MOCK TEST
for
KCET-2024

General Instructions:

1. Duration of Test is 80 Minutes.

2. The Test booklet consists of 60 questions of **Mathematics** only. The maximum marks are 60.

3. Each question is allotted 1 **(one)** mark for correct response.

4. There is **no negative** marking and no deduction from the total score will be made if no response is indicated for a question.

PART – I : MATHEMATICS

1. If a function $f : R \rightarrow S$ defined as
   $f(x) = \sin x - \sqrt{3} \cos x + 1$ is onto, then S is equal to
   (1) [–1, 3]   (2) [1, 3]
   (3) [0, 1]   (4) [–1, 1]

2. If x is real, then the maximum value of
   $f(x) = \dfrac{3x^2 + 9x + 17}{3x^2 + 9x + 7}$ is
   (1) 41   (2) 1
   (3) $\dfrac{17}{7}$ (4) $\dfrac{1}{4}$

3. If $a^2 + b^2 + c^2 = 1$, then the range of $ab + bc + ca$ is
   (1) $[1, \infty)$ (2) $\left[-\dfrac{1}{2}, \infty\right)$
   (3) $\left(-\dfrac{1}{2}, 1\right)$ (4) $\left[-\dfrac{1}{2}, 1\right]$

4. The relations $R = \{(x, y) : x, y$ are real and $x = ky$, for all non-zero rational number $k\}$ and
   $S = \left\{\left(\dfrac{m}{n}, \dfrac{p}{q}\right); m, n, p, q \in Z, \text{ such that } n, q \neq 0, mq = np\right\}$,
   then
   (1) R is an equivalence relation but S is not
   (2) S is an equivalence relation but R is not
   (3) Both R and S are equivalence relations
   (4) Neither R nor S is an equivalence relation

5. The function $f(x) = [x]^2 – [x^2]$ is discontinuous at (where [·] represents greatest integer function)
   (1) All integers except 1
   (2) All integers
   (3) All integers except 0
   (4) All integers except 0 and 1

6. If $f(x) = \dfrac{2^x + 2^{-x}}{2}$, then $f(x+y) + f(x-y)$ is

   (1) $f(x) \cdot f(y)$

   (2) $3f(x) \cdot f(y)$

   (3) $2f(x) \cdot f(y)$

   (4) $f(x) + f(y)$

7. If $f(x) = \min\{x, x^3\}$, $x \in R$, then the set of points where $f(x)$ is not differentiable, is

   (1) $\{-1, 1\}$ (2) $\{-1, 0, 1\}$

   (3) $\{0, 1\}$ (4) $\{-1, 0\}$

8. If $\sin^{-1} x + \sin^{-1} y = \dfrac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y$ is

   (1) $\dfrac{5\pi}{3}$ (2) $\dfrac{\pi}{3}$

   (3) $\dfrac{\pi}{6}$ (4) π

9. If the product of the roots of the equation $x^2 - 3kx + 2e^{2\ln k} - 1 = 0$ is 7, then the roots of the equation are real for k equal to

   (1) 1 only   (2) 2 only

   (3) 0 only   (4) ± 2

10. $\begin{vmatrix} \binom{11}{5} & \binom{11}{6} & \binom{12}{r-2} \\ \binom{12}{7} & \binom{12}{8} & \binom{13}{r} \\ \binom{13}{9} & \binom{13}{10} & \binom{14}{r+2} \end{vmatrix} = 0$, then r is

    (1) 5   (2) 6

    (3) 7   (4) 8

11. The curves $x^3 - 3xy^2 = a$ and $3x^2 y - y^3 = b$ intersect at an angle of

    (1) $\dfrac{\pi}{2}$ (2) $\dfrac{\pi}{4}$

    (3) $\dfrac{\pi}{6}$ (4) $\dfrac{\pi}{3}$

12. $\begin{vmatrix} x+y+z & -z & -y \\ -z & x+y+z & -x \\ -y & -x & x+y+z \end{vmatrix}$ is equal to

    (1) $(x + y + z)^3$

    (2) $2(x + y)(y + z)(z + x)$

    (3) $(x + y)(y + z)(z + x)$

    (4) $3(x + y)(y + z)(z + x)$

13. A circular cylinder is inscribed in a sphere of radius R. If the volume of the cylinder is maximum, then its height is

    (1) $\dfrac{2R}{\sqrt{3}}$ (2) R

    (3) $\dfrac{3R}{2}$ (4) $\sqrt{2}R$

14. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then A^3 is

    (1) $\begin{bmatrix} \cos3\theta & -\sin3\theta \\ -\sin3\theta & \cos3\theta \end{bmatrix}$

    (2) $\begin{bmatrix} \cos3\theta & \sin3\theta \\ \sin3\theta & -\cos3\theta \end{bmatrix}$

    (3) $\begin{bmatrix} \cos3\theta & \sin3\theta \\ -\sin3\theta & \cos3\theta \end{bmatrix}$

    (4) $\begin{bmatrix} \cos3\theta & \sin3\theta \\ \sin3\theta & \cos3\theta \end{bmatrix}$

15. Let $f : R \to R$ be defined as $f(x) = \begin{cases} k - 2x, & x \le -1 \\ 2x + 3, & x > -1 \end{cases}$ and if f has a local minimum at $x = -1$, then a possible value of k is

    (1) 1   (2) Zero

    (3) $\dfrac{-1}{2}$ (4) -1

16. Total number of ways of selecting 10 balls out of unlimited number of white, red, blue and green balls given that balls of each colour are identical, is

    (1) 270   (2) 84

    (3) 286   (4) 86

17. $\int \dfrac{e^x(x-1)}{(x+1)^3}dx$ is equal to

   (1) $\dfrac{xe^x}{(x+1)^2}+c$

   (2) $\dfrac{-(x^4+1)^{\frac{1}{4}}}{x}+c$

   (3) $\dfrac{e^x}{(x+1)^2}+c$

   (4) $\dfrac{e^x}{x(x+1)^2}+c$

18. If $\int \dfrac{2\sin x+\cos x}{7\sin x-5\cos x}dx = Ax + b\ \log_e(7\sin x - 5\cos x) + C$, then $A + B$ is

   (1) $\dfrac{1}{17}$ (2) $\dfrac{3}{37}$

   (3) $\dfrac{13}{37}$ (4) $\dfrac{23}{47}$

19. If the seventh term from the beginning is equal to the seventh term from the end in the expansion of $\left[2^{\frac{1}{3}}+\dfrac{1}{3^{\frac{1}{3}}}\right]^n$, then n is equal to

   (1) 6   (2) 8

   (3) 10   (4) 12

20. $\int \left(\dfrac{x}{x\sin x+\cos x}\right)^2 dx$ is equal to

   (1) $\cot x+\left(\dfrac{x\sec x}{x\sin x+\cos x}\right)+C$

   (2) $\tan x+\left(\dfrac{x\sec x}{x\sin x+\cos x}\right)+C$

   (3) $\cot x-\left(\dfrac{x\sec x}{x\sin x+\cos x}\right)+C$

   (4) $\tan x-\left(\dfrac{x\sec x}{x\sin x+\cos x}\right)+C$

21. $\int_0^{\frac{\pi}{4}}\log_e\left(1+\tan x\right)dx$ is equal to

   (1) $\dfrac{\pi}{4}\log_e(2)$ (2) $\dfrac{\pi}{8}\log_e(2)$

   (3) $\dfrac{\pi}{2}\log_e(2)$ (4) $\log_e(2)$

22. $\int_{-\pi}^{\pi}\dfrac{\cos^2 x}{1+a^x}dx$ is equal to

   (1) $\dfrac{\pi}{2}$ (2) $a\pi$

   (3) 2π (4) $\dfrac{\pi}{a}$

23. $\int \left(\dfrac{x-a}{x}-\dfrac{x}{x+a}\right)\cdot dx$ is equal to

   (1) $\dfrac{1}{a}\log\left|\dfrac{x}{x+a}\right|+c$

   (2) $a\log\left|\dfrac{x+a}{x}\right|+c$

   (3) $a\log\left|\dfrac{x}{x+a}\right|+c$

   (4) $\log\left|\dfrac{x+a}{x}\right|+c$

24. $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}}\left[f(x)+f(-x)\right]\left[g(x)-g(-x)\right]dx$ is equal to

