equal to

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25. If the equation of the hyperbola with foci $(4, 2)$ and $(8, 2)$ is $3x^2 - y^2 - \alpha x + \beta y + \gamma = 0$, then $\alpha + \beta + \gamma$ is equal to

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26. A magnetic dipole experiences a torque of $80\sqrt{3}$ N m when placed in a uniform magnetic field in such a way that the dipole moment makes an angle of 60° with the magnetic field. The potential energy of the dipole is:

(A) 80 J
(B) $-40\sqrt{3}$ J
(C) -60 J
(D) -80 J

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27. In a resonance experiment, two air columns (closed at one end) of 100 cm and 120 cm long, give 15 beats per second when each one is sounding in the respective fundamental modes. The velocity of sound in the air column is :

(A) 335 m/s
(B) 370 m/s
(C) 340 m/s
(D) 360 m/s

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28. Two cylindrical vessels of equal cross-sectional area of $2\,m^2$ contain water up to heights 10 m and 6 m, respectively. If the vessels are connected at their bottom, then the work done by the force of gravity is: (Density of water is $10^3\,kg/m^3$ and $g = 10\,m/s^2$)

(A) 1×10^5 J
(B) 4×10^4 J
(C) 6×10^4 J
(D) 8×10^4 J

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29. Width of one of the two slits in a Young's double slit interference experiment is half of the other slit. The ratio of the maximum to the minimum intensity in the interference pattern is :

(A) $(2\sqrt{2}+1) : (2\sqrt{2}-1)$
(B) $(3+2\sqrt{2}) : (3-2\sqrt{2})$
(C) 9 : 1
(D) 3 : 1

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30. An ideal gas exists in a state with pressure P_0, volume V_0. It is isothermally expanded to 4 times of its initial volume (V_0), then isobarically compressed to its original volume. Finally the system is heated isochorically to bring it to its initial state. The amount of heat exchanged in this process is :

(A) $P_0V_0(2\ln 2 - 0.75)$
(B) $P_0V_0(\ln 2 - 0.75)$
(C) $P_0V_0(\ln 2 - 0.25)$
(D) $P_0V_0(2\ln 2 - 0.25)$

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31. Two monochromatic light beams have intensities in the ratio 1:9. An interference pattern is obtained by these beams. The ratio of the intensities of maximum to minimum is

(A) 8 : 1
(B) 9 : 1
(C) 3 : 1
(D) 4 : 1

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32. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R. Assertion A : The Bohr model is applicable to hydrogen and hydrogen-like atoms only. Reason R : The formulation of Bohr model does not include repulsive force between electrons. In the light of the above statements, choose the correct answer from the options given below :

(1) Both A and R are true but R is NOT the correct explanation of A.
(2) A is false but R is true.
(3) Both A and R are true and R is the correct explanation of A.
(4) A is true but R is false.

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33. Using a battery, a 100 pF capacitor is charged to 60 V and then the battery is removed. After that, a second uncharged capacitor is connected to the first capacitor in parallel. If the final voltage across the second capacitor is 20 V, its capacitance is : (in pF)

(1) 600
(2) 200
(3) 400
(4) 100

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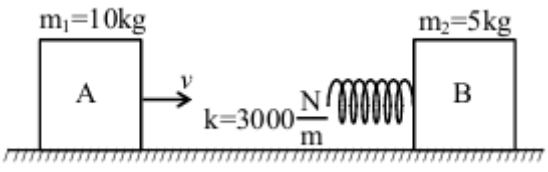
34. A monochromatic light of frequency 5×10^{14} Hz travelling through air, is incident on a medium of refractive index '2'. Wavelength of the refracted light will be :

(1) 300 nm
(2) 600 nm
(3) 400 nm
(4) 500 nm

35.



Consider two blocks A and B of masses $m_1 = 10$ kg and $m_2 = 5$ kg that are placed on a frictionless table. The block A moves with a constant speed $v = 3$ m/s towards the block B kept at rest. A spring with spring constant $k = 3000$ N/m is attached with the block B as shown in the figure. After the collision, suppose that the blocks A and B, along with the spring in constant compression state, move together, then the compression in the spring is, (Neglect the mass of the spring)

(1) 0.2 m
(2) 0.4 m
(3) 0.1 m
(4) 0.3 m

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36. A particle is projected with velocity u so that its horizontal range is three times the maximum height attained by it. The horizontal range of the projectile is given as $\frac{nu^2}{25g}$, where value of n is : (Given 'g' is the acceleration due to gravity).

