SAKSHI

JEE-MAIN

MOCK TEST-1

QUESTION PAPER

MATHEMATICS

1. Given a cube $ABCD\,A_1\,B_1\,C_1\,D_1$ with lower base ABCD, upper base $A_1\,B_1\,C_1\,D_1$ and the lateral edges $AA_1, BB_1, CC_1, and\ DD_1$; M and M_1 are the centres of the faces ABCD and $A_1B_1C_1D_1$ respectively. O is a point on line MM_1, such that

   $\overline{OA} + \overline{OB} + \overline{OC} + \overline{OD} = \overline{OM_1}$ *Then* $\overline{OM} = \lambda\overline{OM_1}$ *if* $\lambda =$

   1) $\dfrac{1}{4}$ 2) $\dfrac{1}{2}$ 3) $\dfrac{1}{6}$ 4) $\dfrac{1}{8}$

Answer: 1

2. Equation of the plane parallel to the planes $x + 2y + 3z = 5, x + 2y + 3z - 7 = 0$ and equidistant from them is

   1) $x + 2y + 3z = 6$ 2) $x + 2y + 3z = 1$ 3) $x + 2y + 3z + 6 = 0$ 4) $x + 2y + 3z + 1 = 0$

Answer: 1

3. A spherical iron ball 10 cm in radius is coated with a layer of ice of uniform thickness that melts at a rate of 50 cm^3 /min. when the thickness of ice is 5 cm, then the rate at which the thickness of ice decreases is

   1) $\dfrac{1}{36\pi}cm/\min$ 2) $\dfrac{1}{18\pi}cm/\min$ 3) $\dfrac{1}{54\pi}cm/\min$ 4) $\dfrac{5}{6\pi}cm/\min$

Answer: 2

4. Let $R = \{(2,3),(3,4)\}$ be a relation defines on $A = \{1,2,3,4,\}$. The minimum number of ordered pairs required to be added in R so that enlarged relation be comes an equivalence relation is

   1) 3   2) 5   3) 7   4) 9

Answer: 3

5. Let the line $\dfrac{x-2}{3} = \dfrac{y-1}{-5} = \dfrac{z+2}{2}$ lie in the plane $x + 3y - \alpha z + \beta = 0.$ then (α, β) equals to

   1) $(-6,7)$ 2) $(5,-15)$ 3) $(-5,5)$ 4) $(6,-17)$

Answer: 1

6. If the roots of the equation $x^3 - ax^2 + 4x - 8 = 0$ are real and positive, then the minimum value of a is

   1) 2   2) 6   3) $3\sqrt[3]{4}$ 4) $\sqrt[3]{4}$

Answer: 2

7. The sum of the products of the 2n numbers $\pm 1, \pm 2, \pm 3, \ldots, \pm n$ taking two at a time is

1) $-\dfrac{n(n+1)}{2}$
2) $\dfrac{n(n+1)(2n+1)}{6}$
3) $\dfrac{-n(n+1)(2n+1)}{6}$
4) $\dfrac{n(n+1)}{2}$

Answer: 3

8. Given $lx^2 - mx + 5 = 0$ does not have distinct real roots then minimum value of $5l + m$ is
1) 5
2) -5
3) 1
4) -1

Answer: 4

9. Extremities of a diagonal of rectangle are (0,0) and (4,3). The equations of the tangents to the circum circle of the rectangle which are parallel to this diagonal are
1) $16x + 8y \pm 25 = 0$
2) $6x - 8y \pm 25 = 0$
3) $8x + 6y \pm 25 = 0$
4) $8x - 6y \pm 25 = 0$

Answer: 2

10. If $A = \cot^{-1}\sqrt{\tan\theta} - \tan^{-1}\sqrt{\tan\theta}, then \tan\left(\dfrac{\pi}{4} - \dfrac{A}{2}\right)$ is equal to

1) $\sqrt{\cot\theta}$
2) $\tan\theta$
3) $\sqrt{\tan\theta}$
4) $\cot\theta$

Answer: 3

11. The set of values of 'b' for which the origin and the point (1,1) lie on the same side of the straight line $a^2 x + aby + 1 = 0 \forall a \in R, b > 0$ are
1) $b \in (2,4)$
2) $b \in (0,2)$
3) $b \in [0,2]$
4) $b \in [2,4]$

Answer: 2

12. If $P = \begin{bmatrix} \dfrac{\sqrt{3}}{2} & \dfrac{1}{2} \\ \dfrac{-1}{2} & \dfrac{\sqrt{3}}{2} \end{bmatrix}, A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} and Q = PAP^T$, then $P^T\left(Q^{2005}\right)P$ is equal to

