JEE Main 2025 April 3 Shift 1 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 A be a matrix of order 3×3 and $|A| = 5$. If

$$|2\,\mathrm{adj}(3A\,\mathrm{adj}(2A))| = 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma}, \quad \alpha, \beta, \gamma \in N$$

then $\alpha + \beta + \gamma$ is equal to

(1) 25
(2) 26
(3) 27
(4) 28

2. Let a line passing through the point $(4, 1, 0)$ intersect the line $L_1 : \frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ at the point $A(\alpha, \beta, \gamma)$ and the line $L_2 : x - 6 = y = -z + 4$ at the point $B(a, b, c)$. Then

$$\begin{vmatrix} 1 & 0 & 1 \\ \alpha & \beta & \gamma \\ a & b & c \end{vmatrix}$$ **is equal to**

(1) 8
(2) 16
(3) 12
(4) 6

---

3. Let α and β be the roots of $x^2 + \sqrt{3}x - 16 = 0$, and γ and δ be the roots of $x^2 + 3x - 1 = 0$. If $P_n = \alpha^n + \beta^n$ and $Q_n = \gamma^n + \delta^n$, then

$$\frac{P_{25} + \sqrt{3}P_{24}}{2P_{23}} + \frac{Q_{25} - Q_{23}}{Q_{24}}$$ **is equal to**

(1) 3
(2) 4
(3) 5
(4) 7

---

4. The sum of all rational terms in the expansion of $\left(2 + \sqrt{3}\right)^8$ is

(1) 16923
(2) 3763
(3) 33845
(4) 18817

---

5. Let A = {-3,-2,-1,0,1,2,3}. Let R be a relation on A defined by xRy if and only if $0 \leq x^2 + 2y \leq 4$. Let l be the number of elements in R and m be the minimum number of elements required to be added in R to make it a reflexive relation. then $l + m$ is equal to

(1) 19
(2) 20
(3) 17
(4) 18

6. A line passing through the point $\mathbf{P}(\sqrt{5}, \sqrt{5})$ intersects the ellipse $\frac{x^2}{36} + \frac{y^2}{25} = 1$ at A and B such that (PA).(PB) is maximum. Then $5(\mathbf{PA}^2 + \mathbf{PB}^2)$ is equal to :

(1) 218
(2) 377
(3) 290
(4) 338

---

7. The sum 1 + 3 + 11 + 25 + 45 + 71 + ... upto 20 terms, is equal to

(1) 7240
(2) 7130
(3) 6982
(4) 8124

---

8. If the domain of the function $f(x) = \log_e\left(\frac{2x-3}{5+4x}\right) + \sin^{-1}\left(\frac{4+3x}{2-x}\right)$ is $[\alpha, \beta]$, then $\alpha^2 + 4\beta$ is equal to

(1) 5
(2) 4
(3) 3
(4) 7

---

9. If $\sum_{r=1}^{9}\left(\frac{r+3}{2^r}\right) \cdot {}^9C_r = \alpha\left(\frac{3}{2}\right)^9 - \beta$, $\alpha, \beta \in N$, then $(\alpha+\beta)^2$ is equal to

(1) 27
(2) 9
(3) 81
(4) 18

---

10. The number of solutions of the equation $2x + 3\tan x = \pi$, $x \in [-2\pi, 2\pi] - \left\{\pm\frac{\pi}{2}, \pm\frac{3\pi}{2}\right\}$ is

(1) 6
(2) 5
(3) 4
(4) 3

11. If $y(x) = \begin{vmatrix} \sin x & \cos x & \sin x + \cos x + 1 \\ 27 & 28 & 27 \\ 1 & 1 & 1 \end{vmatrix}$, $x \in R$, **then** $\frac{d^2y}{dx^2} + y$ **is equal to**

(1) -1
(2) 28
(3) 27
(4) 1

---

12. Let g be a differentiable function such that $\int_0^x g(t)dt = x - \int_0^x tg(t)dt$, $x \geq 0$ **and let** $y = y(x)$ **satisfy the differential equation** $\frac{dy}{dx} - y\tan x = 2(x+1)\sec x g(x)$, $x \in \left[0, \frac{\pi}{2}\right)$. **If** $y(0) = 0$, **then** $y\left(\frac{\pi}{3}\right)$ **is equal to**

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

---

13. A line passes through the origin and makes equal angles with the positive coordinate axes. It intersects the lines $L_1 : 2x + y + 6 = 0$ **and** $L_2 : 4x + 2y - p = 0$, $p > 0$, **at the points A and B, respectively. If** $AB = \frac{9}{\sqrt{2}}$ **and the foot of the perpendicular from the point A on the line** L_2 **is M, then** $\frac{AM}{BM}$ **is equal to**