(1) 6
(2) 18
(3) 12
(4) 24

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37. A solid steel ball of diameter 3.6 mm acquired terminal velocity 2.45×10^{-2} m/s while falling under gravity through an oil of density 925 kg m^{-3}. Take density of steel as 7825 kg m^{-3} and g as 9.8 m/s^2. The viscosity of the oil in SI unit is

(1) 2.18
(2) 2.38
(3) 1.68
(4) 1.99

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38. The truth table corresponding to the circuit given below is

(1)

A	B	C
0	0	0
1	0	0
0	1	0
1	1	1

(2)

A	B	C
0	0	0
0	1	0
1	0	1
1	1	1

(3)

A	B	C
0	0	1
1	0	0
0	1	0
1	1	0

(4)

A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

---

39. A particle moves along the x-axis and has its displacement x varying with time t according to the equation $x = c_0(t^2 - 2) + c(t - 2)^2$ where c_0 and c are constants of appropriate dimensions. Then, which of the following statements is correct?

(1) the acceleration of the particle is $2c_0$
(2) the acceleration of the particle is $2c$
(3) the initial velocity of the particle is $4c$
(4) the acceleration of the particle is $2(c + c_0)$

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40. An electric bulb rated as 100 W-220 V is connected to an ac source of rms voltage 220 V. The peak value of current through the bulb is :

(1) 0.64 A
(2) 0.45 A
(3) 2.2 A
(4) 0.32 A

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41. Match the LIST-I with LIST-II

LIST-I		LIST-II	
A.	Boltzmann constant	I.	ML^2T^{-1}
B.	Coefficient of viscosity	II.	$MLT^{-3}K^{-1}$
C.	Planck's constant	III.	$ML^2T^{-2}K^{-1}$
D.	Thermal conductivity	IV.	$ML^{-1}T^{-1}$

Choose the correct answer from the options given below :

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

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42. Pressure of an ideal gas, contained in a closed vessel, is increased by 0.4

(1) 25°C
(2) 2500 K
(3) 250 K
(4) 250°C

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43. A motor operating on 100 V draws a current of 1 A. If the efficiency of the motor is 91.6

(1) 4
(2) 8.4
(3) 2
(4) 6.2

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44. A block of mass 1 kg, moving along x with speed $v_i = 10$ m/s enters a rough region ranging from $x = 0.1$ m to $x = 1.9$ m. The retarding force acting on the block in this range is $F_r = -kx$ N, with $k = 10$ N/m. Then the final speed of the block as it crosses this rough region is

(1) 10 m/s
(2) 4 m/s
(3) 6 m/s
(4) 8 m/s

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45. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R. Assertion A : If oxygen ion (O^{-2}) and Hydrogen ion (H^{+}) enter normal to the magnetic field with equal momentum, then the path of O^{-2} ion has a smaller curvature than that of H^{+}. Reason R : A proton with same linear momentum as an electron will form a path of smaller radius of curvature on entering a uniform magnetic field perpendicularly. In the light of the above statements, choose the correct answer from the options given below

(1) A is true but R is false
(2) Both A and R are true but R is NOT the correct explanation of A
(3) A is false but R is true
(4) Both A and R are true and R is the correct explanation of A

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46. Light from a point source in air falls on a spherical glass surface (refractive index, $\mu = 1.5$ and radius of curvature $R = 50$ cm). The image is formed at a distance of 200 cm from the glass surface inside the glass. The magnitude of distance of the light source from the glass surface is _____ m.

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47. The excess pressure inside a soap bubble A in air is half the excess pressure inside another soap bubble B in air. If the volume of the bubble A is n times the volume of the bubble B, then, the value of n is _____ .

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48. Two cells of emf 1V and 2V and internal resistance 2 Ω and 1 Ω, respectively, are connected in series with an external resistance of 6 Ω. The total current in the circuit is I_1. Now the same two cells in parallel configuration are connected to the same external resistance. In this case, the total current drawn is I_2. The value of $\left(\frac{I_1}{I_2}\right)$ is $\frac{x}{3}$. The value of x is _____ .