   (1) π (2) 1

   (3) -1 (4) Zero

25. The value of

$2(^nC_0)+\dfrac{3}{2}(^nC_1)+\dfrac{4}{3}(^nC_2)+\dfrac{5}{4}(^nC_3)+...+\dfrac{n+2}{n+1}{}^nC_n$ is

   (1) $\dfrac{2^n(1-n)-1}{n+1}$ (2) $\dfrac{2^n(n+3)-1}{n+1}$

   (3) $\dfrac{2^n-1}{n+1}$ (4) $\dfrac{2^n+2}{n-1}$

26. $I=\int_2^4 (x-1)(x-2)(x-3)(x-4)(x-5)dx$, then I is

   (1) 1   (2) -1

   (3) Zero   (4) $\dfrac{1}{2}$

27. $\underset{n\to\infty}{\text{Lt}}\dfrac{1}{n}\sum_{r=1}^{2n}\dfrac{r}{\sqrt{n^2+r^2}}$ is equal to

   (1) $1+\sqrt{5}$ (2) $\sqrt{5}-1$

   (3) $\sqrt{2}+1$ (4) $\sqrt{2}-1$

28. $\int_0^\pi [\cot x] dx$ is equal to (Where [·] represents greatest integer function)

(1) $\dfrac{\pi}{2}$ (2) 1

(3) -1 (4) $\dfrac{-\pi}{2}$

29. The range of a for which the equation $\cos 2x + a\sin x = 2a - 7$, has a real solution is

(1) $-4 \le a \le 4$ (2) $2 \le a \le 6$

(3) $7 \le a \le 8$ (4) $-9 \le a < 4$

30. The area bounded by the curve $\sqrt{x} + \sqrt{y} = 1$ and the coordinate axes, is

(1) 1 sq. unit   (2) $\dfrac{1}{2}$ sq. unit

(3) $\dfrac{1}{3}$ sq. unit   (4) $\dfrac{1}{6}$ sq. unit

31. The area of the region enclosed by curves $y = x$, $x = e$, $y = \dfrac{1}{x}$ and positive x-axis is

(1) $\dfrac{1}{2}$ (2) 1

(3) $\dfrac{3}{2}$ (4) $\dfrac{5}{2}$

32. If A and B are the vertices of the triangle ABC and are given by (2, 5) and (4, −11) respectively, and C moves along the line $L \equiv -9x + 7y + 4 = 0$, then the locus of the centroid of the triangle ABC is

(1) $9x + 7y - 8 = 0$

(2) $27x + 21y - 8 = 0$

(3) $7x - 9y - 8 = 0$

(4) $27x - 21y = 100$

33. The differential equation obtained by eliminating the constants a and b from $xy = ae^x + be^{-x} + x^2$, is

(1) $xy_2 + 2y_1 - xy = 2 - x^2$

(2) $xy_2 - 2y_1 + xy = 2 - x^2$

(3) $xy_2 + 2y_1 + xy = 2 + x^2$

(4) $xy_2 - 2y_1 - xy = 2 + x^2$

34. A variable chord is drawn through the origin to the circle $x^2 + y^2 - 2ax = 0$. The locus of the centre of the circle drawn on this chord as diameter is

(1) $x^2 + y^2 + ax = 0$ (2) $x^2 + y^2 + ay = 0$

(3) $x^2 + y^2 - ax = 0$ (4) $x^2 + y^2 - ay = 0$

35. If $\dfrac{dy}{dx} = \dfrac{y}{x} + \tan\left(\dfrac{y}{x}\right)$, $y(1) = \dfrac{\pi}{2}$, then the value of $y\left(\dfrac{1}{2}\right)$ is

(1) $\dfrac{\pi}{3}$ (2) $\dfrac{\pi}{4}$

(3) $\dfrac{\pi}{6}$ (4) $\dfrac{\pi}{12}$

36. The equation of the asymptotes of a hyperbola are $4x + 3y + 2 = 0$ and $3x - 4y + 1 = 0$, then equations of axes are

(1) $x + 7y + 1 = 0$ and $7x - y + 3 = 0$

(2) $x + 7y - 1 = 0$ and $7x - y - 3 = 0$

(3) $x + 7y + 3 = 0$ and $7x - y + 1 = 0$

(4) $x - 7y + 1 = 0$ and $x + 7y - 3 = 0$

37. If $(1+x^2)\dfrac{dy}{dx} + y = \tan^{-1}(x)$, $y(0) = 1$, then $y(\tan 1)$ is equal to

(1) $\dfrac{1}{e}$ (2) e

(3) $2e$ (4) $\dfrac{2}{e}$

38. The tangent at any point $P(x, y)$ on a curve meets the x-axis at T, if $OP = PT$, where O being the origin, then the curve can be a/an

(1) Circle   (2) Parabola

(3) Ellipse   (4) Hyperbola

39. The value of $\sin^{-1}(\sin 5)$ is

(1) $3 - \pi$ (2) $2\pi - 5$

(3) $5 - 2\pi$ (4) $3\pi - 5$

40. The approximate value of $(1.0002)^{3000}$ is

    (1) 1.2   (2) 1.4

    (3) 1.6   (4) 1.8

41. The degree and order of differential equation

    $\left[1+\left(\dfrac{dy}{dx}\right)^3\right]^{7/3} = 7\left(\dfrac{d^2y}{dx^2}\right)$ respectively are

    (1) 3, 7   (2) 3, 2

    (3) 7, 3   (4) 2, 3

42. The volume of a sphere is increasing at the rate of 4π c.c. per second, then the rate of increase of the radius when the volume is 288π c.c., is

    (1) $\dfrac{1}{6}$ cm/s   (2) 6 cm/s

    (3) $\dfrac{1}{36}$ cm/s   (4) 36 cm/s

43. If the angle between $\vec{a}$ and $\vec{b}\ (\vec{a}, \vec{b} \neq 0)$ is $\dfrac{5\pi}{6}$ and magnitude of projection of $\vec{a}$ on $\vec{b}$ is $\dfrac{6}{\sqrt{3}}$, then $|\vec{a}|$ is

    (1) 6   (2) $\dfrac{\sqrt{3}}{2}$

    (3) 12   (4) 4

44. The intersection point of $\dfrac{x}{1} = \dfrac{y}{2} = \dfrac{z}{2}$ and $2x + y + z = 6$ is

    (1) (1, 2, 2)   (2) (2, 1, 1)

    (3) (0, 0, 0)   (4) (1, 0, 1)

45. If the length of the semi-major axis of an ellipse is 14 units and the eccentricity is $\dfrac{1}{2}$, then the area of the rectangle formed by joining the ends of the latus rectum of the ellipse is equal to

    (1) 294 sq. units   (2) 296 sq. units

    (3) 324 sq. units   (4) 147 sq. units

46. A variable plane is at a constant distance 'k' from the origin and meets the coordinate axes in A, B, C, then the equation of the locus of the centroid of triangle ABC, is