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

---

14. Let $z \in C$ **be such that** $\frac{z+3i}{z-2+i} = 2 + 3i$. **Then the sum of all possible values of** z **is**

(1) $19 - 2i$
(2) $-19 - 2i$
(3) $19 + 2i$
(4) $-19 + 2i$

---

15. Let $f(x) = \int x^3\sqrt{3 - x^2}dx$. **If** $5f(\sqrt{2}) = -4$, **then** $f(1)$ **is equal to**

(1) $-\frac{2\sqrt{2}}{5}$
(2) $-\frac{8\sqrt{2}}{5}$
(3) $-\frac{4\sqrt{2}}{5}$
(4) $-\frac{6\sqrt{2}}{5}$

---

16. Let $a_1, a_2, a_3, ...$ be a G.P. of increasing positive numbers. If $a_3 a_5 = 729$ and $a_2 + a_4 = \frac{111}{4}$, then $24(a_1 + a_2 + a_3)$ is equal to

(1) 131
(2) 130
(3) 129
(4) 128

---

17. Let the domain of the function $f(x) = \log_2 \log_4 \log_6(3 + 4x - x^2)$ be (a, b). If $\int_0^{a+b} [x^2] dx = p - q\sqrt{r}$, $p, q, r \in N$, gcd(p, q, r) = 1, where [.] is the greatest integer function, then p + q + r is equal to

(1) 10
(2) 8
(3) 11
(4) 9

---

18. The radius of the smallest circle which touches the parabolas $y = x^2 + 2$ and $x = y^2 + 2$ is

(1) $\frac{7\sqrt{2}}{2}$
(2) $\frac{7\sqrt{2}}{16}$
(3) $\frac{7\sqrt{2}}{4}$
(4) $\frac{7\sqrt{2}}{8}$

---

19. Let $f(x) = \begin{cases} (1+ax)^{1/x} & , x < 0 \\ 1 + b & , x = 0 \\ \frac{(x+4)^{1/2} - 2}{(x+c)^{1/3} - 2} & , x > 0 \end{cases}$ be continuous at x = 0. Then $e^a bc$ is equal to

(1) 64
(2) 72

(3) 48
(4) 36

---

20. Line L_1 passes through the point (1, 2, 3) and is parallel to z-axis. Line L_2 passes through the point $(\lambda, 5, 6)$ and is parallel to y-axis. Let for $\lambda = \lambda_1, \lambda_2, \lambda_2 < \lambda_1$, the shortest distance between the two lines be 3. Then the square of the distance of the point $(\lambda_1, \lambda_2, 7)$ from the line L_1 is

(1) 40
(2) 32
(3) 25
(4) 37

---

21. All five letter words are made using all the letters A, B, C, D, E and arranged as in an English dictionary with serial numbers. Let the word at serial number n be denoted by W_n. Let the probability $P(W_n)$ of choosing the word W_n satisfy $P(W_n) = 2P(W_{n-1})$, $n > 1$. If $P(CDBEA) = \frac{2^\alpha}{2^\beta - 1}$, $\alpha, \beta \in N$, then $\alpha + \beta$ is equal to :

---

22. Let the product of the focal distances of the point P(4, $2\sqrt{3}$) on the hyperbola H: $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be 32. Let the length of the conjugate axis of H be p and the length of its latus rectum be q. Then $p^2 + q^2$ is equal to .....

---

23. Let $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 3\hat{i} + 2\hat{j} - \hat{k}$, $\vec{c} = \lambda\hat{j} + \mu\hat{k}$ and $\hat{d}$ be a unit vector such that $\vec{a} \times \hat{d} = \vec{b} \times \hat{d}$ and $\vec{c} \cdot \hat{d} = 1$. If $\vec{c}$ is perpendicular to $\vec{a}$, then $|3\lambda\hat{d} + \mu\vec{c}|^2$ is equal to ____.

---

24. If the number of seven-digit numbers, such that the sum of their digits is even, is $m \cdot n \cdot 10^a$; $m, n \in \{1, 2, 3, ..., 9\}$, then $m + n$ is equal to

---

25. The area of the region bounded by the curve $y = \max\{|x|, |x - 2|\}$, then x-axis and the lines x = -2 and x = 4 is equal to ____.

