JEE MAINS: TEST SERIES-10

Time : 3 hrs. **M.M. : 360**

TOPIC COVERED :

PHYSICS: Complete Syllabus

CHEMISTRY: Complete Syllabus

MATHEMATICS: Complete Syllabus

GENERAL INSTRUCTIONS :

1. The Test Booklet consists of **90 questions**. The maximum marks are **360**.
2. There are ***three*** subject in the question paper Mathematics, Physics and Chemistry having 30 questions in each subject of equal weightage. Each question allotted **4 (*four*)** marks for each correct response.
3. *Candidates will be awarded marks as in Instruction No. 2 for correct response of each question.* ***1 marks*** *will be deducted for indicated incorrect response of each question.*
4. There is only one correct response for each question. Filling up more than one response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 3 above.
5. Four alternatives are given for each question out of which one is correct. **Darken the correct alternative on the given answer-sheet, with a pencil or pen.**
6. Use of calculator is not permitted.
7. Use of unfair means shall invite cancellation of the test.

MATHEMATICS

1. Let $\mathbf{p}$, $\mathbf{q}$, $\mathbf{r}$ be three mutually perpendicular vectors of the same magnitude. If a vector $\mathbf{x}$ satisfies the equation

$$\mathbf{p} \times \{(\mathbf{x} - \mathbf{q}) \times \mathbf{p}\} + \mathbf{q} \times \{(\mathbf{x} - \mathbf{r}) \times \mathbf{q}\} + \mathbf{r} \times \{(\mathbf{x} - \mathbf{p}) \times \mathbf{r}\} = \mathbf{0}$$

then $\mathbf{x}$ is given by

(a) $\frac{1}{2}(\mathbf{p} + \mathbf{q} - 2\mathbf{r})$ (b) $\frac{1}{2}(\mathbf{p} + \mathbf{q} + \mathbf{r})$ (c) $\frac{1}{3}(\mathbf{p} + \mathbf{q} + \mathbf{r})$ (d) $\frac{1}{3}(2\mathbf{p} + \mathbf{q} + \mathbf{r})$

2. If $a_n = \int_0^{\pi/2} \frac{\sin^2 nx}{\sin x}\, dx$, then $a_2 - a_1$, $a_3 - a_2$, $a_4 - a_3$, ... are in

(a) AP (b) GP (c) HP (d) none of these

3. In a triangle ABC, let $\angle C = \frac{\pi}{2}$. If r is the inradius and R is the circumradius of the triangle, then $2(r + R)$ is equal to

(a) $a + b$ (b) $b + c$ (c) $c + a$ (d) $a + b + c$

4. The equation $x - \log_e(1 + e^x) = c$ has a solution

(a) for every $c \geq 1$ (b) for every $c < 1$ (c) for every $c < 0$ (d) for every $c > -1$

5. The sum of the series $^nC_1\frac{1}{2} + {}^{n+1}C_2\left(\frac{1}{2}\right)^2 + {}^{n+2}C_3\left(\frac{1}{2}\right)^3 + ... + {}^{2n-1}C_n\left(\frac{1}{2}\right)^n$ must be

(a) $^{2n}C_n$ (b) $\frac{^{2n}C_n + 2^{2n}}{2^{2n+1}}$ (c) $\frac{^{2n}C_n}{2^{2n}}$ (d) $\frac{2^{2n} - 2^{n+1} + {}^{2n}C_n}{2^{n+1}}$

6. If $1 < x < \sqrt{2}$, the number of solutions of the equation $\tan^{-1}(x - 1) + \tan^{-1}x + \tan^{-1}(x + 1) = \tan^{-1}3x$ is

(a) 0 (b) 1 (c) 2 (d) 3

7. Non-zero vectors $\vec{a}$ and $\vec{b}$ are equally inclined to vector $\vec{c}$, if $\vec{c}$ is equal to

(a) $\frac{|\vec{b}|}{|\vec{a}|+|\vec{b}|}\vec{a} + \frac{|\vec{a}|}{|\vec{a}|+|\vec{b}|}\vec{b}$ (b) $\frac{|\vec{a}|}{|\vec{a}|+|\vec{b}|}\vec{a} + \frac{|\vec{b}|}{|\vec{a}|+|\vec{b}|}\vec{b}$

(c) $\frac{|\vec{a}|}{|\vec{a}|+2|\vec{b}|}\vec{a} + \frac{|\vec{b}|}{|\vec{a}|+2|\vec{b}|}\vec{b}$ (d) none of these

8. $\int_{-1}^{0} \tan^{-1}(1 + x + x^2)dx$ is equal to

(a) $\log 2$ (b) $\log \frac{1}{2}$ (c) $\pi \log 2$ (d) $\frac{\pi}{2}\log\frac{1}{2}$