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49. An electron in the hydrogen atom initially in the fourth excited state makes a transition to n^{th} energy state by emitting a photon of energy 2.86 eV. The integer value of n will be _____ .

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50. A physical quantity C is related to four other quantities p, q, r and s as follows

$$C = \frac{pq^2}{r^3\sqrt{s}}$$

The percentage errors in the measurement of p, q, r and s are 1

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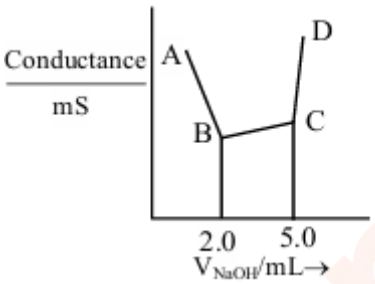
51. 40 mL of a mixture of CH_3COOH and HCl (aqueous solution) is titrated against 0.1 M NaOH solution conductometrically. Which of the following statement is correct?



(1) The concentration of CH_3COOH in the original mixture is 0.005 M
(2) The concentration of HCl in the original mixture is 0.005 M
(3) CH_3COOH is neutralised first followed by neutralisation of HCl
(4) Point 'C' indicates the complete neutralisation HCl

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52. 10 mL of 2 M NaOH solution is added to 20 mL of 1 M HCl solution kept in a beaker. Now, 10 mL of this mixture is poured into a volumetric flask of 100 mL containing 2 moles of HCl and made the volume upto the mark with distilled water. The solution in this flask is :

(1) 0.2 M NaCl solution
(2) 20 M HCl solution
(3) 10 M HCl solution
(4) Neutral solution

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53. Fat soluble vitamins are : A. Vitamin B_1 B. Vitamin C C. Vitamin E D. Vitamin B_{12} E. Vitamin K
Choose the correct answer from the options given below :

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

54. Match the LIST-I with LIST-II.

LIST-I		LIST-II	
A.	Pnicogen (group 15)	I.	Ts
B.	Chalcogen (group 16)	II.	Og
C.	Halogen (group 17)	III.	Lv
D.	Noble gas (group 18)	IV.	Mc

Choose the correct answer from the options given below :

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

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55. For electron in '2s' and '2p' orbitals, the orbital angular momentum values, respectively are :

(1) $\sqrt{2}\frac{h}{2\pi}$ and 0
(2) $\frac{h}{2\pi}$ and $\sqrt{2}\frac{h}{2\pi}$
(3) 0 and $\sqrt{6}\frac{h}{2\pi}$
(4) 0 and $\sqrt{2}\frac{h}{2\pi}$

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56. Compounds that should not be used as primary standards in titrimetric analysis are : A. $Na_2Cr_2O_7$ B. Oxalic acid C. NaOH D. $FeSO_4.6H_2O$ E. Sodium tetraborate
Choose the most appropriate answer from the options given below :

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

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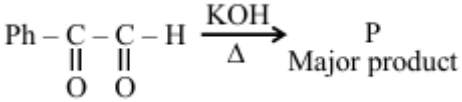
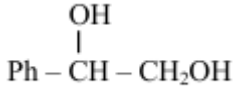
57. The major product (P) in the following reaction is :





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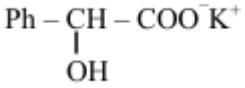
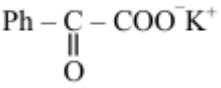
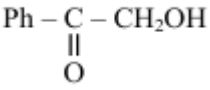
(2) 

(3) 

(4) 

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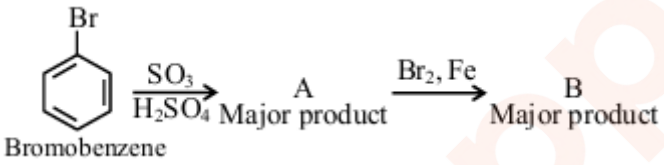
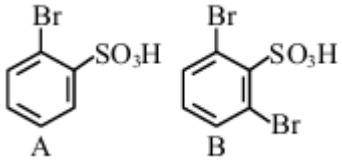
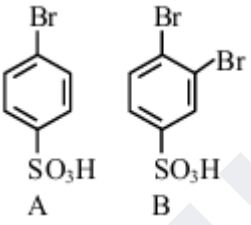
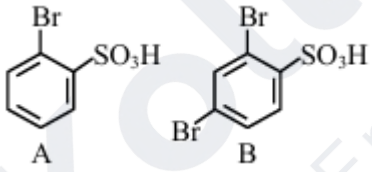
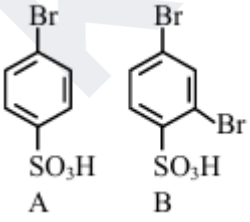
58. In the following series of reactions identify the major products A and B respectively.