---

26. During the melting of a slab of ice at 273 K at atmospheric pressure:

(1) Internal energy of ice-water system remains unchanged.
(2) Positive work is done by the ice-water system on the atmosphere.
(3) Internal energy of the ice-water system decreases.
(4) Positive work is done on the ice-water system by the atmosphere.

---

27. Consider a completely full cylindrical water tank of height 1.6 m and cross-sectional area 0.5 m^2. It has a small hole in its side at a height 90 cm from the bottom. Assume, the cross-sectional area of the hole to be negligibly small as compared to that of the water tank. If a load 50 kg is applied at the top surface of the water in the tank then the velocity of the water coming out at the instant when the hole is opened is : (g = 10 m/s^2)

(1) 3 m/s
(2) 5 m/s
(3) 2 m/s
(4) 4 m/s

---

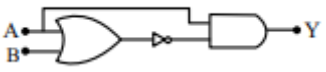
28. Choose the correct logic circuit for the given truth table having inputs A and B.

Inputs		Output
A	B	Y
0	0	0
0	1	0
1	0	1
1	1	1

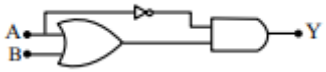
(1)

(2)

(3)



(4)



---

29. The radiation pressure exerted by a 450 W light source on a perfectly reflecting surface placed at 2m away from it, is :

(1) 1.5 $\times 10^{-4}$ Pascals
(2) 0
(3) 6 $\times 10^{-5}$ Pascals
(4) 3 $\times 10^{-5}$ Pascals

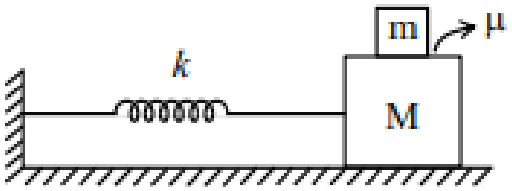
---

30. A wire of length 25 m and cross-sectional area 5 mm^2 having resistivity $2 \times 10^{-6}\,\Omega \cdot$ m is bent into a complete circle. The resistance between diametrically opposite points will be:

(1) 12.5 Ω
(2) 50 Ω
(3) 100 Ω
(4) 25 Ω

---

31. Two blocks of masses m and M, (M ¿ m), are placed on a frictionless table as shown in figure. A massless spring with spring constant k is attached with the lower block. If the system is slightly displaced and released then (μ = coefficient of friction between the two blocks)



(A) The time period of small oscillation of the two blocks is T = $2\pi\sqrt{\frac{M+m}{k}}$
(B) The acceleration of the blocks is a = $\frac{kx}{M+m}$ (x = displacement of the blocks from the mean position)
(C) The magnitude of the frictional force on the upper block is $\frac{m\mu x}{M+m}$
(D) The maximum amplitude of the upper block, if it does not slip, is $\frac{\mu(M+m)g}{k}$
(E) Maximum frictional force can be $\mu(M+m)g$.

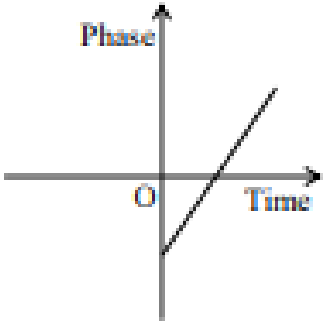
Choose the **correct** answer from the options given below :

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

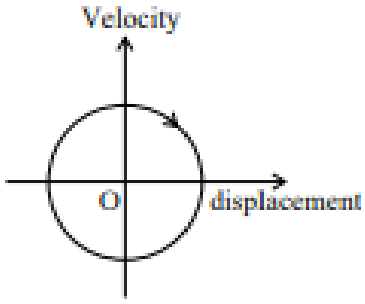
---

32. Which of the following curves possibly represent one-dimensional motion of a particle?

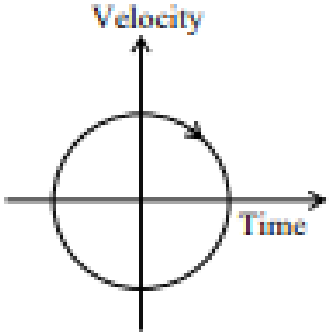
(A)



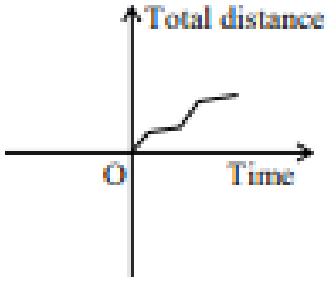
(B)



(C)



(D)