9. If λ is a root of the equation $x^2 + 3x + 1 = 0$, then $\tan^{-1}\lambda + \tan^{-1}(1/\lambda)$ is

(a) $\pi/2$ (b) $-\pi/2$ (c) $\pi/3$ (d) none of these

10. If $0 < c \leq 1$, then range of the function $f(x) = \frac{x^2 + 2x + c}{x^2 + 4x + 3c}$ is

(a) $(0, \infty)$ (b) $(-\infty, 0)$ (c) $(-\infty, \infty)$ (d) none of these

11. The sum of all the even divisors of 420 is

(a) 860 (b) 192 (c) 1344 (d) 1152

12. Let $f(x) = (x - 1)^p(x - 2)^q$ where $p > 1$, $q > 1$, each critical point of $f(x)$ is a point of extremum when

(a) $p = 3, q = 4$ (b) $p = 4, q = 2$ (c) $p = 2, q = 3$ (d) none of these

13. Let $f(x) = \int_0^2 |x - t|\, dt$ $(x > 0)$, then minimum value of $f(x)$ is

(a) 1 (b) 2 (c) 0 (d) none of these

14. If $I_n = \int_1^e (\log x)^n dx$, $n \in \mathrm{N}$, then the value of $I_n + nI_{n-1}$ is

(a) n (b) ne (c) e (d) none of these

15. If p, q be non-zero real numbers and $f(x)$ is a continuous function such that $f(x) \neq 0$ in $[0, 2]$ and $\int_0^1 f(x)\cdot(x^2 + px + q)dx = \int_0^2 f(x)\cdot(x^2 + px + q)dx = 0$, then equation $x^2 + px + q = 0$ has

(a) two imaginary roots (b) no root in $(0, 2)$

(c) one root in $(0, 1)$ and other in $(1, 2)$ (d) one root in $(-\infty, 0)$ and other in $(2, \infty)$

16. Let $\mathbf{r}$, $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$ be four non-zero vectors such that $\mathbf{r} \cdot \mathbf{a} = 0$, $|\mathbf{r} \times \mathbf{b}| = |\mathbf{r}||\mathbf{b}|$, $|\mathbf{r} \times \mathbf{c}| = |\mathbf{r}||\mathbf{c}|$ then $[\mathbf{a}\ \mathbf{b}\ \mathbf{c}]$ is

(a) -1 (b) 0 (c) 1 (d) 2

17. Let P, Q be ends of latus rectum of parabola $y = ax^2 + bx + c$ whose vertex is V, then angle PVQ is

(a) dependent of a, b (b) independent on a, b only

(c) independent of a, b & c (d) dependent only on a

18. If f and g are two continuous functions being even and odd respectively, then $\int_{-a}^{a} \frac{f(x)}{b^{g(x)} + 1}$ (where a being any non-zero real numbers and b is a positive real number) is

(a) independent of f, but dependent on g (b) independent of g, but dependent on f

(c) independent of both f and g (d) dependent of both f and g

19. If $f(x) = 4x^3 - x^2 - 2x + 1$ and $g(x) = \begin{cases} \min\{f(t) : 0 \le t \le x\}; & 0 \le x \le 1 \\ 3 - x; & 1 < x \le 2 \end{cases}$, then $g\left(\frac{1}{4}\right) + g\left(\frac{3}{4}\right) + g\left(\frac{5}{4}\right)$ has the value equal to

(a) $\frac{7}{4}$ (b) $\frac{9}{4}$ (c) $\frac{13}{4}$ (d) $\frac{5}{2}$

20. $\lim_{n\to\infty}\left(\left(\frac{n}{n+1}\right)^{\alpha}+\sin\frac{1}{n}\right)^{n}$ when $\alpha \in Q$ is equal to

(a) 1 (b) $-\alpha$ (c) $e^{1-\alpha}$ (d) $e^{1+\alpha}$

21. The period of $\sin\frac{\pi[x]}{12}+\cos\frac{\pi[x]}{4}+\tan\frac{\pi[x]}{3}$ is

(a) 12 (b) 16 (c) 15 (d) 24

22. If $z = i^{i^{i\ldots\infty}} = A + iB$, then $|z|$ is

(a) $e^{-\frac{\pi}{2}(A+B)}$ (b) $e^{(-\pi/2)B}$ (c) $e^{(-\pi/2)A}$ (d) none of these

23. In ΔABC, $\cos A + 2\cos B + \cos C = 2$, then which one of the following is wrong

(a) $\tan\left(\frac{A}{2}\right)\tan\left(\frac{C}{2}\right) = 3$ (b) $\cot\left(\frac{A}{2}\right)\cot\left(\frac{C}{2}\right) = 3$