    (1) $\dfrac{1}{x^2} + \dfrac{1}{y^2} + \dfrac{1}{z^2} = \dfrac{1}{k^2}$

    (2) $\dfrac{1}{x^2} + \dfrac{1}{y^2} + \dfrac{1}{z^2} = \dfrac{4}{k^2}$

    (3) $\dfrac{1}{x^2} + \dfrac{1}{y^2} + \dfrac{1}{z^2} = \dfrac{16}{k^2}$

    (4) $\dfrac{1}{x^2} + \dfrac{1}{y^2} + \dfrac{1}{z^2} = \dfrac{9}{k^2}$

47. If the odds in favour of an event be 3 : 5, then the probability of non-occurrence of the event is

    (1) $\dfrac{3}{5}$ (2) $\dfrac{8}{3}$

    (3) $\dfrac{3}{8}$ (4) $\dfrac{5}{8}$

48. The probability distribution of the random variable X is given by

X	1	2	3	4
$P(X = x)$	$\dfrac{1}{8}$	$\dfrac{1}{2}$	$\dfrac{1}{8}$	$\dfrac{1}{4}$

    Then the value of $V(X)$ is equal to

    (1) 0   (2) 1

    (3) $\dfrac{1}{2}$ (4) $\dfrac{2}{3}$

49. Two dice are thrown together. The probability that at least one will show digit 6 is

    (1) $\dfrac{11}{36}$ (2) $\dfrac{5}{36}$

    (3) $\dfrac{5}{11}$ (4) $\dfrac{1}{6}$

50. Total number of common tangents of $y^2 = 4ax$ and $xy = c^2$ is equal to

    (1) 1   (2) 2

    (3) 3   (4) 4

51. The probability of occurring an event A is $\dfrac{1}{2}$ and occurring of B is $\dfrac{3}{10}$, if A and B are mutually exclusive, then the probability of neither A nor B occurring, is

    (1) 0.2   (2) 0.5

    (3) 0.6   (4) 0.7

52. Five horses are in a race. A person selects 2 of the horses at random and bets on them, then the probability that he selected the winning horse, is

(1) $\dfrac{4}{5}$

(2) $\dfrac{3}{5}$

(3) $\dfrac{1}{5}$

(4) $\dfrac{2}{5}$

53. A and B stand in a ring along with 10 other persons, if the arrangement is at random, then the probability that there are exactly 3 persons between A and B, is

(1) $\dfrac{1}{11}$

(2) $\dfrac{2}{11}$

(3) $\dfrac{3}{11}$

(4) $\dfrac{1}{12}$

54. The normal to $x^2 = 4y$ passing through (2, 1) has equation

(1) $2x = y$

(2) $y + 2x = 4$

(3) $2x + 3y - 8 = 0$

(4) $x + y - 3 = 0$

55. The area of the parallelogram whose diagonals represent the vectors $3\vec{i} + \vec{j} - 2\vec{k}$ and $\vec{i} - 3\vec{j} + 4\vec{k}$, is

(1) 4 sq. units

(2) 8 sq. units

(3) $5\sqrt{3}$ sq. units

(4) $10\sqrt{3}$ sq. units

56. The plane passing through the points (1, 1, 1), (1, −1, 1), (−1, 3, −5) will also passes through (2, K, 4) for

(1) No value of K

(2) Only two values of K

(3) Any value of K

(4) Only one value of K

57. If $\vec{r} \cdot \vec{a} = 0$, $\vec{r} \cdot \vec{b} = 0$, $\vec{r} \cdot \vec{c} = 0$ for some non-zero vector $\vec{r}$, then the value of $\left[\vec{a}\ \vec{b}\ \vec{c} \right]$ is

(1) Zero

(2) 1

(3) 2

(4) 4

58. Let $\vec{a}, \vec{b}, \vec{c}$ be non-zero, non-coplanar vectors such that $\left(\vec{a} \times \vec{b} \right) \times \vec{c} = \dfrac{1}{3}|\vec{b}||\vec{c}|\vec{a}$. If θ is the acute angle between the vectors $\vec{b}$ and $\vec{c}$, then $\sin\theta$ is

(1) $\dfrac{1}{3}$

(2) $\dfrac{\sqrt{2}}{3}$

(3) $\dfrac{2}{3}$

(4) $\dfrac{2\sqrt{2}}{3}$

59. The shortest distance between the lines $\dfrac{x-1}{2} = \dfrac{y-2}{3} = \dfrac{z-3}{4}$ and $\vec{r} = \left(2\vec{i} + 4\vec{j} + 5\vec{k}\right) + \lambda\left(3\vec{i} + 4\vec{j} + 5\vec{k}\right)$ is

(1) $\dfrac{1}{\sqrt{2}}$

(2) $\dfrac{1}{\sqrt{3}}$

(3) $\dfrac{1}{\sqrt{6}}$

(4) $\dfrac{1}{\sqrt{8}}$

60. The mean and standard deviation of a binomial variate X are 4 and $\sqrt{3}$ respectively, then $P(X \geq 1)$ is

(1) $1 - \left(\dfrac{1}{4}\right)^{16}$

(2) $1 - \left(\dfrac{3}{4}\right)^{16}$

(3) $1 - \left(\dfrac{2}{3}\right)^{16}$

(4) $1 - \left(\dfrac{1}{2}\right)^{16}$

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MOCK TEST
for
KCET-2024

General Instructions:

1. Duration of Test is 160 Minutes.

2. The Test booklet consists of 120 questions. The maximum marks are 120.

3. There are **two** parts in the question paper consisting of **Physics** and **Chemistry** having 60 questions in each part of equal weightage. Each question is allotted 1 **(one)** mark for correct response.

4. There is **no negative** marking and no deduction from the total score will be made if no response is indicated for a question.

(PART-II : PHYSICS & CHEMISTRY)

1. The number of significant figures in the numbers 4.8000×10^4 and 48000.50 are respectively
   (1) 5 and 7
   (2) 2 and 7
   (3) 2 and 6
   (4) 5 and 6

2. A body of mass 'm' moving along a straight line covers half the distance with a speed of $2\ ms^{-1}$. The remaining half of the distance is covered in two equal time intervals with a speed of $3\ ms^{-1}$ and $5\ ms^{-1}$ respectively. The average speed of the particle for the entire journey is
   (1) $\dfrac{8}{3}\ ms^{-1}$
   (2) $\dfrac{4}{3}\ ms^{-1}$
   (3) $\dfrac{16}{3}\ ms^{-1}$
   (4) $\dfrac{3}{8}\ ms^{-1}$

3. The moment of inertia of a circular ring of radius 'r' and mass 'M' about diameter is
   (1) $\dfrac{Mr^2}{4}$
   (2) $\dfrac{Mr^2}{2}$
   (3) $\dfrac{Mr^2}{12}$
   (4) $\dfrac{2}{5}Mr^2$

4.
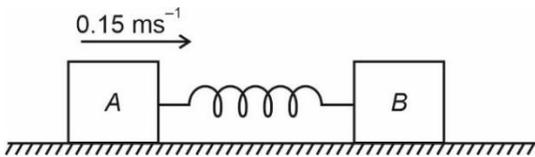
   Two rectangular blocks A and B of masses 2 kg and 3 kg respectively are connected by a spring of spring constant $10.8\ Nm^{-1}$ and are placed on a frictionless horizontal surface. The block 'A' was given an initial velocity of $0.15\ ms^{-1}$ in the direction shown in the figure. The maximum compression of the spring during the motion is
   (1) 0.02 m
   (2) 0.05 m
   (3) 0.03 m
   (4) 0.01 m

5.

A force acting on a body is as shown in the graph. The total work done in covering an initial distance of 20 m is

(1) 200 J   (2) 400 J

(3) 175 J   (4) 225 J

6.

Horizontal tube of non-uniform cross-section has radii of 0.1 m and 0.05 m respectively at M and N. For a streamline flow of liquid the rate of liquid flow is

(1) Greater at M than at N

(2) Greater at N than at M

(3) Same at M and N

(4) Continuously changes with time

7.