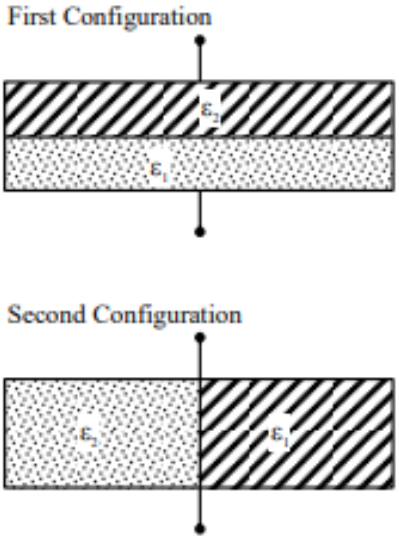
Choose the **correct** answer from the options given below :

(1) A, B and D only

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

---

33. A parallel plate capacitor is filled equally (half) with two dielectrics of dielectric constant ϵ_1 and ϵ_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 $\frac{C_1}{C_2}$ is:



(1) $\frac{\epsilon_1\epsilon_2}{(\epsilon_1+\epsilon_2)^2}$
(2) $\frac{4\epsilon_1\epsilon_2}{(\epsilon_1+\epsilon_2)^2}$
(3) $\frac{\epsilon_1\epsilon_2}{\epsilon_1+\epsilon_2}$
(4) $\frac{\epsilon_0(\epsilon_1+\epsilon_2)}{2}$

---

34. Match the LIST-I with LIST-II

LIST-I	LIST-II
A. Gravitational constant	I. $[LT^{-2}]$
B. Gravitational potential energy	II. $[L^2T^{-2}]$
C. Gravitational potential	III. $[ML^2T^{-2}]$
D. Acceleration due to gravity	IV. $[M^{-1}L^3T^{-2}]$

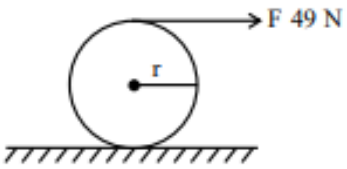
Choose the **correct** answer from the options given below :

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

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

---

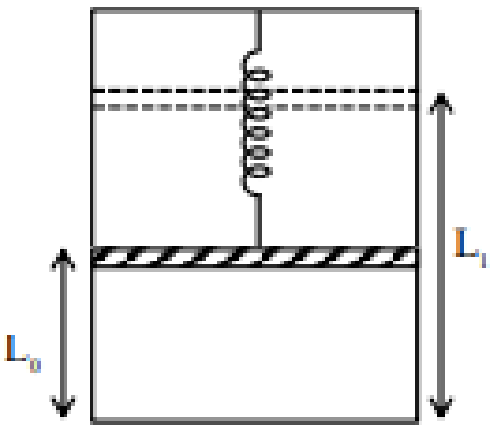
35. A force of 49 N acts tangentially at the highest point of a sphere (solid) of mass 20 kg, kept on a rough horizontal plane. If the sphere rolls without slipping, then the acceleration of the center of the sphere is



(1) 3.5 m/s^2
(2) 0.35 m/s^2
(3) 2.5 m/s^2
(4) 0.25 m/s^2

---

36. A piston of mass M is hung from a massless spring whose restoring force law goes as F = -kx, where k is the spring constant of appropriate dimension. The piston separates the vertical chamber into two parts, where the bottom part is filled with 'n' moles of an ideal gas. An external work is done on the gas isothermally (at a constant temperature T) with the help of a heating filament (with negligible volume) mounted in lower part of the chamber, so that the piston goes up from a height L_0 to L_1, the total energy delivered by the filament is (Assume spring to be in its natural length before heating)



(1) $3nRT\ln\left(\frac{L_1}{L_0}\right) + 2Mg(L_1 - L_0) + \frac{k}{3}(L_1^3 - L_0^3)$
(2) $nRT\ln\left(\frac{L_1}{L_0}\right) + \frac{Mg}{2}(L_1 - L_0) + \frac{k}{4}(L_1^4 - L_0^4)$

(3) $nRT\ln\left(\frac{L_1}{L_0}\right) + Mg(L_1 - L_0) + \frac{k}{4}(L_1^4 - L_0^4)$

(4) $nRT\ln\left(\frac{L_1}{L_0}\right) + Mg(L_1 - L_0) + \frac{3k}{4}(L_1^4 - L_0^4)$

---

37. A gas is kept in a container having walls which are thermally non-conducting. Initially the gas has a volume of 800 cm^3 and temperature 27°C. The change in temperature when the gas is adiabatically compressed to 200 cm^3 is: (Take γ = 1.5 : γ is the ratio of specific heats at constant pressure and at constant volume)