(c) $\cot\left(\frac{A}{2}\right)+\cot\left(\frac{C}{2}\right)=2\cot\left(\frac{B}{2}\right)$ (d) a, b, c are in AP

24. If $\frac{\sin^4 x}{a}+\frac{\cos^4 x}{b}=\frac{1}{a+b}$, then

(a) $\tan^2 x = \frac{b}{a}$ (b) $\cos^2 x = \frac{a}{a+b}$

(c) $\frac{\sin^6 x}{a^2}+\frac{\cos^6 x}{b^2}=\frac{1}{(a+b)^2}$ (d) none of these

25. If $\lim_{x\to 0}\frac{ae^x - b\cos x + ce^{-x}}{x\sin x} = 2$, then

(a) $a = c$ (b) $c = 2$ (c) $a = 2$ (d) $b = 1$

26. If $a, x_1, x_2, \ldots, x_k, \ldots$ and $b, y_1, y_2, \ldots, y_k, \ldots$ form two A.P.s with common differences m and n respectively, then the locus of point (x, y) where $x=\frac{\sum_{i=1}^{k} x_i}{k}$ and $y=\frac{\sum_{i=1}^{k} y_i}{k}$, k variable, is

(a) $(x - a)\, m = (y - b)\, n$ (b) $(x - m)\, a = (y - n)\, b$

(c) $(x - n)\, a = (y - m)\, b$ (d) $(x - a)\, n = (y - b)\, m$

27. The region of the complex plane for which $\left|\frac{z-a}{z+\bar{a}}\right| = 1$ (Re(a) $\neq 0$) is (where a is a complex number)

(a) $y = 0$ (b) $x = 0$

(c) the straight line $x = |a|$ (d) none of these

28. For $f(x) = ax^3 + bx^2 + 2cx$, where $a, b, c > 0$, if α and β are the points of local maxima and minima respectively, then

(a) $\alpha < 0 < \beta$ (b) $\alpha > \beta$ (c) $\alpha, \beta > 0$ (d) $\alpha, \beta < 0$

29. If $x = (\beta - \gamma)(\alpha - \delta)$, $y = (\gamma - \alpha)(\beta - \delta)$ and $z = (\alpha - \beta)(\gamma - \delta)$, then the value of $x^3 + y^3 + z^3 - 3xyz$ is

(a) 0 (b) $\alpha^6 + \beta^6 + \gamma^6 + \delta^6$ (c) $\alpha^6\beta^6\gamma^6\delta^6$ (d) none of these

30. If the value of the integral $\int_1^2 e^{x^2} dx$ is α, then the value of $\int_e^{e^4} \sqrt{\log x}\, dx$ is

(a) $e^4 - e - \alpha$ (b) $2e^4 - e - \alpha$ (c) $2(e^4 - e) - \alpha$ (d) none of these

PHYSICS

31. A doubly ionized Li^{2+} ion in ground state absorbs 91.8 eV of energy. Find the increase in angular momentum of electron. (take $h = 6.63 \times 10^{-34}$ J-s)

(a) 2.11×10^{-34} J-s (b) 3.16×10^{-34} J-s (c) 1.05×10^{-34} J-s (d) 4.22×10^{-34} J-s

32. A wire whose cross-section is 4 mm^2 is stretched by 0.1 mm by a certain weight. How far wall a wire of the same material and length stretch, if its cross sectional area is 8 mm^2 and the same weight is attached?

(a) 0.5 mm (b) 1.0 mm (c) 0.05 mm (d) 0.06 mm

33. Molar heat capacity of a gas depends on

(a) the state of the gas (b) the process

(c) nature of gas (d) nature of gas and the process

34. A particle is moving in a straight line with constant velocity 3 m/s. At $t = 0$, a force starts acting on the particle in a direction perpendicular to the direction of its initial motion which causes an acceleration of 1 m/s^2. Determine the magnitude of particle's velocity at $t = 3$ s.

(a) 3 m/s (b) 6 m/s (c) $3\sqrt{2}$ m/s (d) $2\sqrt{3}$ m/s

35. Mark the correct option

(a) In electrostatics, there is no motion of charge at all in conductors' bulk

(b) In electrostatics, there is a motion of charge particle in conductor's bulk

(c) In electrostatics and current electricity there is a net motion of charge particles in the bulk of the material of the conductor.

(d) In electrostatics and current electricity there is no net motion of charge particles in the bulk of the material of the conductor.