In the following combination of logic gates, the outputs of A, B and C are respectively

(1) 0, 1, 0   (2) 1, 1, 0

(3) 1, 0, 1   (4) 0, 1, 1

8. An α-particle of mass 6.4×10^{-27} kg and charge 3.2×10^{-19} C is situated in a uniform electric field of 1.6×10^5 V m^{-1}. The velocity of the particle at the end of 2×10^{-2} m path when it starts from rest is

(1) 8×10^5 ms^{-1} (2) 16×10^5 ms^{-1}

(3) $4\sqrt{2} \times 10^5$ ms^{-1} (4) $2\sqrt{3} \times 10^5$ ms^{-1}

9. A coil of 'n' number of turns is wound tightly in the form of a spiral with inner and outer radii 'a' and 'b' respectively. When a current of strength I is passed through the coil, the magnetic field at its centre is

(1) $\dfrac{\mu_0 nI}{2(b-a)}$

(2) $\dfrac{2\mu_0 nI}{b}$

(3) $\dfrac{\mu_0 nI}{2(b-a)} \log_e \dfrac{b}{a}$

(4) $\dfrac{\mu_0 nI}{(b-a)} \log_e \dfrac{a}{b}$

10. Hydrogen atom from excited state comes to the ground state by emitting a photon of wavelength λ. If R is the Rydberg constant, the principal quantum number 'n' of the excited state is

(1) $\sqrt{\dfrac{\lambda}{\lambda R - 1}}$ (2) $\sqrt{\dfrac{\lambda R^2}{\lambda R - 1}}$

(3) $\sqrt{\dfrac{\lambda R}{\lambda - 1}}$ (4) $\sqrt{\dfrac{\lambda R}{\lambda R - 1}}$

11. The kinetic energy of an electron gets tripled, then the de-Broglie wavelength associated with it changes by a factor

(1) $\sqrt{3}$ (2) $\dfrac{1}{\sqrt{3}}$

(3) 3   (4) $\dfrac{1}{3}$

12. The amount of energy released when one microgram of matter is annihilated is

(1) 9×10^{10} kWh   (2) 25 kWh

(3) 0.5×10^5 kWh   (4) 0.25×10^5 kWh

13. The displacement-time graphs of two moving particles make angles of 30º and 45º with the x-axis. The ratio of their velocities is
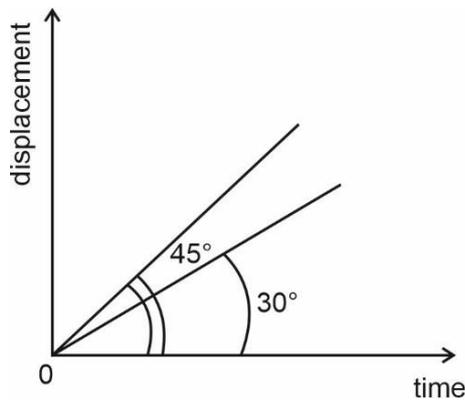
(1) $\sqrt{3} : 2$
(2) 1 : 1
(3) 1 : 2
(4) $1 : \sqrt{3}$

14. Block A of mass 2 kg is placed over block B of mass 8 kg. The combination is placed over a rough horizontal surface. Coefficient of friction between B and the floor is 0.5. Coefficient of friction between A and B is 0.4. A horizontal force of 10 N is applied on block B. The force of friction between A and B is (g = 10 ms^{-2})
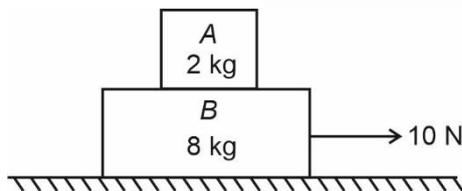
(1) 100 N
(2) 40 N
(3) 50 N
(4) Zero

15. A solid sphere of mass m rolls down an inclined plane without slipping, starting from rest at the top of an inclined plane. The linear speed of the sphere at the bottom of the inclined plane is v. The kinetic energy of the sphere at the bottom is

(1) $\frac{1}{2} mv^2$
(2) $\frac{5}{3} mv^2$
(3) $\frac{2}{5} mv^2$
(4) $\frac{7}{10} mv^2$

16. Two satellites of mass m and $9m$ are orbiting a planet in orbits of radius R. Their periods of revolution will be in the ratio of

(1) 9 : 1
(2) 3 : 1
(3) 1 : 1
(4) 1 : 3

17. The quantities of heat required to raise the temperatures of two copper spheres of radii r_1 and r_2 (r_1 = 1.5 r_2) through 1 K are in the ratio of

(1) $\frac{27}{8}$
(2) $\frac{9}{4}$
(3) $\frac{3}{2}$
(4) 1

18. Which one of the following is $v_m - T$ graph for perfectly black body? v_m is the frequency of radiation with maximum intensity. T is the absolute temperature.
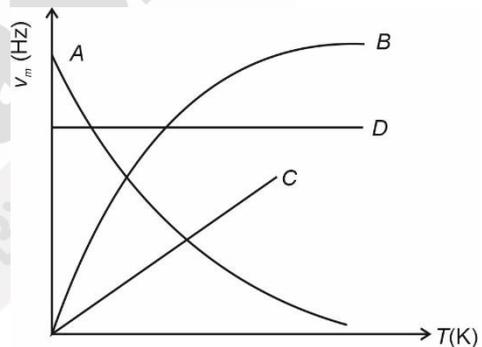
(1) A
(2) B
(3) C
(4) D

19. Two tuning forks, A and B, produce notes of frequencies 258 Hz and 262 Hz. An unknown note sounded with A produces certain beats. When the same note is sounded with B, the beat frequency gets doubled. The unknown frequency is

(1) 250 Hz
(2) 252 Hz
(3) 254 Hz
(4) 256 Hz

20. Wavelength of given light waves in air and in a medium are 6000 Å and 4000 Å respectively. The critical angle is

    (1) $\tan^{-1}\left(\dfrac{2}{3}\right)$

    (2) $\tan^{-1}\left(\dfrac{3}{2}\right)$

    (3) $\sin^{-1}\left(\dfrac{2}{3}\right)$

    (4) $\sin^{-1}\left(\dfrac{3}{2}\right)$

21. In Young's double slit experiment, the ratio of maximum and minimum intensity of fringe system is 9 : 1. Ratio of amplitude, is

    (1) 2 : 1   (2) 3 : 1

    (3) 9 : 1   (4) 8 : 1

22. In the circuit shown, the currents i_1 and i_2 are

    (1) i_1 = 1.5 A, i_2 = 0.5 A

    (2) i_1 = 0.5 A, i_2 = 1.5 A

    (3) i_1 = 1 A, i_2 = 3 A

    (4) i_1 = 3 A, i_2 = 1 A

23. In the given network, the value of C, so that an equivalent capacitance between A and B is 3 μF, is

(1) $\dfrac{1}{5}\mu F$

(2) $\dfrac{31}{5}\mu F$

(3) 48 μF

(4) 36 μF

24. The torque required to hold a small circular coil of 10 turns, area 1 mm^2 and carrying a current of $\left(\dfrac{21}{44}\right)$A in the middle of a long solenoid of 10^3 turns/m carrying a current of 2.5 A, with its axis perpendicular to the axis of the solenoid is

    (1) 1.5 × 10^{-6} N-m

    (2) 1.5 × 10^{-8} N-m

    (3) 1.5 × 10^{+6} N-m

    (4) 1.5 × 10^{+8} N-m

25. The photoelectric threshold wavelength for silver is λ_0. The energy of the electron ejected from the surface of silver by an incident wavelength $\lambda(\lambda < \lambda_0)$ will be