(1) 327 K
(2) 600 K
(3) 522 K
(4) 300 K

---

38. Match the LIST-I with LIST-II

LIST-I	LIST-II
A. ${}^{236}_{92}U \rightarrow {}^{94}_{38}Sr + {}^{140}_{54}Xe + 2n$	I. Chemical Reaction
B. $2H_2 + O_2 \rightarrow 2H_2O$	II. Fusion with +ve Q value
C. ${}^{3}_{1}H + {}^{2}_{1}H \rightarrow {}^{4}_{2}He + n$	III. Fission
D. ${}^{1}_{1}H + {}^{3}_{1}H \rightarrow {}^{4}_{2}H + \gamma$	IV. Fusion with -ve Q value

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

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

---

39. The electrostatic potential on the surface of uniformly charged spherical shell of radius R = 10 cm is 120 V. The potential at the centre of shell, at a distance r = 5 cm from centre, and at a distance r = 15 cm from the centre of the shell respectively, are:

(1) 120V, 120V, 80V
(2) 40V, 40V, 80V
(3) 0V, 0V, 80V
(4) 0V, 120V, 40V

---

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

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

---

41. A particle is released from height S above the surface of the earth. At certain height its kinetic energy is three times its potential energy. The height from the surface of the earth and the speed of the particle at that instant are respectively.

(1) $\frac{S}{2}$, $\sqrt{\frac{3gS}{2}}$
(2) $\frac{S}{2}$, $\frac{3gS}{2}$
(3) $\frac{S}{4}$, $\sqrt{\frac{3gS}{2}}$
(4) $\frac{S}{4}$, $\frac{3gS}{2}$

---

42. A person measures mass of 3 different particles as 435.42 g, 226.3 g and 0.125 g. According to the rules for arithmetic operations with significant figures, the additions of the masses of 3 particles will be.

(1) 661.845 g
(2) 662 g
(3) 661.8 g
(4) 661.84 g

---

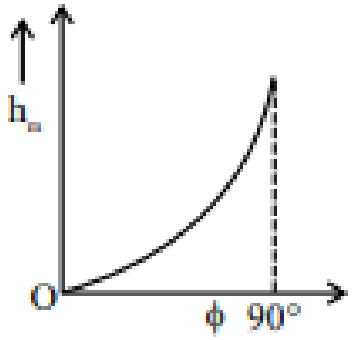
43. The radii of curvature for a thin convex lens are 10 cm and 15 cm respectively. The focal length of the lens is 12 cm. The refractive index of the lens material is

(1) 1.2
(2) 1.4
(3) 1.5
(4) 1.8

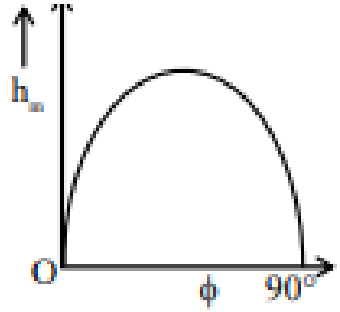
---

44. The angle of projection of a particle is measured from the vertical axis as ϕ and the maximum height reached by the particle is h_m. Here h_m as function of ϕ can be presented as

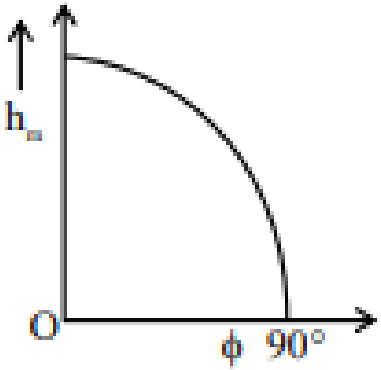
(1)



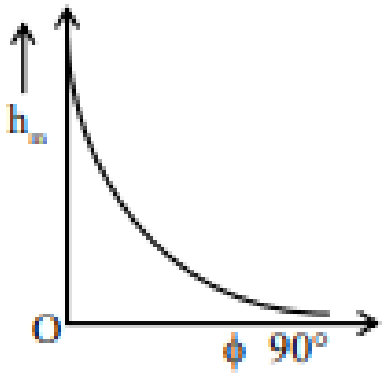
(2)



(3)



(4)



---

45. Consider following statements for refraction of light through prism, when angle of deviation is minimum.

(A) The refracted ray inside prism becomes parallel to the base.

(B) Larger angle prisms provide smaller angle of minimum deviation.