36. An alternating current having peak value 14 A is used to heat a metal wire. To produce the same heating effect, a constant current i can be used, where i is

(a) 14 A (b) about 20 A (c) 7 A (d) about 10 A

37. Mark the correct option

(a) Kinetic friction always opposes the motion

(b) Kinetic friction can cause the motion

(c) Static friction as well as kinetic friction can perform positive work

(d) both (b) and (c)

38. I. The Faraday's law of electromagnetic induction is induced emf $e = -\frac{d\phi}{dt}$

II. Due to changing magnetic field, if E is induced electric field, then $e = \int E.dl$

III. From above two statements $\int E.dl = -\frac{d\phi}{dt}$

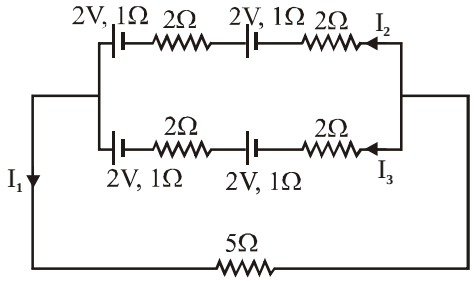
(a) All the three statements are always true (b) Only I and II are correct

(c) All three are wrong (d) none of these

39. Consider two light sources of wavelength λ_1 and λ_2 ($\lambda_1 > \lambda_2$) which are emitting n_1 and n_2 photons respectively, in a given time. Assume equal power for both the sources, then

(a) $n_1 > n_2$ (b) $n_1 < n_2$ (c) $n_1 = n_2$ (d) can't say anything

40. Four cells each of emf 2.0 V and internal resistance 1 Ω are connected as shown in the figure. Find I_1, I_2 and I_3.



(a) 0.8 A, 0.4 A, 0.4 A

(b) 0.5A, 0.25A, 0.25A

(c) (8/13)A, (4.13)A, (4.13)A

(d) none of these

41. Mark the correct option

(a) Ampere's law states that flux of B through any closed surface is μ_0 times the current passing through the area bounded by closed surface.

(b) Gauss's law for magnetic field in magnetostatics serves the same purpose as Gauss's law for electric field in electrostatics

(c) Gauss's law for magnetic field states that the flux of B through any closed surface is always zero, whether or not there are currents within the surface.

(d) All of these

42. For a cyclic process $A \to B \to C \to A$, the following information is given

Path	ΔQ (heat supplied)	ΔU (Increase in internal energy)	work done by system on surrounding
$A \to B$	600 J	200 J	400 J
$B \to C$	–100 J	100 J	–200 J
$C \to A$	–100 J	–300 J	200 J

Calculate the heat of the cycle and efficiency of cycle.

(a) 400 J, 100% (b) 600 J, 66.67% (c) 400 J, 66.67% (d) 600 J, 100%

43. The dimensional formula for torque is $[ML^2T^{-2}]$, same as that of work or energy, its proper SI unit is

(a) joule (b) either N-m or joule (c) N-m (d) none of these

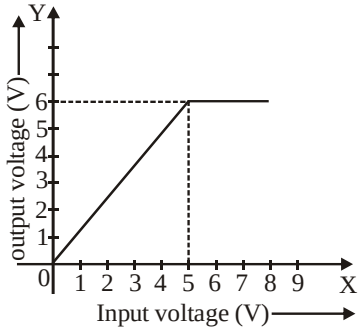
44. The period of oscillation of a simple pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$, where l is about 100 cm and is known to have 1 mm accuracy. The period is about 2s. The time of 100 oscillations is measured by a stop watch of least count 0.1 s. The percentage error in g is

(a) 0.1% (b) 1% (c) 0.2% (d) 0.8%

45. The gravitational potential energy of a body of mass m at the earth's surface $-mgR_e$. Its gravitational potential energy at a height R_e from earth's surface will be (here, R_e is the radius of the earth)

(a) $-2mgR_e$ (b) $2mgR_e$ (c) $(1/2)mgR_e$ (d) $(-1/2)mgR_e$

46. The reverse breakdown voltage of a Zener diode for which the following graph exists is



(a) 5V

(b) 6V

(c) (6/5)V

(d) (5/6)V

47. If four complete revolution of the cap, the distance travelled on the pitch scale is 2 mm. If there are 50 divisions on the circular scale, then the least count of the screw gauge is

(a) 0.001 mm (b) 0.01 mm (c) 0.10 mm (d) 1.0 m

48. Mark the correct option

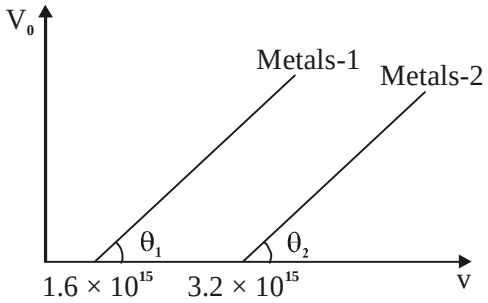
(a) To convert a galvanometer into an ammeter a large resistance has to be connected in series with galvanometer coil

(b) To convert a galvanometer into an ammeter a small resistance has to be connected in parallel with galvanometer coil

(c) To convert a galvanometer into a voltmeter a small resistance has to be connected in series with a galvanometer coil.