(1) 

(2) 

(3) 

(4) 

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59. The standard cell potential (E°_{cell}) of a fuel cell based on the oxidation of methanol in air that has been used to power a television relay station is measured as 1.21 V. The standard half cell reduction potential for O_2/H_2O ($E^{\circ}_{O_2/H_2O}$) is 1.229 V. Choose the correct statement:

(1) The standard half cell reduction potential for the reduction of CO_2 ($E^{\circ}_{CO_2/CH_3OH}$) is 19 mV
(2) Oxygen is formed at the anode.
(3) Reactants are fed at one go to each electrode.
(4) Reduction of methanol takes place at the cathode.

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60. Identify the diamagnetic octahedral complex ions from below ; A. $[Mn(CN)_6]^{3-}$ B. $[Co(NH_3)_6]^{3+}$ C. $[Fe(CN)_6]^{4-}$ D. $[Co(H_2O)_3F_3]$
Choose the correct answer from the options given below :

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

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61. In Dumas' method for estimation of nitrogen 0.4 g of an organic compound gave 60 mL of nitrogen collected at 300 K temperature and 715 mm Hg pressure. The percentage composition of nitrogen in the compound is (Given : Aqueous tension at 300 K = 15 mm Hg)

(1) 15.71
(2) 20.95
(3) 17.46
(4) 7.85

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62. Mass of magnesium required to produce 220 mL of hydrogen gas at STP on reaction with excess of dil. HCl is Given : Molar mass of Mg is 24 g mol^{-1}.

(1) 235.7 g
(2) 0.24 mg
(3) 236 mg
(4) 2.444 g

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63. Given below are two statements : Statement I : Wet cotton clothes made of cellulose based carbohydrate takes comparatively longer time to get dried than wet nylon polymer based clothes. Statement II : Intermolecular hydrogen bonding with water molecule is more in nylon-based clothes than in the case of cotton clothes. In the light of the above statements, choose the Correct answer from the options given below (1) Statement I is false but Statement II is true (2) Statement I is true but Statement II is false (3) Both Statement I and Statement II are true (4) Both Statement I and Statement II are false

64. Given below are two statements : Statement I : CrO_3 is a stronger oxidizing agent than MoO_3 Statement II : Cr(VI) is more stable than Mo(VI) In the light of the above statements, choose the correct answer from the options given below (1) Statement I is false but Statement II is true (2) Statement I is true but Statement II is false (3) Both Statement I and Statement II are true (4) Both Statement I and Statement II are false

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65. Given below are two statements : Statement I : Hyperconjugation is not a permanent effect. Statement II : In general, greater the number of alkyl groups attached to a positively charged C-atom, greater is the hyperconjugation interaction and stabilization of the cation. In the light of the above statements, choose the correct answer from the options given below (1) Statement I is true but Statement II is false (2) Both Statement I and Statement II are false (3) Statement I is false but Statement II is true (4) Both Statement I and Statement II are true

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66. Given below are two statements : Statement I : When a system containing ice in equilibrium with water (liquid) is heated, heat is absorbed by the system and there is no change in the temperature of the system until whole ice gets melted. Statement II : At melting point of ice, there is absorption of heat in order to overcome intermolecular forces of attraction within the molecules of water in ice and kinetic energy of molecules is not increased at melting point. In the light of the above statements, choose the correct answer from the options given below: (1) Statement I is true but Statement II is false (2) Statement I is false but Statement II is true (3) Both Statement I and Statement II are true (4) Both Statement I and Statement II are false