1) $\begin{bmatrix} 1 & 2005 \\ 0 & 1 \end{bmatrix}$
2) $\begin{bmatrix} \sqrt{3}/2 & 2005 \\ 1 & 0 \end{bmatrix}$
3) $\begin{bmatrix} 1 & 2005 \\ \sqrt{3}/2 & 1 \end{bmatrix}$
4) $\begin{bmatrix} 1 & \sqrt{3}/2 \\ 0 & 2005 \end{bmatrix}$

Answer: 1

13. Let p be the statement "x is an irrational number", q be the statement "y is a transcendental number". And r be the statement "x is a rational number iff y is a transcendental number".
    Statement-1: r is equivalent to either q or p
    Statement- 2 : r is equivalent to $\sim(p \leftrightarrow \sim q)$.
    1) Statement-1 is false, Statement-2 is true

2) Statement-1 is true, Statement-2 is true ; Statement-2 is a correct explanation for Statement-1

3) Statement-1 is true , Statement-2is true; Statement-2 is not a correct explanation for Statement-1

4) Statement-1 is false, Statement-2 is false

Answer: 4

14. If $f\left(\dfrac{3x-4}{3x+4}\right) = x+2,$ then $\int f(x)\,dx = \dfrac{2}{3}x + \dfrac{k}{3}\log|x-1| + c,$ where k is equal to

1) -4   2) 4   3) -8   4) 8

Answer: 3

15. If the focal distance of an end of the minor axis of any ellipse (referred to its axes as the axes of x and y respectively) is k and the distance between the foci is 2h, then its equation is

1) $\dfrac{x^2}{k^2} + \dfrac{y^2}{k^2+h^2} = 1$ 2) $\dfrac{x^2}{k^2} + \dfrac{y^2}{h^2-k^2} = 1$ 3) $\dfrac{x^2}{k^2} + \dfrac{y^2}{k^2-h^2} = 1$ 4) $\dfrac{x^2}{k^2} + \dfrac{y^2}{h^2} = 1$

Answer: 3

16. $\displaystyle\lim_{x\to\frac{\pi}{2}} \dfrac{\left[1-\tan\left(\dfrac{x}{2}\right)\right][1-\sin x]}{\left[1+\tan\left(\dfrac{x}{2}\right)\right][\pi-2x]^2}$ is

1) ∞ 2) $\dfrac{1}{8}$ 3) 0   4) $\dfrac{1}{32}$

Answer: 3

17. If $\displaystyle\int_0^{\pi} xf\left(\sin^3 x + \cos^2 x\right)dx = k\int_0^{\pi/2} f\left(\sin^3 x + \cos^2 x\right)dx$ *Then* $k = \underline{\quad}$

1) $\dfrac{\pi}{2}$ 2) π 3) 2π 4) 3π

Answer: 2

18. A man alternately tosses a coin and throws a dice beginning with the coin. The probability that he gets a head before he gets 5 or 6 in the dice is

1) $\dfrac{3}{4}$ 2) $\dfrac{1}{2}$ 3) $\dfrac{1}{3}$ 4) $\dfrac{1}{5}$

Answer: 1

19. If the points $A(x, y+z), B(y, z+x)\ and\ C(z, x+y)$ are such that $AB = BC$, then x, y, z are in

1) A.P   2) G.P   3) H.P   4) A.G.P

Answer: 1

20. If the second term in the expansion $\left(\sqrt[13]{a} + \dfrac{a}{\sqrt{a^{-1}}} \right)^{n}$ is $14a^{5/2}$ then the value of $\dfrac{{}^{n}C_{3}}{{}^{n}C_{2}}$ is

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

Answer: 3

21. If m = number of distinct rational numbers $\dfrac{p}{q} \in (0,1)$ such that $p, q \in \{1, 2, 3, 4, 5\}$ and

n = number of onto mappings from $\{1, 2, 3\}$ to $\{1, 2\}$, then m – n is

1) 1   2) -1   3) 0   4) 3

Answer: 4

22. In a triangle ABC, medians AD and BE are drawn. If AD = 4, $\angle DAB = \dfrac{\pi}{6}$ and $\angle ABE = \dfrac{\pi}{3}$, then the area of the Δ ABC is

1) $\dfrac{64}{3}$ 2) $\dfrac{8}{3}$ 3) $\dfrac{16}{3}$ 4) $\dfrac{32}{3\sqrt{3}}$