(C) Angle of incidence and angle of emergence becomes equal.

(D) There are always two sets of angle of incidence for which deviation will be same except at minimum deviation setting.
(E) Angle of refraction becomes double of prism angle.
Choose the **correct** answer from the options given below:

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

---

46. Three identical spheres of mass m, are placed at the vertices of an equilateral triangle of length a. When released, they interact only through gravitational force and collide after a time T = 4 seconds. If the sides of the triangle are increased to length 2a and also the masses of the spheres are made 2m, then they will collide after _____ seconds.

---

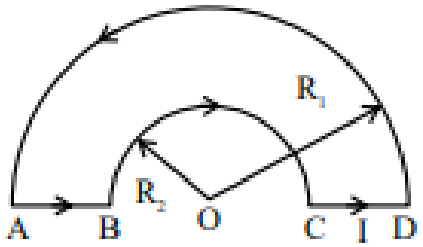
47. A 4.0 cm long straight wire carrying a current of 8A is placed perpendicular to an uniform magnetic field of strength 0.15 T. The magnetic force on the wire is _____ mN.

---

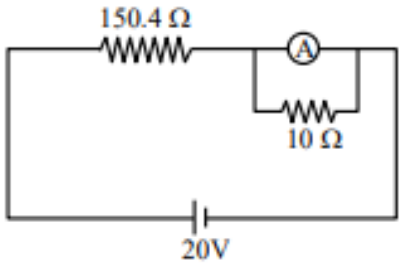
48. Two coherent monochromatic light beams of intensities 4I and 9I are superimposed. The difference between the maximum and minimum intensities in the resulting interference pattern is xI. The value of x is _____.

---

49. A loop ABCD, carrying current $I = 12\,\mathbf{A}$, is placed in a plane, consists of two semi-circular segments of radius $R_1 = 6\pi\,\mathbf{m}$ and $R_2 = 4\pi\,\mathbf{m}$. The magnitude of the resultant magnetic field at center O is $k \times 10^{-7}\,\mathbf{T}$. The value of k is _____ (Given $\mu_0 = 4\pi \times 10^{-7}\,\mathbf{T\ m\ A^{-1}}$)



50. In the figure shown below, a resistance of 150.4 Ω is connected in series to an ammeter A of resistance 240 Ω. A shunt resistance of 10 Ω is connected in parallel with the ammeter. The reading of the ammeter is _____ mA.



51. Which of the following postulate of Bohr's model of hydrogen atom in not in agreement with quantum mechanical model of an atom ?

(1) An atom in a stationary state does not emit electromagnetic radiation as long as it stays in the same state
(2) An atom can take only certain distinct energies E_1, E_2, E_3, etc. These allowed states of constant energy are called the stationary states of atom
(3) When an electron makes a transition from a higher energy stationary state to a lower energy stationary state, then it emits a photon of light
(4) The electron in a H atom's stationary state moves in a circle around the nucleus

52. Given below are two statements: Statement I : The N-N single bond is weaker and longer than that of P-P single bond Statement II : Compounds of group 15 elements in +3 oxidation states readily undergo disproportionation reactions. In the light of 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

53. Given below are two statements:
Statement I: A catalyst cannot alter the equilibrium constant (K_c) of the reaction, temperature remaining constant.
Statement II: A homogeneous catalyst can change the equilibrium composition of a system, temperature remaining constant.

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) Both Statement I and Statement II are true
(3) Both Statement I and Statement II are false
(4) Statement I is true but Statement II is false

---

54. The metal ions that have the calculated spin only magnetic moment value of 4.9 B.M. are A. Cr^{2+} **B.** Fe^{2+} **C.** Fe^{3+} **D.** Co^{2+} **E.** Mn^{2+} **Choose the correct answer from the options given below**

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

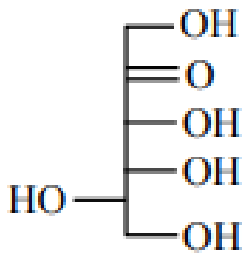
---

55. 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?**

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

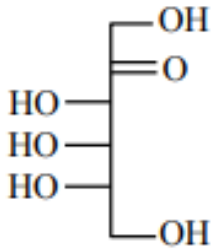
---

56. Which of the following is the correct structure of L-fructose?

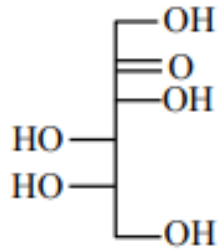


(1)