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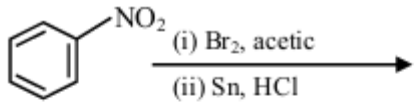
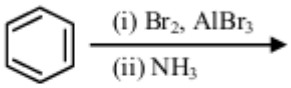
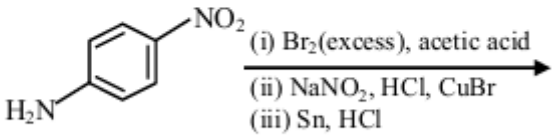
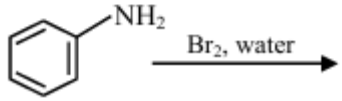
67. The sequence from the following that would result in giving predominantly 3, 4, 5 -Tribromoaniline is :

(1) 

(2) 

(3) 

(4) 

(1) Nitrobenzene $\xrightarrow{\text{(i) } Br_2,\text{acetic acid}}$ $\xrightarrow{\text{(ii) Sn, HCl}}$

(2) Bromobenzene $\xrightarrow{\text{(i) } Br_2,AlBr_3}$ $\xrightarrow{\text{(ii) } NH_3}$

(3) p-Nitroaniline $\xrightarrow{\text{(i) } Br_2\text{(excess),acetic acid}}$ $\xrightarrow{\text{(ii) } NaNO_2,HCl,CuBr}$ $\xrightarrow{\text{(iii) Sn, HCl}}$

(4) Aniline $\xrightarrow{Br_2,\text{water}}$

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68. The correct orders among the following are:

A. Atomic radius : B ¡ Al ¡ Ga ¡ In ¡ Tl

B. Electronegativity : Al ¡ Ga ¡ In ¡ Tl ¡ B

C. Density : Tl ¡ In ¡ Ga ¡ Al ¡ B

D. 1st Ionisation Energy : In ¡ Al ¡ Ga ¡ Tl ¡ B

Choose the correct answer from the options given below :

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

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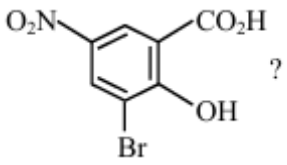
69. What is the correct IUPAC name of



?

(1) 3-Bromo-2-hydroxy-5-nitrobenzoic acid
(2) 3-Bromo-4-hydroxy-1-nitrobenzoic acid
(3) 2-Hydroxy-3-bromo-5-nitrobenzoic acid
(4) 5-Nitro-3-bromo-2-hydroxybenzoic acid

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70. Consider the following statements related to temperature dependence of rate constants. Identify the correct statements, A. The Arrhenius equation holds true only for an elementary homogeneous reaction. B. The unit of A is same as that of k in Arrhenius equation. C. At a given temperature, a low activation energy means a fast reaction. D. A and Ea as used in Arrhenius equation depend on temperature. E. When Ea ¿¿ RT. A and Ea become interdependent. Choose the correct answer from the options given below :

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

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71. X g of nitrobenzene on nitration gave 4.2 g of m-dinitrobenzene. X = _____ g. (nearest integer) [Given : molar mass (in g mol^{-1}) C : 12, H : 1, O : 16, N : 14]

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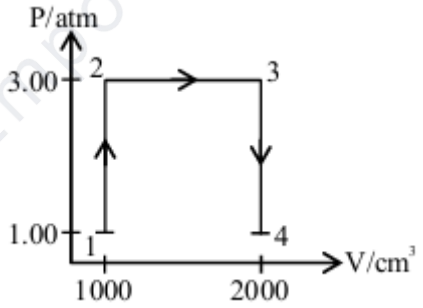
72. A perfect gas (0.1 mol) having $\bar{C}_V = 1.50$ R (independent of temperature) undergoes the above transformation from point 1 to point 4. If each step is reversible, the total work done (w) while going from point 1 to point 4 is (_____) J (nearest integer) [Given : R = 0.082 L atm K^{-1}]



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73. A sample of n-octane (1.14 g) was completely burnt in excess of oxygen in a bomb calorimeter, whose heat capacity is 5 kJ K^{-1}. As a result of combustion, the temperature of the calorimeter increased by 5 K. The magnitude of the heat of combustion at constant volume is _____ kJ mol^{-1} (nearest integer).

74. Among, Sc, Mn, Co and Cu, identify the element with highest enthalpy of atomisation. The spin only magnetic moment value of that element in its +2 oxidation state is _____ BM (in nearest integer).

75. The total number of structural isomers possible for the substituted benzene derivatives with the molecular formula C_7H_{12} is _____ .