    (1) $hc(\lambda_0 - \lambda)$

    (2) $\dfrac{hc}{\lambda_0 - \lambda}$

    (3) $\dfrac{h}{c}\left(\dfrac{\lambda_0 - \lambda}{\lambda\lambda_0}\right)$

    (4) $hc\left(\dfrac{\lambda_0 - \lambda}{\lambda\lambda_0}\right)$

26. Earth is moving around the Sun (at O) in elliptical orbit as shown. The ratio of OB and OA is R. Then the ratio of earth's velocity at A and B is

    (1) R^{-1}

    (2) $\sqrt{R}$

    (3) R

    (4) $R^{2/3}$

27. The refraction through the prisms are as shown. Pick out the WRONG statement from the following. Path of the light ray in

(a)   (b)

(c)   (d)
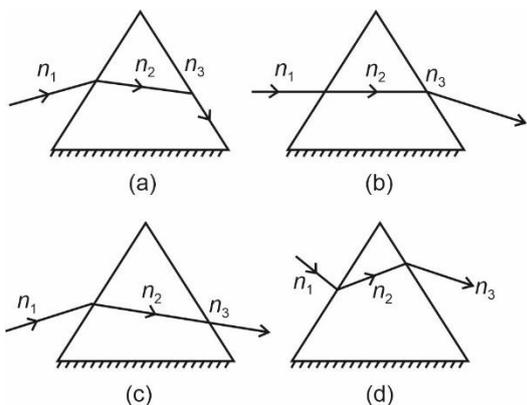
(1) a is correct if $n_2 > n_1$ and $n_2 > n_3$

(2) b is correct if $n_1 = n_2$ and $n_2 > n_3$

(3) c is correct if $n_2 < n_1$ and $n_2 = n_3$

(4) d is correct if $n_1 > n_2$ and $n_2 < n_3$

28. The speed of light in media M_1 and M_2 are 1.5×10^8 ms^{-1} and 2×10^8 ms^{-1} respectively. A ray travels from medium M_1 to the medium M_2 with an angle of incidence θ. The ray suffers total internal reflection. Then the value of the angle of incidence θ is

(1) $> \sin^{-1}\left(\dfrac{3}{4}\right)$

(2) $< \sin^{-1}\left(\dfrac{3}{4}\right)$

(3) $= \sin^{-1}\left(\dfrac{4}{3}\right)$

(4) $\leq \sin^{-1}\left(\dfrac{3}{4}\right)$

29. A uniform electric field in the plane of the paper is as shown. Here A, B, C, D are the points on the circle. V_A, V_B, V_C and V_D are the potentials at those points respectively. Then
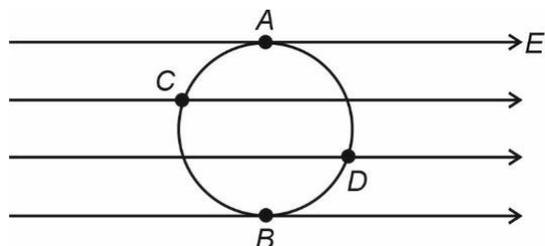
(1) $V_A = V_C$, $V_B = V_D$

(2) $V_A = V_C$, $V_B > V_D$

(3) $V_A < V_C$, $V_B > V_D$

(4) $V_A = V_B$, $V_C = V_D$

30. Two concentric spheres of radii R and r have positive charges q_1 and q_2 with equal surface charge densities σ. What is the electric potential at their common centre?

(1) $\dfrac{\sigma}{\varepsilon_0}(R+r)$

(2) $\dfrac{\sigma}{\varepsilon_0}(R-r)$

(3) $\dfrac{\sigma}{\varepsilon_0}\left(\dfrac{1}{R}+\dfrac{1}{r}\right)$

(4) $\dfrac{\sigma}{\varepsilon_0}\left(\dfrac{R}{r}\right)$

31. When a potential difference of 10^3 V is applied between A and B, a charge of 0.75 mC is stored in the system of capacitors as shown. The value of C is (in μF)
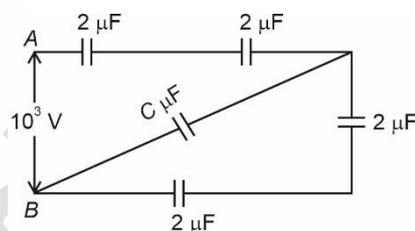
(1) $\dfrac{1}{2}$

(2) 2

(3) 2.5

(4) 3

32. See the diagram. Area of each plate is 2.0 m^2 and $d = 2 \times 10^{-3}$ m. A charge of 8.85×10^{-8} C is given to Q, then the potential of Q becomes
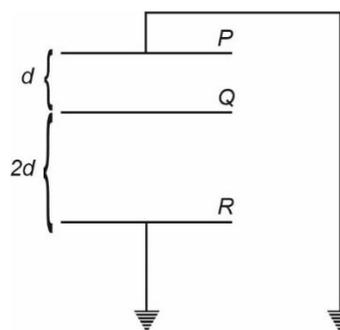
(1) 13 V

(2) 10 V

(3) 6.67 V

(4) 8.825 V

33. In the circuit diagram, heat produced in R, $2R$ and $1.5R$ are in the ratio of
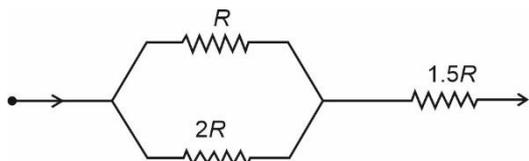
(1) 4 : 2 : 3

(2) 8 : 4 : 27

(3) 2 : 4 : 3

(4) 27 : 8 : 4

34. A nucleus $_Z X^A$ emits an α-particle with velocity v. The recoil speed of the daughter nucleus is

(1) $\dfrac{A-4}{4v}$

(2) $\dfrac{4v}{A-4}$

(3) v

(4) $\dfrac{v}{4}$

35. The width of the depletion region in a P-N junction diode is

(1) Increased by reverse bias

(2) Increased by forward bias

(3) Decreased by reverse bias

(4) Independent of the bias voltage

36. When the transistor is used as an amplifier

(1) Emitter-base junction must be reverse biased, Collector-base junction must be forward biased.

(2) Emitter-base junction must be forward biased, Collector-base junction must be forward biased.

(3) Emitter-base junction must be reverse biased, Collector-base junction must be reverse biased.

(4) Emitter-base junction must be forward biased, Collector-base junction must be reverse biased.

37. Two cells of emf E_1 and E_2 are joined in opposition (such that $E_1 > E_2$). If r_1 and r_2 be the internal resistance and R be the external resistance, then the terminal potential difference is
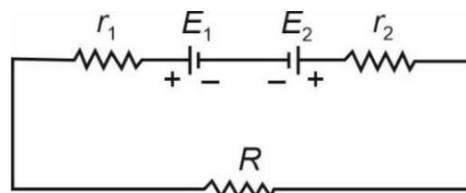
(1) $\dfrac{E_1 + E_2}{r_1 + r_2} \times R$

(2) $\dfrac{E_1 + E_2}{r_1 + r_2 + R} \times R$

(3) $\dfrac{E_1 - E_2}{r_1 + r_2} \times R$

(4) $\dfrac{E_1 - E_2}{r_1 + r_2 + R} \times R$

38. In the circuit shown below, the ammeter and the voltmeter readings are 3 A and 6 V respectively. Then the value of the resistance of R is
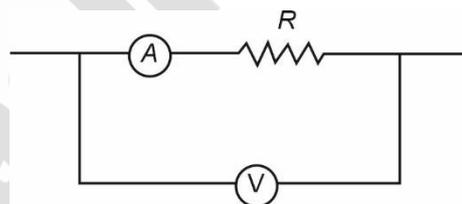
(1) $2\,\Omega$