(d) all of these

49. The graph between stopping potential *versus* frequency is given for two different metals, then choose the most appropriate statement



(a) $v_{01} = v_{02}$ and $\theta_1 = \theta_2$

(b) $v_{01} > v_{02}$ and $\theta_1 > \theta_2$

(c) $v_{01} < v_{02}$ and $\theta_1 < \theta_2$

(d) $v_{01} < v_{02}$ and $\theta_1 = \theta_2$

50. A constant current of 2.8 A exists in a resistor. The rms current is

(a) 2.8 A (b) about 2 A

(c) 1.4 A (d) undefined for a direct current

51. A particle is moving in X-Y plane, whose position vectors are given as a function of time $x = 2.0\ \text{m} - (0.25\ \text{m/s}^2)t^2$ and $y = (1.0\ \text{m/s})t + (0.025\ \text{m/s}^3)t^3$. Find the unit vector along particle's velocity at t = 2 s.

(a) $\dfrac{(\hat{i} + 2.2\hat{j})}{2.42}$ (b) $\dfrac{(-\hat{i} + 1.3\hat{j})}{1.64}$ (c) $\hat{j}$ (d) $\dfrac{(\hat{k} + \hat{j})}{\sqrt{2}}$

52. A electric field is applied to a semiconductor. Let the number of charge carriers be *n* and the average drift speed be v. If the temperature is increased

(a) both *n* and v will increase (b) *n* will increase but v will decrease

(c) v will increase but *n* will decrease (d) both *n* and v will decrease.

53. An object is launched straight up into the air from the ground with an initial velocity of 30 m/s. The object rises to a highest point approximately 45 m above the ground in 3 s, it then falls back to the ground in 3 more second, impacting with a speed of 30 m/s. Determine the closest value of average speed and average velocity during 6 s interval

(a) 0 m/s, 0 m/s (b) 15 m/s, 0 m/s (c) 0 m/s, 15 m/s (d) 15 m/s, 15 m/s

54. A 3.0 kg block slides on a frictionless horizontal surface, first moving to the left at 50 m/s. It collides with a spring as it moves left, compresses the spring, an is brought to rest momentarily. The body continues to be accelerated to the right by the force of the compressed spring. Finally, the body moves to the right at 40 m/s. The block remains in contact with spring for 0.020 s. What was the magnitude of the impulse of the spring on the block?

(a) 270 kg-m/s (b) 135 kg-m/s (c) 170 kg-m/s (d) 370 kg-m/s

55. A car has to go from station A to station B(the car will start from rest from station A and comes to halt at station B), which are at a distance of 500 m in minimum possible time. Find this minimum possible time. The car has a limiting acceleration of 7 m/s^2 and it can have a maximum speed of 35 m/s

(a) 15.65 s (b) 20 s (c) 10 s (d) 19.28 s

56. Mark the correct option

(a) A positive charge accelerates from a region of higher electric potential toward a region of lower electric potential

(b) A negative charge accelerates from a region of lower electric potential toward a region of higher electric potential

(c) For every electric field due to a static charge distribution, the force exerted by that field is conservative

(d) All of these

57. For a polytropic process whose equation is given by pV^x = constant, $x \neq 0$, 1 or γ, which is true?

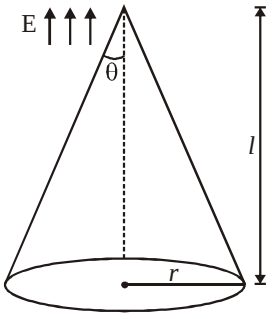
(a) Molar heat capacity, $C = C_v + R/(1 - x)$

(b) Work done by gas when temperature changes from T_1 to T_2 is $W = \dfrac{nR(T_2 - T_1)}{(1-x)}$

(c) Bulk modulus, $B = xp$

(d) all of these

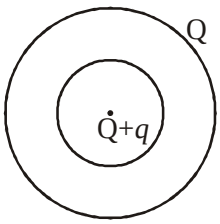
58. Consider a region bunded by conical surface as shown in the figure. In this region, E is in vertical upward direction. Find the flux crossing this surface.