Answer: 4

23. The area of the smaller part bounded by the semi-circle $y = \sqrt{4 - x^2}$, $y = x\sqrt{3}$ and x-axis is

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

Answer: 2

24. If $|z - 1| + |z + 3| \leq 8$, then the range of values of $|z - 4|$ is

1) $(0, 8)$ 2) $[0, 8]$ 3) $[1, 9]$ 4) $[5, 9]$

Answer: 3

25. Let $A = \begin{pmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{pmatrix}$ and $10B = \begin{pmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{pmatrix}$. If B is the inverse of matrix A, then α is

1) 5   2) -1   3) 2   4) -2

Answer: 1

26. The maximum distance from origin to a point on the curve $x = a\sin t - b\sin\left(\dfrac{at}{b}\right)$

$y = a\cos t - b\cos\left(\dfrac{at}{b}\right)$, both a, b > 0 is

1) $a - b$ 2) $a + b$ 3) $\sqrt{a^2 + b^2}$ 4) $\sqrt{a^2 - b^2}$

Answer: 2

27. Coordinates of any point on the parabola, whose focus is $\left(\dfrac{-3}{2}, -3\right)$ and the directrix is $2x + 5 = 0$ is given by

1) $\left(2t^2 + 2, 2t - 3\right)$ 2) $\left(2t^2 - 2, 2t - 3\right)$ 3) $\left(2t^2 - 2, 2t + 3\right)$ 4) $\left(2t^2 + 2, 2t + 3\right)$

Answer: 2

28. Mean of 25 observations was found to be 78.4. But later on it was found that 96 was misread as 69. The correct mean is

1) 79.48   2) 76.54   3) 81.32   4) 78.4

Answer: 1

29. If for real value of x, $\cos\theta = x + \dfrac{1}{x}$, then

1) θ is an acute angle   2) θ is a right angle

3) θ is an obtuse angle   4) no value of θ is possible

Answer: 4

30. If y is a function of x and $\log(x + y) - 2xy = 0$, then the value of $y^1(0)$ is equal to

1) 1   2) -1   3) 2   4) 0

Answer: 1

PHYSICS

31. A block of mass M is pulled along a horizontal frictionless surface by a rope of mass *m*. If a force *F* is applied at the free end of the rope, the net force exerted on the rope will be

1) F 2) $\dfrac{FM}{M + m}$ 3) $\dfrac{Fm}{M + m}$ 4) $\dfrac{FM}{M - m}$

Answer: 3

32. Two plane concave lenses of glass of refractive index 1.5 have radii of curvature 20 cm and 30 cm respectively. They are placed in contact with the curved surfaces towards each other and the space between them is filled with a liquid of refractive index $\frac{5}{2}$. The focal length of the combination is

1) 6 cm 　　　　　　 2) –92 cm 　　　　　　 3) 108 cm 　　　　　　 4) 12 cm

Answer: 4

33. A body of mass m slides downward along a plane inclined at an angle α. The coefficient of friction is μ. The rate at which kinetic energy plus gravitational potential energy dissipates expressed as a function of time is

1) $\mu m t g^2 \cos\alpha$ 　　　　　　　　　 2) $\mu m t g^2 \cos\alpha(\sin\alpha - \mu\cos\alpha)$

3) $\mu m t g^2 \sin\alpha$ 　　　　　　　　　 4) $\mu m t g^2 \sin\alpha(\sin\alpha - \mu\cos\alpha)$

Answer: 2

34. An enemy plane is flying horizontally at an altitude of 2km with a speed of 300m/s. An army man with an anti-aircraft gun on the ground sights the enemy plane when it is directly overhead and fires a shell with a muzzle velocity of 600m/s. At what angle with the vertical should the gun fired so as to hit the plane?

1) 60^0 　　　　　　 2) 45^0 　　　　　　 3) 30^0 　　　　　　 4) 75^0

Answer: 3

35. In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength 600 nm is used. If the wavelengii of light is changed to 400 nm, number of fringes observed in the same segment of the screen is given by

1) 12 　　　　　　 2) 18 　　　　　　 3) 24 　　　　　　 4) 30

Answer: 2

36. A standing wave set up in a medium is represented by $y = 4 \cos\frac{\pi x}{3}\sin 40\pi t$ where x and y are in cm and t in sec. Find the distance between adjacent nodes

1) 3 cm 　　　　　　 2) 6 cm 　　　　　　 3) 1.5 cm 　　　　　　 4) 12 cm

Answer: 1

37. The wave disturbance propagating in the positive x-direction is given by $y = \frac{1}{1+x^2}$ at t = 0 and $y = \frac{1}{\left[1+(x-1)^2\right]}$ at t = 2 sec. Find the velocity of the wave. (x and y are in cm)