(2) $> 2\,\Omega$

(3) $< 2\,\Omega$

(4) $\geq 2\,\Omega$

39. In Wheatstones network $P = 2\,\Omega$, $Q = 2\,\Omega$, $R = 2\,\Omega$ and $S = 3\,\Omega$. The resistance with which S is to be shunted in order that the bridge may be balanced is

(1) $1\,\Omega$

(2) $2\,\Omega$

(3) $4\,\Omega$

(4) $6\,\Omega$

40. The resistance of the bulb filament is $100\,\Omega$ at a temperature of 100°C. If its temperature co-efficient of resistance be 0.005 per °C. Its resistance will become $200\,\Omega$ at a temperature

(1) 300 °C

(2) 400 °C

(3) 500 °C

(4) 200 °C

41. If there is no torsion in the suspension thread, then the time period of a magnet executing SHM is

    (1) $T = \dfrac{1}{2\pi}\sqrt{\dfrac{MB}{I}}$ (2) $T = \dfrac{1}{2\pi}\sqrt{\dfrac{I}{MB}}$

    (3) $T = 2\pi\sqrt{\dfrac{I}{MB}}$ (4) $T = 2\pi\sqrt{\dfrac{MB}{I}}$

42. Core of electromagnets are made of ferromagnetic material which has

    (1) High permeability and low retentivity

    (2) High permeability and high retentivity

    (3) Low permeability and high retentivity

    (4) Low permeability and low retentivity

43. In an LCR circuit, at resonance

    (1) The current and voltage are in phase

    (2) The impedance is maximum

    (3) The current is minimum

    (4) The current leads the voltage by $\dfrac{\pi}{2}$

44. A transformer is used to light 100 W – 110 V lamp from 220 V mains. If the main current is 0.5 A, the efficiency of the transformer is

    (1) 90%   (2) 95%

    (3) 96%   (4) 99%

45. The efficiency of a Carnot engine which operates between the two temperatures $T_1 = 500$ K and $T_2 = 300$ K is

    (1) 50%   (2) 25%

    (3) 75%   (4) 40%

46. The ratio of hydraulic stress to the corresponding strain is known as

    (1) Compressibility

    (2) Bulk modulus

    (3) Young's modulus

    (4) Rigidity modulus

47. 1 gram of ice is mixed with 1 gram of steam. At thermal equilibrium, the temperature of the mixture is

    (1) 0 °C   (2) 100 °C

    (3) 50 °C   (4) 55 °C

48. A proton beam enters a magnetic field of 10^{-4} Wb m^{-2} normally. If the specific charge of the proton is 10^{11} C kg^{-1} and its velocity is 10^{9} ms^{-1}, then the radius of the circle described will be

    (1) 0.1 m   (2) 10 m

    (3) 100 m   (4) 1 m

49. In terms of Boolean algebra, $\left(A+\bar{B}\right).A$ is equal to_____.

    (1) B (2) $\bar{B}$

    (3) A (4) $\bar{A}$

50. Five identical resistors each of resistance $R = 1500\ \Omega$ are connected to a 300 V battery as shown in the circuit. The reading of the ideal ammeter A is
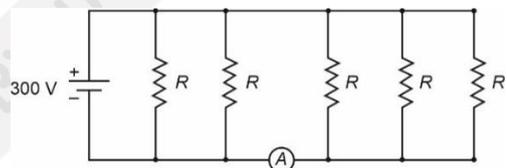
    (1) $\dfrac{1}{5}$ A   (2) $\dfrac{3}{5}$ A

    (3) $\dfrac{2}{5}$ A   (4) $\dfrac{4}{5}$ A

51. The correct Biot-Savart law in vector form is

    (1) $d\vec{B} = \dfrac{\mu_0}{4\pi}\dfrac{I\left(d\vec{l}\times\vec{r}\right)}{r^2}$

    (2) $d\vec{B} = \dfrac{\mu_0}{4\pi}\dfrac{I\left(d\vec{l}\times\vec{r}\right)}{r^3}$

    (3) $d\vec{B} = \dfrac{\mu_0}{4\pi}\dfrac{Id\vec{l}}{r^2}$

    (4) $d\vec{B} = \dfrac{\mu_0}{4\pi}\cdot\dfrac{Id\vec{l}}{r^3}$

52. The magnetic flux linked with a coil varies as $\phi = 3t^2 + 4t + 9$. The magnitude of the emf induced at $t = 2$ seconds is

    (1) 8 V

    (2) 16 V

    (3) 32 V

    (4) 64 V

53. In Karnataka, the normal domestic power supply AC is 220 V, 50 Hz. Here 220 V and 50 Hz refer to

    (1) Peak value of voltage and frequency

    (2) rms value of voltage and frequency

    (3) Mean value of voltage and frequency

    (4) Peak value of voltage and angular frequency

54. An object is placed at a distance of 20 cm from the pole of a concave mirror of focal length 10 cm. The distance of the image formed is

    (1) 20 cm   (2) 10 cm

    (3) 5 cm   (4) 40 cm

55. A candle placed 25 cm from a lens forms an image on a screen placed 75 cm on the other side of the lens. The focal length and type of the lens should be

    (1) +18.75 cm and convex lens

    (2) −18.75 cm and concave lens

    (3) +20.25 cm and convex lens

    (4) −20.25 cm and concave lens

56. In Young's double slit experiment, two wavelength $\lambda_1 = 780$ nm and $\lambda_2 = 520$ nm are used to obtain interference fringes. If the nth bright band due to λ_1 coincides with $(n + 1)^{th}$ bright band due to λ_2, then the value of n is

    (1) 4   (2) 3

    (3) 2   (4) 6

57. The maximum kinetic energy of emitted photoelectrons depends on

    (1) Intensity of incident radiation

    (2) Frequency of incident radiation

    (3) Speed of incident radiation

    (4) Number of photons in the incident radiation

58. A proton and an α particle are accelerated through the same potential difference V. The ratio of their de Broglie wavelengths is

    (1) $\sqrt{2}$

    (2) $2\sqrt{2}$

    (3) $\sqrt{3}$

    (4) $2\sqrt{3}$

59. An electron is moving in a circle of radius r in a uniform magnetic field B. Suddenly the field is reduced to $\dfrac{B}{2}$. The radius of the circular path now becomes

    (1) $\dfrac{r}{2}$ (2) $2r$

    (3) $\dfrac{r}{4}$ (4) $4r$

60. A charge q is accelerated through a potential difference V. It is then passed normally through a uniform magnetic field, where it moves in a circle of radius r. The potential difference required to move it in a circle of radius $2r$ is

   (1) 2V   (2) 4V

    (3) 1V   (4) 3V

CHEMISTRY

61. Calculate the relation between ΔH and ΔU when solid benzoic acid is completely oxidized in the presence of oxygen at 27°C and 1 atm pressure.