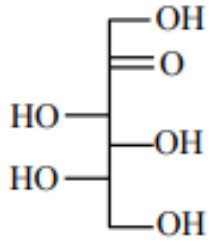
(2)



(3)

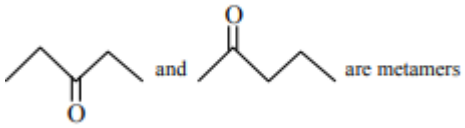


(4)

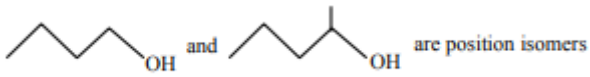


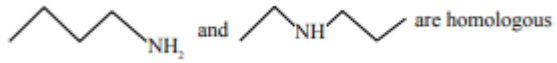
---

57. Identify the correct statements from the following

A. 

B. 

C. 

D. 

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

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

---

58. Among 10^{-10} g (each) of the following elements, which one will have the highest number of atoms?

Element : Pb, Po, Pr and Pt

(1) Po
(2) Pr
(3) Pb
(4) Pt

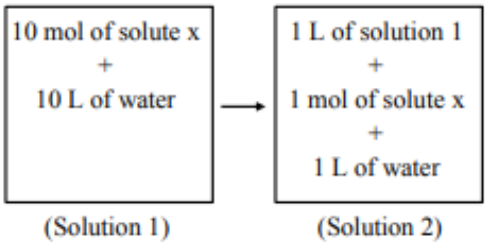
---

59. Which of the following statements are correct? A. The process of the addition an electron to a neutral gaseous atom is always exothermic B. The process of removing an electron from an isolated gaseous atom is always endothermic C. The 1st ionization energy of the boron is less than that of the beryllium D. The electronegativity of C is 2.5 in CH_4 and CCl_4 E. Li is the most electropositive among elements of group 1 Choose the correct answer from the options given below

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

---

60. Which of the following properties will change when system containing solution 1 will become solution 2 ?



(1) Molar heat capacity
(2) Density
(3) Concentration
(4) Gibbs free energy

---

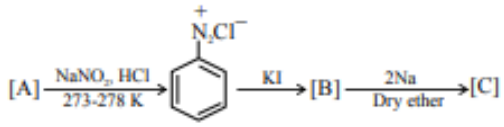
61. Number of molecules from below which cannot give iodoform reaction is:
Ethanol, Isopropyl alcohol, Bromoacetone, 2-Butanol, 2-Butanone, Butanal, 2-Pentanone, 3-Pentanone, Pentanal and 3-Pentanol

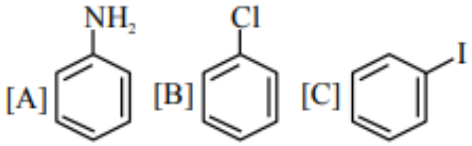
(1) 2

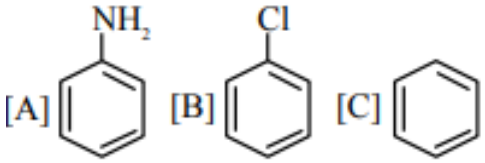
(2) 4
(3) 3
(4) 2

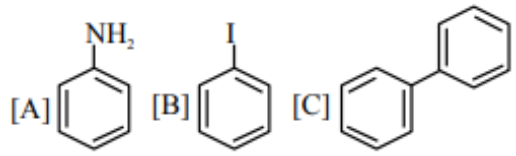
---

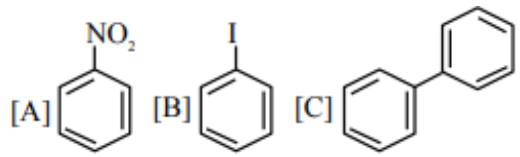
62. Identify [A], [B], and [C], respectively in the following reaction sequence :



(1)


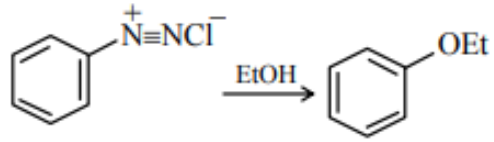
(2)


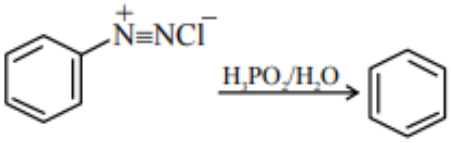
(3)


(4)