1) 0.5 cm/sec 　　　　　　 2) 1 cm/sec 　　　　　　 3) 2 cm/sec 　　　　　　 4) 4 cm/sec

Answer: 1

38. A light rod is pivoted at one end so that it can swing freely as a pendulum. Two masses 2m and m are attached to it at distances b and 3b respectively from the pivot. The rod is held horizontal and then released. The angular acceleration at the instant it is released is

1) $\dfrac{3mg}{4b}$
2) $\dfrac{g}{b}$
3) $\dfrac{5g}{11b}$
4) $\dfrac{11g}{5b}$

Answer: 3

39. An open end organ pipe and a closed organ pipe have same length. The ratio of frequencies of their nth overtone is

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

Answer: 2

40. A star with a mass of more than three times that of the sun contracts so much upon cooling that it loses its capacity to radiate; neither material particles nor light are able to overcome its gravitational field (such an object is called a "black hole"). Taking mass of sun to be $2\times10^{30}\,kg$, the radius of such an object could be (approximately)

1) 6 km
2) 7 km
3) 8 km
4) 9 km

Answer: 4

41. Water from a tap emerges vertically downwards with an initial speed of 1 ms^{-1}. The cross sectional area of the tap is $10^{-4}\,m^2$. Assume that the pressure is constant throughout the stream of water and that the flow is steady. The cross-sectional area of the stream 0.15 m below the tap is

1) $5\times10^{-4}m^2$
2) $1\times10^{-5}m^2$
3) $5\times10^{-5}m^2$
4) $2\times10^{-5}m^2$

Answer: 3

42. Two sirens situated 1 km apart are producing sound of frequency 330 Hz. A boy starts moving from one siren to the other with a speed of 2 m/s. If the speed of sound is 330 m/s, the no. of beats heard by the boy per second is

1) 2
2) 4
3) 1
4) 3

Answer: 2

43. A particle has an initial velocity 9 m/s due east and a constant acceleration of 2 m/s^2 due west. The distance covered by the particle in the fifth second of its motion is

1) 0
2) 0.5 m
3) 2 m
4) none of these

Answer: 2

44. The wavelength of K_α X-ray line of an element of atomic number Z = 11 is λ. The wave length of K_α X-ray line of another element of atomic number Z_1 is 4λ. Then Z_1 is
   1) 11 2) 44 3) 6 4) 4

Answer: 3

45. A weight 'W' is attached to the end of a small rope of diameter 'd' is raised vertically by winding the rope on a reel as shown. If the reel is turned uniformly at the rate of 'n' revolutions per second , what will be the tension in the rope ? Neglect weight of the rope and slight lateral motion of the suspended weigh W
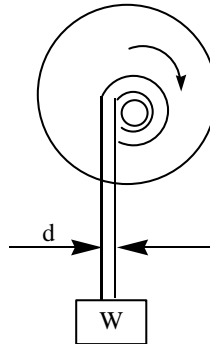
   1) $W\left(1+\dfrac{\pi n^2 d}{g}\right)$ 2) $W\left(1+\dfrac{2\pi n^2 d}{g}\right)$ 3) $W\left(1+\dfrac{4\pi n^2 d}{g}\right)$ 4) $W\left(1+\dfrac{8\pi n^2 d}{g}\right)$

Answer: 2

46. If $\vec{E} = \left(3\vec{i} + 4\vec{j} + 8\vec{k}\right)$ N/c, the electric flux through a surface area 100 m^2 lying in x-y plane is
   1) $200 Nm^2 c^{-1}$ 2) $400 Nm^2 c^{-1}$ 3) $600 Nm^2 c^{-1}$ 4) $800 Nm^2 c^{-1}$

Answer: 4

47. Two points charges +9q and +q are kept at a distance d from each other. A third charge –Q is placed at a distance x from +9q on the line joining the above charges. If all the charges are in equilibrium, then x is equal to
   1) $\dfrac{3d}{4}$ 2) $\dfrac{d}{2}$ 3) $\dfrac{3d}{8}$ 4) $\dfrac{4d}{3}$

Answer: 1

48. A proton, a deuteron and an alpha particle are accelerated through potentials of V , 2V and 4V respectively. Their velocities will bear a ratio
   1) 1:1:1 2) $1:\sqrt{2}:1$ 3) $\sqrt{2}:1:1$ 4) $1:1:\sqrt{2}$
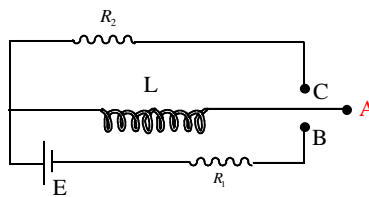
Answer: 4

49. PQ is an infinite current carrying conductor. AB and CD are smooth conducting rods on which a conductor EF moves with constant velocity V as shown. The force needed to maintain constant speed of EF is