(a) $\pi r^2 E$ (b) $\pi r^2 \sin\theta \times E$

(c) $\pi r\, l E \sin\theta/3$ (d) $\pi r^2\, l \cos\theta \times E/3$

59. A charged solid conductor having a cavity is shown in the figure. If a charge + q is placed asymmetrically within the cavity, then charge induced on outer surface of conductor would be



(a) $-q$ (b) $+q$

(c) $q - Q$ (d) $Q - q$

60. An engineer is working on a new engine design. One of the moving parts contain 1.6 kg of aluminium and 0.3 kg of iron, and is designed to operate at 210°C. How much energy is dissipated as heat to raise its temperature from 20°C to 210°C? (s_{Al} = 910 J/kg-K and s_{iron} = 470J/kg-K)

(a) 3.03×10^5 J (b) 7×10^5 J (c) 3×10^6 J (d) 1.04×10^5 J

CHEMISTRY

61. On descending Group 2, the ions of the corresponding metals become larger. Therefore, the

(a) lattice energy and the hydration energy of the compounds decrease

(b) lattice energy of the compounds decreases and the hydration energy of the compounds increases

(c) lattice energy and the hydration energy of the compounds increase

(d) lattice energy of the compounds increases and the hydration energy of the compounds decreases

62. Which of the following statements is incorrect?

(a) $B(OH)_3$ partially reacts with water to form H_3O^+ and $[B(OH)_4]^-$, and behaves like a weak acid.

(b) $B(OH)_3$ behaves like a strong monobasic acid in the presence of sugars, and this acid can be titrated against an NaOH solution using phenolphthalein as an indicator.

(c) $B(OH)_3$ does not donate a proton and hence does not form any salt with NaOH.

(d) $B(OH)_3$ reacts with NaOH, forming $Na[B(OH)_4]$

63. The blue colour of a cupric salt solution in water is due to the formation of a hydrated cupric ion. The hydrated ion is

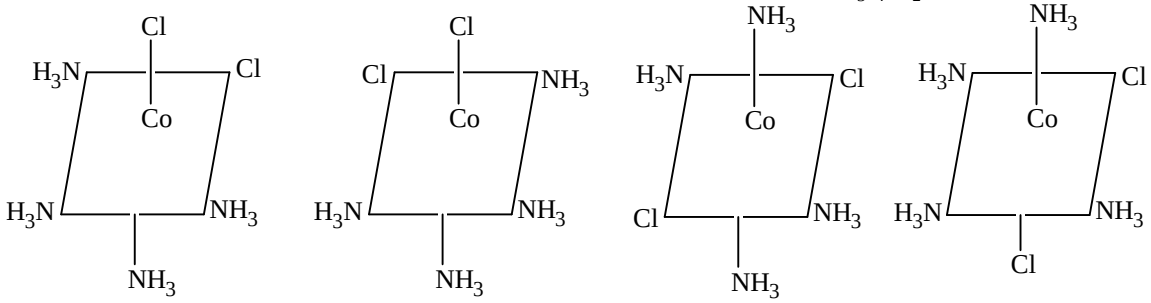
(a) octahedral with two long bonds trans to each other and four short bonds trans to each other.

(b) tetrahedral with two long bonds trans to each other and two short bonds cis to each other

(c) octahedral with two long bonds cis to each other and four short bonds trans to each other

(d) octahedral with two short bonds cis to each other and four long bonds trans to each other

64. Consider the following arrangements of the octahedral complex ion $[Co(NH_3)_4Cl_2]^+$



Which of the following statements is incorrect?

(a) I and II are enantiomers

(b) II and III are cis and trans isomers respectively

(c) III and IV are trans and cis isomers respectively

(d) II and IV are identical structures.

65. The I_3^- ion has

(a) five equatorial lone pairs on the central Iodine atom and two axial bonding pairs in a trigonal bipyramidal arrangement.

(b) five equatorial lone pairs on the central Iodine atom and two axial bonding pairs in a pentagonal bipyramidal arrangement

(c) three equatorial lone pairs on the central Iodine atom and two axial bonding pairs in a trigonal bipyramidal arrangement

(d) two equatorial lone pairs on the central Iodine atom and three axial bonding pairs in a trigonal bipyramidal arrangement

66. Which of the following statements is incorrect?

(a) HNO_2 is a stronger acid than CH_3CO_2H (b) NO_2^- is a weaker base than CN^-

(c) NH_2^- exist in an aqueous solution (d) $HC \equiv C^-$ is more stable than NH_2^-

67. 25 mL of 2N HCl, 50 mL of 4 N HNO_3 and *x* mL of 5 M H_2SO_4 are mixed together and the total volume is made upto 1 L with water, 50 mL of this acid mixture exactly neutralizes 25 mL of a 1 N Na_2CO_3 solution. The value of *x* is

(a) 25 mL (b) 40 mL (c) 60 mL (d) 50 mL

68. Consider the following reactions at 300 K

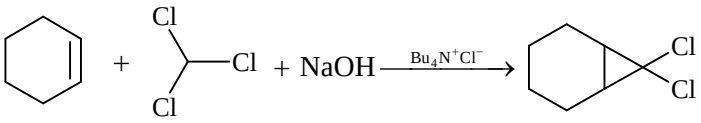
$A \longrightarrow B$ (uncatalysed reaction)

$A \xrightarrow{\text{catalyst}} B$ (catalysed reaction)

The activation energy is lowered by 8.314 kJ mol^{-1} for the catalysed reaction. The rate of this reaction is

(a) 15 times (b) 38 times (c) 22 times (d) 28 times

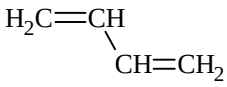
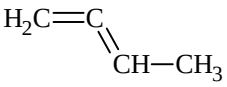
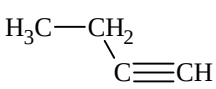
that of the uncatalysed reaction.