    (1) $\Delta H = \Delta U$

    (2) $\Delta H = \Delta U + 150R$

    (3) $\Delta H = \Delta U - 150R$

    (4) $\Delta H = \Delta U + 300R$

62. Which of the following can show both Frenkel and Schottky defect?

    (1) ZnS   (2) NaCl

    (3) AgBr   (4) CsBr

63. Which of following does not belong to first transition series?

    (1) Ni   (2) W

    (3) Cr   (4) Mn

64. Oxidation of which compound will not form organic molecule?

    (1) CH_3—CH_2—OH   (2) CH_3—CHO

    (3) $CH_3 - \overset{\overset{\displaystyle CH_3}{|}}{CH} - OH$ (4) HCOOH

65. Which of the following does not form ether as major product?

    (1) ⟨⟩—$O^{\ominus}Na^+ + CH_3 - Br \rightarrow$

    (2) $CH_3 - CH_2 - O^{\ominus}Na^+ + CH_3 - Br \rightarrow$

    (3) $H_3C - \overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C}} - \overset{\ominus}{O} Na^+ + CH_3 - Br \rightarrow$

    (4) $CH_3 - CH_2 - O^{\ominus}Na^+ + H_3C - \overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C}} - Br \rightarrow$

66. What is the shape of XeO_2F_2?

    (1) See-saw

    (2) T-shape

    (3) Trigonal planar

    (4) Octahedral

67. Primary valency of Ni in $[Ni(CO)_4]$ is

    (1) Zero   (2) +2

    (3) +4   (4) +6

68. The maximum number of linear atoms in 2-butyne

    (1) 6   (2) 4

    (3) 3   (4) 2

69. Which of the following is correct order as mentioned in bracket?

    (1) $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$ (Reducing character)

    (2) $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$ (Thermal stability)

    (3) $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$ (Boiling point)

    (4) $PH_3 < AsH_3 < NH_3 < SbH_3 < BiH_3$ (Basicity)

70. Hybridization and shape of complex $[Ni(CO)_4]$ are

    (1) sp^3, tetrahedral

    (2) dsp^2, square planar

    (3) sp^3d^2, octahedral

    (4) dsp^2, tetrahedral

71. What is the correct order of boiling point of isomeric 1°, 2° and 3° alcohol?

    (1) 1° > 2° > 3°

    (2) 3° > 2° > 1°

    (3) 2° > 1° > 3°

    (4) 2° > 3° > 1°

72. The amine can be formed in the following reaction is

$$CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - NH_2 \xrightarrow{Br_2 + NaOH}$$
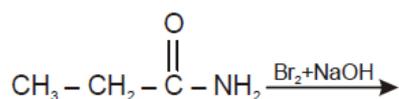
   (1) $CH_3 - CH_2 - NH_2$

   (2) $CH_3 - NH_2$

   (3) $CH_3 - NH - CH_3$

   (4) $CH_3 - CH_2 - CH_2 - NH_2$

73. Iodoform reaction is given by which of the following?

   (1) $CH=CH-\overset{\overset{O}{\|}}{C}-CH_3$

   (2)

   (3) $H_3C - CH_2 - \overset{\overset{O}{\|}}{C} - H$

   (4) $-CH=O$
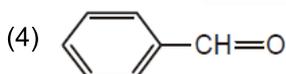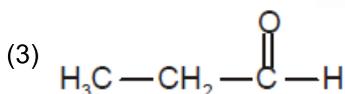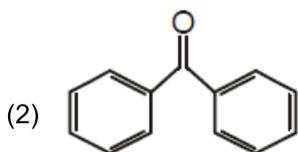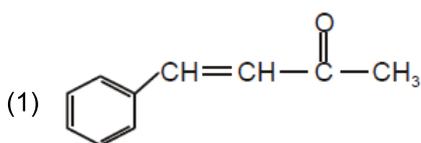
74. What is the name of the following reaction?
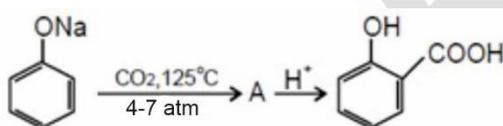
   (1) Reimer-Tiemann reaction

   (2) Kolbe's reaction

   (3) Friedel-Crafts reaction

   (4) Williamson's synthesis

75. IUPAC name of

   $CH_3 - CH_2 - O - CH_2 - CH_3$ is

   (1) Diethyl ether

   (2) Ethoxy ethane

   (3) Butanone

   (4) Butanol

76. Reaction between A and B is carried out for different initial concentrations and the corresponding rate are measured.

   The data are listed in the table

Entry	$[A]_0$(M)	$[B]_0$(M)	Rate (Msec^{-1})
1	0.1	0.1	10^{-4}
2	0.1	0.2	2×10^{-4}
3	0.2	0.2	8×10^{-4}

   The orders with respect to A and B respectively are

   (1) One and One   (2) Two and One

   (3) One and Two   (4) Two and Two

77. For Freundlich adsorption isotherm, which is a correct graph?

   (1)   (2)

   (3)   (4)
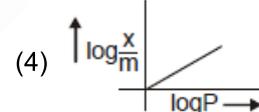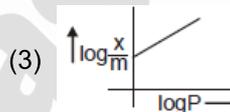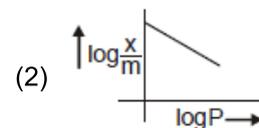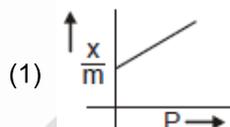
78. Graphite is an example of

   (1) Ionic solid   (2) Covalent solid

   (3) Molecular solid   (4) Metallic crystal

79. Which of the following is incorrect about catalyst?

   (1) It shortens the time to reach equilibrium

   (2) It does not change equilibrium constant

   (3) It makes a non-spontaneous reaction to spontaneous reaction

   (4) It alters the reaction mechanism

80. What is the value of free energy change for the following cell reaction from the e.m.f. measurement?

   $Zn(s) + Cu^{2+}(aq) \longrightarrow Zn^{2+}(aq) + Cu(s)$

   (e.m.f. for the cell is 1.10 V)

   (1) –2.123 kJ   (2) +212.3 kJ

   (3) +2.123 kJ   (4) –212.3 kJ

81. Units of rate constant for first and zero order reaction in terms of molarity 'M' unit are respectively

    (1) s^{-1}, $M^{-1}s^{-1}$

    (2) s^{-1}, M

    (3) $M^{-1}s^{-1}$, s^{-1}

    (4) M, s^{-1}

82. In CsCl lattice, the coordination number of Cs^+ ion is

    (1) 2   (2) 4

    (3) 8   (4) 12

83. Which of the following does not give positive Tollens' test?

    (1) Acetone   (2) Fructose

    (3) Acetaldehyde   (4) Glucose

84. CH_3COOH $\xrightarrow[\substack{(ii)\ \Delta \\ (iii)\ P_2O_5}]{(i)\ NH_3}$ Product

    Identify the product.

    (1) CH_3NH_2 (2) CH_3CH_2CN

    (3) CH_3CN (4) CH_3CH_2OH

85. $CH_3-CHO \xrightarrow[\Delta]{dil.\ NaOH}$ Product.

    Identify the product.

    (1) CH_3COOH

    (2) $CH_3-CH=CH-CHO$

    (3) CH_3-CH_2-OH

    (4) $CH_3-CH=CH-CH_2-CHO$

86. The correct order of increasing first ionization potential is

    (1) C < B < Be < Li   (2) Li < B < Be < C

    (3) B < C < Be < Li   (4) Be < Li < B < C

87. Which set represents isoelectronic species?

    (1) O^{2-}, Mg^{2+}, Al^{3+} (2) Be, Al^{3+}, Cl^-

    (3) H, H^+, H^- (4) Na^+, Ca^{2+}, Mg^{2+}

88. Among the following, the molecule with least dipole moment is

    (1) CH_3Cl (2) CH_2Cl_2

    (3) $CHCl_3$ (4) CH_4

89. Which of the following acid is known as oil of vitriol?

    (1) HCl   (2) H_2SO_4

    (3) HNO_3 (4) HF

90. The reactivity order of following towards nucleophilic addition reaction

    HCHO, CH_3CHO, CH_3COCH_3
      (I)   (II)   (III)