1) $\dfrac{1}{VR}\left[\dfrac{\mu_o IV}{2\pi}\ln\left(\dfrac{b}{a}\right)\right]^2$

2) $VR\left[\dfrac{\mu_o IV}{2\pi}\ln\left(\dfrac{b}{a}\right)\right]^2$

3) $\dfrac{V}{R}\left[\dfrac{\mu_o IV}{2\pi}\ln\left(\dfrac{b}{a}\right)\right]^2$
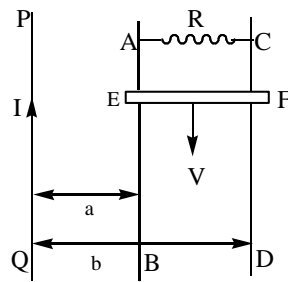
4) $\dfrac{R}{V}\left[\dfrac{\mu_o IV}{2\pi}\ln\left(\dfrac{b}{a}\right)\right]^2$

Answer: 1

50. The circuit shown in the figure consists of a battery of emf E, resistances R_1 and R_2, inductance L and a two way switch ABC. First A is connected to B for a long time and then A is connected to C. The total heat produced in R_2 is

1) $L\dfrac{E^2}{R_1^2}$

2) $\dfrac{LE^2}{4R_1^2}$

3) $\dfrac{LE^2}{2R_1^2}$

4) $\dfrac{LE^2}{2R_1 R_2}$

Answer: 3

51. $\displaystyle\int\dfrac{dv}{\sqrt{2av-v^2}}=a^n\sin^{-1}\left[\dfrac{x}{a}-1\right]$ on the basis of dimensional analysis, the value of n is :

1) 0   2) -2   3) 3   4) none of these

Answer: 1

52. The relation between time t and distance x is $t = ax^2 + bx$, where a and b are constants. If v is velocity of particle the acceleration of particle will be

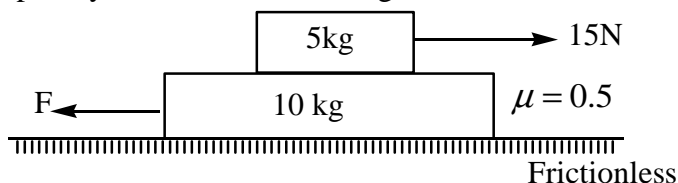1) $-2abv^2$ 2) $2bv^3$ 3) $-2av^3$ 4) $2av^2$

Answer: 3

53. The given hinge construction consists of two rhombus with the ratio 3 : 2. The vertex A_2 moves in the horizontal direction with a velocity v. The velocity of A_1 is :
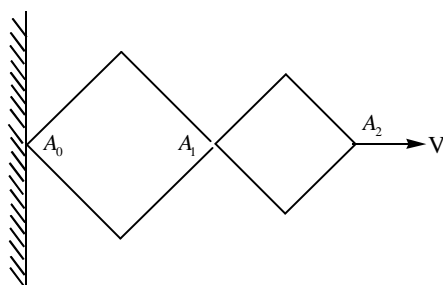
1) 0.6 V   2) 0.7 V   3) 3 V   4) 2 V

Answer: 1

54. The blocks are acted upon by forces as shown in figure

The friction coefficient between the two blocks is $\mu = 0.5$. What maximum force 'F' can be applied on lower block so that there will be no relative motion between the two bodies?
1) 15 N   2) 25 N   3) 40 N   4) 45 N

Answer: 4

55. H^+, He^+ and O^+ all having the same kinetic energy pass through a region in which there is a uniform magnetic field perpendicular to their velocity. The masses of H^+, He^+ and O^{+2} and 1 amu, 4 amu and 16 amu respectively, then
1) H^+ will be deflected most   2) O^{+2} will be deflected most
3) H^+ and O^{+2} will be deflected equally   4) All will be deflected equally

Answer: 1

56. A metal rod of cross- sectional area 2.0 cm^2 is being heated at one end. At some instant the temperature gradient is 5.0^0 C / cm at cross-section A and in 2^0 c / cm at cross – section B. The heat capacity of the part AB of the rod is 0.5 J / ^{0}C. Thermal conductivity of the material of the rod = 200 w / m ^{0}C. Neglect any loss of heat to the atmosphere. Calculate the rate at which the temperature is increasing in the part of AB of the rod.
1) 24 ^{0}C / sec   2) 40 ^{0}C / sec   3) 16 ^{0}C / sec   4) 48 ^{0}C / sec

Answer: 1

57. A thermally insulated piece of metal is heated under atmosphere by an electric current so that it receives electric energy at a constant power P. This leads to an increase of the absolute temperature T of the metal with time t as follows $T = at^{1/4}$ Then, the heat capacity C_P is :

1) $\dfrac{4PT^3}{a^4}$ 2) $\dfrac{4PT^2}{a^3}$ 3) $4PT^2$ 4) none of these

Answer: 1

58. The mean lives of a radioactive substance are 1620 years and 405 years for α-emission and β-emission respectively. The time during which three fourth of a sample will decay if it is decaying both by α-emission and β-emission simultaneously.