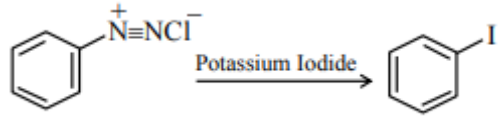
---

63. In the following reactions, which one is NOT correct?

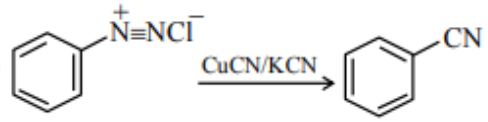
(1)


(2)


(3)



(4)



---

64. The correct order of the complexes

$[Co(NH_3)_5(H_2O)]^{3+}$ (A),
$[Co(NH_3)_6]^{3+}$ (B),
$[Co(CN)_6]^{3-}$ (C),
$[CoCl(NH_3)_5]^{2+}$ (D)

in terms of wavelength of light absorbed is:

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

---

65. In the following system, $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ at equilibrium, upon addition of xenon gas at constant T and p, the concentration of

(1) PCl_5 will increase
(2) Cl_2 will decrease
(3) PCl_5, PCl_3 and Cl_2 remain constant
(4) PCl_3 will increase

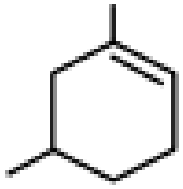
---

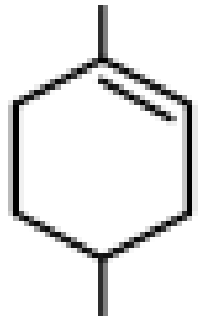
66. 2 moles each of ethylene glycol and glucose are dissolved in 500 g of water. The boiling point of the resulting solution is: (Given: Ebullioscopic constant of water $= 0.52\,\text{K kg mol}^{-1}$)

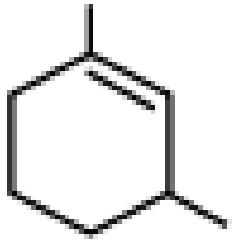
(1) 379.2 K
(2) 377.3 K
(3) 375.3 K
(4) 277.3 K

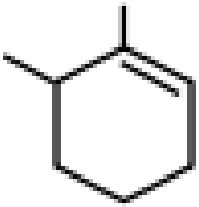
---

67. Which compound would give 3-methyl-6-oxoheptanal upon ozonolysis ?

(1) 

(2) 

(3) 

(4) 

---

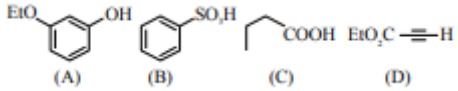
68. Match the LIST-I with LIST-II

LIST-I	LIST-II
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 :

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

69. The least acidic compound, among the following is



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

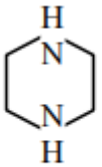
---

70. Correct order of limiting molar conductivity for cations in water at 298 K is :

(1) $H^+ > K^+ > Ca^{2+} > Mg^{2+}$
(2) $H^+ > Ca^{2+} > Mg^{2+} > K^+$
(3) $Mg^{2+} > H^+ > Ca^{2+} > K^+$
(4) $H^+ > Na^+ > Ca^{2+} > Mg^{2+} > K^+$

---

71. During estimation of Nitrogen by Dumas' method of compound X (0.42 g) :



X

mL of N_2 gas will be liberated at STP. (nearest integer)
(Given molar mass in g mol^{-1} : C : 12, H : 1, N : 14)

---

72. 0.5 g of an organic compound on combustion gave 1.46 g of CO_2 and 0.9 g of H_2O. The percentage of carbon in the compound is _____ (Nearest integer)
(Given : Molar mass (in g mol^{-1}) C : 12, H : 1, O : 16)

---

73. The number of optical isomers exhibited by the iron complex (A) obtained from the following reaction is _____ $FeCl_3 + KOH + H_2C_2O_4 \rightarrow A$

---

74. Given: $\Delta H_f^0[C(graphite)] = 710$ **kJ mol¹** $\Delta_c H^0 = 414$ **kJ mol¹** $\Delta_{H-H}^0 = 436$ **kJ mol¹** $\Delta_{C-H}^0 = 611$ **kJ mol¹ The**
$\Delta H_{C=C}^0$ **for** $CH_2 = CH_2$ **is** _____ **kJ mol**$^{-1}$ **(nearest integer value)**

---

75. Consider the following reactions $A + HCl + H_2SO_4 \rightarrow CrO_2Cl_2 + SideProducts$
Little amount $CrO_2Cl_2(vapour) + NaOH \rightarrow B + NaCl + H_2O$ $B + H^+ \rightarrow C + H_2O$ **The number of terminal 'O' present in the compound 'C' is** _____