    (1) I > II > III   (2) III > II > I

    (3) I > III > II   (4) II > III > I

91. The decreasing order of basic nature of alkali metal hydroxides follows the order

    (1) CsOH > RbOH > KOH > NaOH > LiOH

    (2) LiOH > NaOH > KOH > RbOH > CsOH

    (3) LiOH > CsOH > RbOH > KOH > NaOH

    (4) KOH > NaOH > LiOH > RbOH > CsOH

92. The property of the alkaline earth metals that decreases with their atomic number, is

    (1) Metallic nature

    (2) Solubility of their hydroxides

    (3) Solubility of their sulphates

    (4) Metallic radius

93. Which of the following does not give Tollens' test?

    (1) C_2H_2

    (2) HCHO

    (3) CH_3CHO

    (4) 2-Butyne

94. Which of the following is not an interstitial compound?

    (1) TiC   (2) VC

    (3) WC   (4) SiC

95. Which of the following does not form black ppt. of sulphide?

    (1) PbS (2) Ag_2S

    (3) HgS (4) Sb_2S_3

96. When hydrogen sulphide gas is passed in an acidified $K_2Cr_2O_7$ solution, the oxidation number of sulphur is changed from

    (1) +4 to +6 (2) –2 to +4

    (3) –2 to 0 (4) +2 to 0

97. Which pair gives Cl_2 at room temperature?

    (1) Conc. HCl + $KMnO_4$

    (2) NaCl + CH_3COOH

    (3) NaCl + $K_2Cr_2O_7$ + Conc. H_2SO_4

    (4) NaCl + Conc. H_2SO_4

98. 3-phenyl propene on reaction with HBr gives (as major product)

    (1) $C_6H_5CH_2CH(Br)CH_3$

    (2) $C_6H_5CH(Br)CH_2CH_3$

    (3) $C_6H_5CH_2CH_2CH_2Br$

    (4) $C_6H_5CH(Br)CH=CH_2$

99. When $K_4[Fe(CN)_6]$ is added to $FeCl_3$ solution, Prussian blue colour appears due to formation of

    (1) $Fe(OH)_3$ (2) $Fe_4[Fe(CN)_6]_3$

    (3) $K_2Fe[Fe(CN)_6]$ (4) $Fe_3[Fe(CN)_6]_4$

100. Identify the gas A.

    $$NH_4NO_2 \xrightarrow{\Delta} H_2O + A$$

    (1) N_2O (2) N_2

    (3) NO_2 (4) N_2O_4

101. Which of the following statements is correct about amorphous solids?

    (1) They are anisotropic

    (2) They have sharp melting point

    (3) They are isotropic

    (4) They have long range ordered arrangement of particles

102. What is the concentration of urea solution having an osmotic pressure of 0.821 atm at 300 K?

    (1) 0.66 M (2) 0.32 M

    (3) 0.066 M (4) 0.033 M

103. What is the order of radioactive reaction?

    (1) Zero (2) One

    (3) Two (4) Three

104. Which of the following statement is true?

    (1) Nature of adsorbent will not affect the amount of adsorption

    (2) Increase of temperature always increase the amount of adsorption

    (3) Physisorption is multilayered

    (4) Chemisorption is multilayered

105. Reactivity order of alkyl halide for S_N1 reaction is

    (1) R - F > R - Cl > R - Br > R - I

    (2) R - I > R - Br > R - Cl > R - F

    (3) R - Cl > R - I > R - F > R - Br

    (4) R - Br > R - Cl > R - F > R - I

106. Out of following, which oxide is neutral?

    (1) SiO_2 (2) Al_2O_3

    (3) BeO (4) NO

107. Which of the following does not contain –COOH group?

    (1) Aspirin (2) Benzoic acid
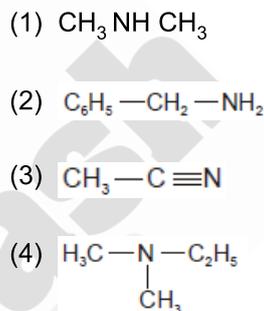
    (3) Picric acid (4) Salicylic acid

108. The number of peptide bonds present in tripeptide is

(1) 3

(2) 2

(3) 4

(4) 5

109. An ether is more volatile than an alcohol having the same molecular formula. This is due to

(1) Dipolar character of ethers

(2) Alcohols have resonance structures

(3) Intermolecular hydrogen bonding in ethers

(4) Intermolecular hydrogen bonding in alcohols

110. Regarding solubility of gas which of the following is correct?

(1) Higher the value of Henry's law constant at given pressure, the lower is the solubility of gas in the liquid

(2) Solubility of gas in a liquid decrease with increase in temperature and pressure

(3) The dissolution of gas in a liquid is exothermic process

(4) All of these

111. Which carbon-halogen bond has the lowest bond enthalpy?

(1) C – Br

(2) C – Cl

(3) C – F

(4) C – I

112. Formaldehyde can be distinguished from acetaldehyde by

(1) Fehling solution

(2) Schiff's reagent

(3) Iodoform test

(4) Tollen's test
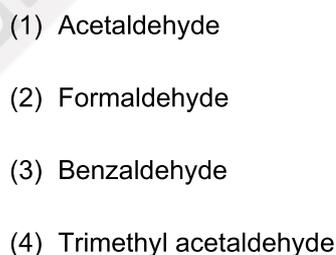
113.
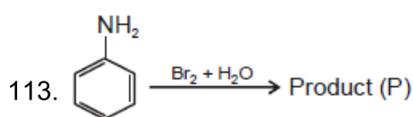
Identify the product P.

(1)   (2)

(3)   (4)
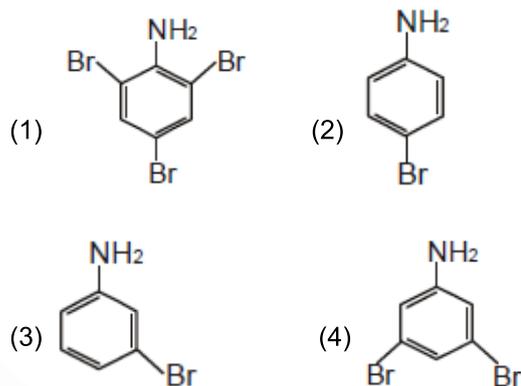
114. Which of the following gives carbylamine reaction?

(1) $CH_3\,NH\,CH_3$

(2) $C_6H_5-CH_2-NH_2$

(3) $CH_3-C\equiv N$

(4) $H_3C-\underset{\underset{CH_3}{|}}{N}-C_2H_5$

115. Cannizzaro's reaction is not given by

(1) Acetaldehyde

(2) Formaldehyde

(3) Benzaldehyde

(4) Trimethyl acetaldehyde

116. What is the number of precipitable halide ions in $[Pt(NH_3)Cl_2Br]Cl$?

(1) 2

(2) 3

(3) 4

(4) 1

117. What is the shape of BrF_3?

(1) See-saw

(2) T-shape

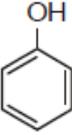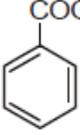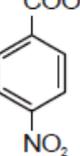(3) Octahedral

(4) Trigonal planar
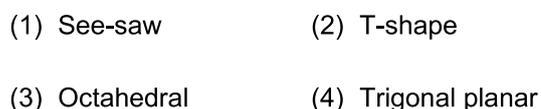
118. Which among the following is strongest base?

    (1) $C_6H_5NH_2$
    (2) $(C_6H_5)_2NH$

    (3) CH_3NH_2
    (4) $(CH_3)_2NH$

119. Which of the following pair has same hybridization for central atom?

    (1) XeF_6, BrF_5
    (2) XeF_6, SF_6

    (3) I_3^-, XeF_2
    (4) XeF_4, SF_4

120. Which of the following has highest pK_a?

(1) OH (phenol)

(2) COOH (benzoic acid)

(3) OH (cyclohexanol)

(4) COOH with NO₂ (4-nitrobenzoic acid)

□ □ □