1) 449 years   2) 349 years   3) 249 years   4) 149 years

Answer: 1

59. **Assertion(A) :** Invar steel is used to prepare clock pendulum
   Reason (R) : The coefficient of linear expansion of invar steel is infinity.
   1) A and R are correct and R is correct explanation for A
   2) A and R are correct and R is not correct explanation for A
   3) A is true and R is false   4) A is wrong and R is true

Answer: 3

60. **Assertion (A) :** Platinum is used to fuse into glass tube.
   Reason (R) : Both platinum and glass have almost same values of coefficient of linear expansion
   1) A and R are correct and R is correct explanation for A
   2) A and R are correct and R is not correct explanation for A
   3) A is true and R is false
   4) A is wrong and R is true

Answer: 1

CHEMISTRY

61. In an experiment 50 mL of 0.1 M solution of a salt reacted with 25 mL of 0.1 M solution of sodium sulphite.The half equation for the oxidation of sulphite ion is $SO_3^{2-}(aq) + H_2O(l) \longrightarrow SO_4^{2-}(aq) + 2H^+(aq) + 2e^-$. If the oxidation number of metal in the salt was 3, what would be the new oxidation number of the metal?

    1) Zero   2) 1   3) 2   4) 4

Answer: 3

62. A and B are two allotropes of an element. One gram of A will differ from one gram of B in

    1) oxidation number   2) chemical composition
    3) total number of atoms   4) atomic arrangement

Answer: 4

63. Which one of the following will most readily be dehydrated in acidic conditions?
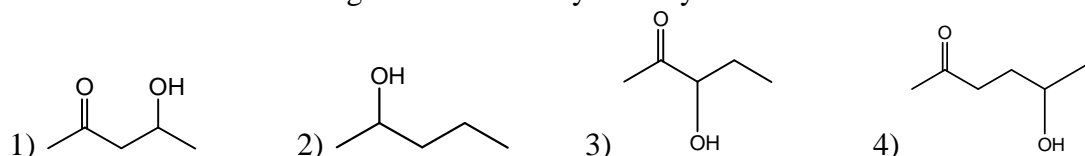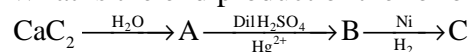

Answer: 1

64. Molecular size of ICl and Br_2 is nearly same, but boiling point of ICl is about 40°C higher than that of Br_2. This might be due to

    1) I–Cl bond is stronger than Br–Br bond
    2) ionisation energy of I< ionization energy of Br
    3) ICl is polar whereas Br_2 is non-polar
    4) The size of I > size of Br

Answer: 3

65. A mixture of $Al(OH)_3$ and $Fe(OH)_3$ can be separated easily by treating it with

    1) HCl   2) NH_4OH 3) HNO_3 4) NaOH

Answer: 4

66. What is the end product of the following sequence of operations?

    $CaC_2 \xrightarrow{H_2O} A \xrightarrow[Hg^{2+}]{Dil\,H_2SO_4} B \xrightarrow[H_2]{Ni} C$

    1) Methyl alcohol   2) Acetaldehyde
    3) Ethyl alcohol   4) Ethylene

Answer: 3

67. Two isotopes P and Q of atomic weights 10 and 20, respectively are mixed in equal amounts by weight. After 20 days, their weight ratio is found to be 1 : 4. Isotope P has a half – life of 10 days. The half-life of isotope Q is

1) zero   2) 5 days   3) 20 days   4) infinite

Answer: 4

68. The crystals of ferrous sulphate on heating give

1) $FeO + SO_2 + H_2O$ 2) $Fe_2O_3 + SO_3 + H_2O$

3) $Fe_2O_3 + SO_2 + SO_3 + H_2O$ 4) $FeO + SO_3 + H_2SO_4 + H_2O$

Answer: 3

69. A compound A of formula $C_3H_6Cl_2$ on reaction with alkali can give B of formula C_3H_6O or C of formula C_3H_4. B , on oxidation gives a compound of the formula $C_3H_6O_2$. C with dilute H_2SO_4 containing Hg^{2+} ion gives D of formula C_3H_6O, which with bromine and NaOH gives the sodium salt of $C_2H_4O_2$. Then A is