69. 

In this $Bu_4N^+Cl^-$ act as

(a) Base (b) Solvent (c) Catalyst (d) All

70. $H_3C-C\equiv C-CH_3 \xrightarrow[\text{heat}]{NaNH_2 \text{ / inert solvent}} A$

(a)  (b)  (c)  (d) No reaction

71. A 100 ml solution of 0.1 N HCl was tritrated with 0.2 N NaOH solution. The titration was discontinued after adding 30 ml of NaOH solution. The remaining titration was completed by adding 0.25 N KOH solution. The volume of KOH required for completing the titration is

(a) 70 ml (b) 32 ml (c) 35 ml (d) 16 ml

72. The flame colours of metal ions are due to

(a) Frenkel defect (b) Schottky defect

(c) Metal deficiency defect (d) Metal excess defect

73. When 10 ml of 0.1 M acetic acid ($pK_a = 5.0$) is titrated against 10 ml of 0.1 M ammonia solution ($pK_b = 5.0$), the equivalence point occurs at pH

(a) 5.0 (b) 6.0 (c) 7.0 (d) 9.0

74. When one mole of monoatomic ideal gas at T K undergoes adiabatic change under a constant external pressure of 1 atm changes volume from 1 litre to 2 litre. The final temperature in Kelvin would be

(a) $\frac{T}{2^{(2/3)}}$ (b) $T + \frac{2}{3\times 0.0821}$ (c) T (d) $T - \frac{2}{3\times 0.0821}$

75. Gold number gives

(a) The amount of gold present in the colloid

(b) The amount of gold required to break the colloid

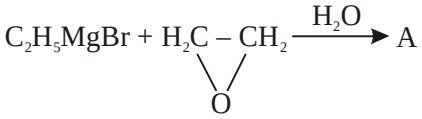
(c) The amount of gold required to protect the colloid

(d) None of these

76. KF combines with HF to form KHF_2. The compound contains the species

(a) K^+, F^- and H^+ (b) H^+, F^- and HF (c) K^+ and $[HF_2]^-$ (d) $[KHF]^+$ and F^-

77. In the following reaction A is



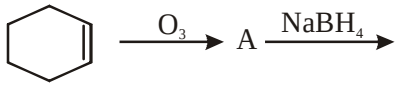
(a) $C_2H_5CH_2CHO$ (b) $C_2H_5CH_2CH_2OH$ (c) $C_2H_5CH_2OH$ (d) C_2H_5CHO

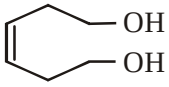
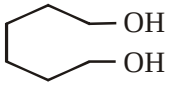
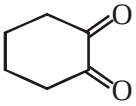
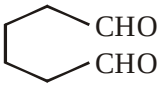
78. Find the dissociation constant of 0.5 M CH_3COOH. If it is 25% dissociated by the course of reaction

(a) 3.12×10^{-6} (b) 5.8×10^{-5} (c) 8.5×10^{-6} (d) 2.5×10^{-5}

79. $CH_3.C \equiv C - CH_3 \xrightarrow{Na/liq.NH_3}$ A. The product A is

(a) cis-but-2-ene (b) trans-but-2-ene (c) but-1-ene (d) 2-methyl propene

80.  B. The final product B is

(a)  (b)  (c)  (d) 

81. For the reaction $M^{x+} + MnO_4^- \longrightarrow MO_3^- + Mn^{2+} + ½\ O_2$

If one mole of MnO_4^- oxidises 1.67 moles of M^{x+} to MO_3^-, then the value of *x* in the reaction is

(a) 5 (b) 3 (c) 2 (d) 1

82. The co-ordination numbers of Fe in Ferocene is

(a) 10 (b) 8 (c) 6 (d) 12

83. Plot of log x/m against log P is a straight line inclined at an angle of 45°. When the pressure is 0.5 atm and Freundlich parameter, K is 10.0, the amount of the solute adsorbed per gram of absorbent will be (log 5 = 0.6990)

(a) 1 g (b) 2 g (c) 3 g (d) 5 g

84. Under the same reaction conditions, initial concentration of 1.386 mol dm^{-3} of a substance becomes half in 40 seconds and 20 seconds through first order and zero order kinetics respectively. Ratio (k_1/k_0) where the rate constants for first order (k_1) and zero order (k_0) of the reaction is