1) $CH_3CH_2CHCl_2$ 2) $CH_2CCl_2CH_3$ 3) $CH_2ClCH_2CH_2Cl$ 4) $CH_3CHClCH_2Cl$

Answer: 1

70. A substance will be deliquescent if its vapour pressure is
1) equal to the atmospheric pressure
2) equal to that of water vapour in the air
3) greater than that of water vapour in their air
4) lesser than that of water vapour in the air

Answer: 4

71. When PCl_5 reacts with sulphuric acid, sulphuryl chloride (SO_2Cl_2) is formed as the final product. This shows that sulphuric acid
1) is a dibasic acid   2) has great affinity for water
3) has two hydroxyl groups in its structure.
4) is a derivative of sulphur dioxide

Answer: 3

72. Identify X in the sequence, $X \xrightarrow[(ii)H_2O/H^+]{(i)CH_3MgCl} C_5H_{12}O \xrightarrow[375K]{Cu} C_5H_{10}$

1) $CH_3 - \underset{\underset{O}{\|}}{C} - CH_2CH_3$ 2) $CH_3CH_2CH_2CH_2CHO$

3) $(CH_3)_2 CHCHO$ 4) $CH_3CH_2CH_2CH_2OH$

Answer: 1

73. Peptization is a process of
     1) precipitating colloidal particles
     2) Converting a sol into a gel
     3) dispersing a precipitate into colloidal state
     4) Removal of impurities of true solution state from a colloid

Answer: 3

74. The solubility of noble gases in water shows the order
     1) He > Ar > Kr > Ne > Xe   2) He > Ne > Ar > Ar > Xe
     3) Xe > Kr > Ar > Ne > He   4) None of the above

Answer: 3

75. The correct order of decreasing acid strength of trichloroaceticacid (A), trifluoroacetic acid (B), acetic acid (C) and formic acid (D), is
     1) A > B > C > D   2) A > C > B > D   3) B > A > D > C   4) B > D > C > A

Answer: 3

76. For the reaction, $N_2O_5 \longrightarrow 2NO_2 + \dfrac{1}{2}O_2$

     Given, $-\dfrac{d[N_2O_5]}{dt} = k_1[N_2O_5]$; $\dfrac{d[NO_2]}{dt} = k_2[N_2O_5]$; and $\dfrac{d[O_2]}{dt} = k_3[N_2O_5]$

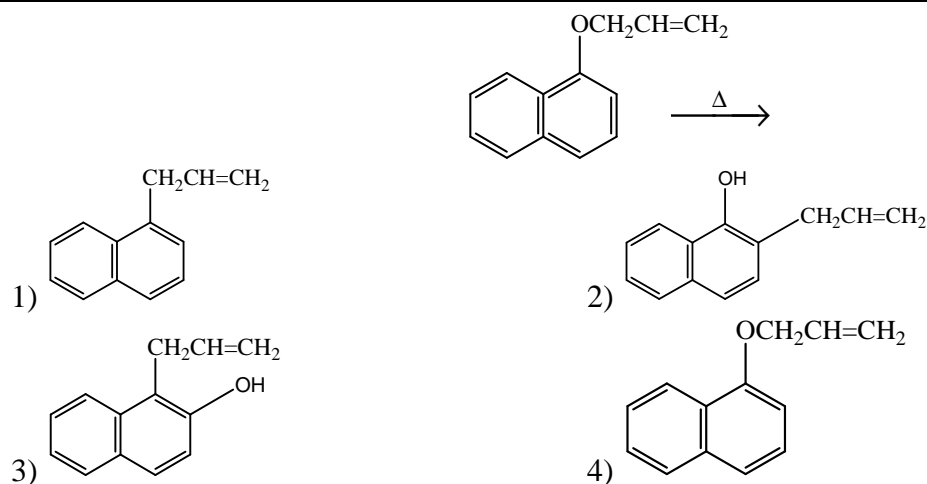   The relation between k_1, k_2 and k_3, is

     1) $2k_1 = k_2 = 4k_3$ 2) $k_1 = k_2 = k_3$ 3) $2k_1 = 4k_2 = k_3$ 4) $k_1 = 2k_2 = 4k_3$

Answer: 1

77. Which one is the most likely structure of $CrCl_3 \cdot 6H_2O$, if $\dfrac{1}{3}^{rd}$ of total chlorine of the compound is precipitated by adding $AgNO_3$ to its aqueous solution?