(a) 0.5 mol^{-1} dm^3 (b) 1.0 mol dm^{-3} (c) 1.5 mol dm^{-3} (d) 2.0 mol^{-1} dm^3

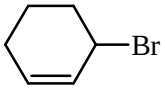
85. Two students use same stock solutions of $ZnSO_4$ and $CuSO_4$. The emf of one cell is 0.03 V higher then the other. The concentration of $CuSO_4$ solution in the cell with higher emf is 0.5 M. The concentration of $CuSO_4$ solution in the other cell is (2.303 RT/F = 0.06)

(a) 0.10 M (b) 0.25 M (c) 0.025 M (d) 0.05 M

86. Two liquids X and Y form an ideal solution. At 300 K, vapour pressure of the solution containing 1 mol of X and 3 mol of Y is 550 mm Hg. At the same temperature if 1 mol of Y is further added to this solution, vapour pressure of the solution increases by 10 mm Hg. Vapour pressure (in mm Hg) of X and Y in their pure states will be respectively.

(a) 200 and 300 (b) 300 and 400 (c) 400 and 600 (d) 500 and 600

87. Which of the following compound is inert towards E_2 elimination?

(a) $CH_3-\underset{\underset{Br}{|}}{CH}-CH_2CH_3$ (b)  (c) $(CH_3)_3C-CH_2Br$ (d) $(CH_3)_3C-\underset{\underset{Br}{|}}{CH}-CH_3$

88. Compound A (molecular formula C_3H_8O) is treated with acidified potassium dichromate to form a product B (molecular formula C_3H_6O). B forms a shining silver mirror on warming with ammoniacal silver nitrate. B when treated with an aqueous solution of $H_2NCONHNH_2.HCL$ and sodium acetate gives a product C. Identify the structure of C

(a) $CH_3CH_2CH = NNHCONH_2$ (b) $CH_3-\underset{\underset{CH_3}{|}}{C}=NNHCONH_2$

(c) $CH_3-\underset{\underset{CH_3}{|}}{C}=NCONHNH_2$ (d) $CH_3CH_2CH = NCONHNH_2$

89. In the Cannizzaro reaction given below, $2Ph-CHO \xrightarrow{OH^-} Ph-CH_2OH + PhCO_2^-$ the slowest step is

(a) the attack of ^-OH at the carbonyl group

(b) the transfer of hydride ion to the carbonyl group

(c) the abstraction of a proton from the carboxylic acid

(d) the deprotonation of $Ph-CH_2OH$

90. The optically active compound (X) $\begin{matrix}CH_3\\ \diagdown\\ \quad\ast\\ \diagup\\ CH_3\end{matrix}\!\!>\!\!-CH_2-NH_2$ on treatment with $NaNO_2/HCl$ gives

(a) 1° alcohol with retention of configuration (b) 2° alcohol with inversion of configuration

(c) racemic mixture of 2° alcohols (d) racemic mixture of 1° alcohols

JEE MAINS: TEST SERIES-10

Time : 3 hrs. **M.M. : 360**

ANSWERS

Mathematics

1.	(b)	2.	(c)	3.	(a)	4.	(c)	5.	(d)
6.	(a)	7.	(a)	8.	(a)	9.	(b)	10.	(c)
11.	(d)	12.	(b)	13.	(a)	14.	(c)	15.	(c)
16.	(b)	17.	(c)	18.	(b)	19.	(d)	20.	(c)
21.	(d)	22.	(b)	23.	(a)	24.	(c)	25.	(a)
26.	(d)	27.	(b)	28.	(d)	29.	(a)	30.	(b)

Physics

31.	(c)	32.	(c)	33.	(d)	34.	(c)	35.	(b)
36.	(d)	37.	(d)	38.	(b)	39.	(a)	40.	(b)
41.	(d)	42.	(c)	43.	(c)	44.	(c)	45.	(d)
46.	(b)	47.	(b)	48.	(b)	49.	(d)	50.	(a)
51.	(b)	52.	(b)	53.	(b)	54.	(a)	55.	(d)
56.	(d)	57.	(d)	58.	(a)	59.	(b)	60.	(a)

Chemistry

61.	(a)	62.	(c)	63.	(a)	64.	(a)	65.	(c)
66.	(c)	67.	(a)	68.	(d)	69.	(c)	70.	(c)
71.	(d)	72.	(d)	73.	(c)	74.	(d)	75.	(d)
76.	(c)	77.	(b)	78.	(a)	79.	(b)	80.	(b)
81.	(c)	82.	(a)	83.	(d)	84.	(a)	85.	(d)
86.	(c)	87.	(c)	88.	(a)	89.	(b)	90.	(c)