     1) $CrCl_3 \cdot 6H_2O$ 2) $\left[Cr(H_2O)_3 Cl_3\right] \cdot (H_2O)_3$

     3) $\left[CrCl_2(H_2O)_4\right] \cdot Cl \cdot 2H_2O$ 4) $\left[CrCl(H_2O)_5\right]Cl_2 \cdot H_2O$

Answer: 3

78. The product formed in the given reaction is

Answer: 2

79. The decomposition of N_2O_4 to NO_2 is carried out at 280 K in chloroform. When equilibrium has been established, 0.2 mole of N_2O_4 and 2×10^{-3} mole of NO_2 are present in a 2 L solution. The equilibrium constant for the reaction, $N_2O_4 \rightleftharpoons 2NO_2$, is

1) 1×10^{-2} 2) 2×10^{-3} 3) 1×10^{-5} 4) 2×10^{-5}

Answer: 3

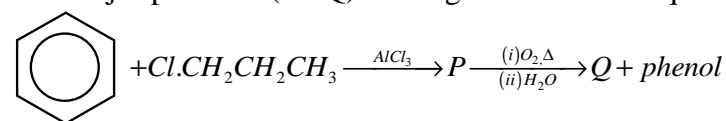80. Tests on an aqueous solution of a sodium salt having an anion X^{n-} gave the following results

Anion, $X^{n-} \xrightarrow{K_2Cr_2O_7+H_2SO_4}$ Green solution; $X^{n-} \xrightarrow{Pb(NO_3)_2(aq)}$ Black precipitate

Which one of the following could be X^{n-} ?

1) I^- 2) NO_2^- 3) S^{2-} 4) SO_4^{2-}

Answer: 3

81. The major products (P&Q) in the given reaction sequence are

$+Cl.CH_2CH_2CH_3 \xrightarrow{AlCl_3} P \xrightarrow[(ii)H_2O]{(i)O_2,\Delta} Q + phenol$

1) , and CH_3CHO 2) , and CH_3COCH_3

3) , and CH_3COCH_3 4) , and CH_3CH_2CH

Answer: 3

82. A weak acid $HX\left(K_a = 1\times10^{-5}\right)$ on reaction with NaOH gives NaX. For 0.1 M aqueous solution of NaX, the per cent hydrolysis is
1) 0.001%　　　　2) 0.01%　　　　3) 0.15%　　　　4) 1%

Answer: 2

83. The given cell is $\dfrac{Pt\left(H_2\right)\,||\,H^+\left(1M\right)\,||\,H^+\left(1M\right)\,|\,\left(H_2\right)Pt}{p_1\left(atm\right)\qquad\qquad\qquad p_2\left(atm\right)}$. The cell reaction will be spontaneous if
1) $p_1 = p_2$　　　　2) $p_1 > p_2$　　　　3) $p_2 > p_1$　　　　4) $p_1 = 1atm$
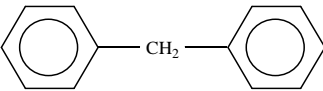
Answer: 2

84. Glucose gives many reactions of aldehyde because
1) it is hydrolysed to acetaldehyde
2) it is a polyhydroxy ketone
3) it is a cyclic aldehyde
4) it is a hemiacetal in equilibrium with its aldehyde form in solution

Answer: 4

85. For a reversible process at T = 300 K, the volume of 2 moles of an ideal gas is increased from 1 L to 10 L. The ΔH for isothermal change is
1) 11.47 kJ　　　　2) 4.98 kJ　　　　3) 0　　　　4) 11.47 Kj

Answer: 3

86. The molecular formula of diphenyl methane is $C_{13}H_{12}$. How many structural isomers are possible when one of the hydrogens is replaced by a chlorine atom?
1) 6　　　　2) 4　　　　3) 8　　　　4) 7

Answer: 2

87. Bases common to DNA and RNA are
1) adenine, cytosine, uracil　　　　2) guanine, adenine, cytosine
3) guanine, uracil, thymine　　　　4) adenine, thymine, guanine

Answer: 2

88. Na^+ ion is smaller in size than Na atom. Correct statement among the following is
1) nucleus in each case contains different nucleons

2) sodium atom has an electron less than the sodium ion

3) sodium atom has 11 electrons while sodium ion has 10 electrons with same nuclear positive charge

4) the force of attraction is less in Na^+ ion than in Na atom

Answer: 3

89.   The optically active tartaric acid is named as $D-(+)-$ tartaric acid because it is

1) dextro rotatory and derived from D-glucose

2) dextro rotatory and so it has D-configuration

3) dextro rotatory and derived from $D-(+)-$ glyceraldehyde

4) dextro rotatory when substituted by deuterium

Answer: 3

90.   Of the following which is a step-growth polymer?
1) Bakelite   2) Polyethylene   3) Teflon   4) PVC

Answer: 1