SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SENIOR | ASSIGNMENT | Date: 24-04-2020
Time: 3 Hours | | Max. Marks:

MATHEMATICS-IIA

Syllabus: DOT PRODUCT

1. **If** $|\vec{a}|=11, |\vec{a}-\vec{b}|=30, |\vec{a}+\vec{b}|=20$ **then** $|\vec{b}|=$

1) 11 2) 41 3) 23 4) 19

2. **The number of distinct real values of** λ, **for which the vectors** $-\lambda^2\hat{i}+\hat{j}+\hat{k}, \hat{i}-\lambda\hat{j}+\hat{k}$ **and** $\hat{i}-\hat{j}-\lambda^2\hat{k}$ **are coplanar is.**

1) zero 2) one 3) two 4) three

3. **Let** $a=i$ **be a vector which makes an angle** 120^0 **with a unit vector b, then the unit vector** $(a+b)$ **is**

1) $-\frac{1}{2}i+\frac{\sqrt{3}}{2}j$ 2) $\frac{-\sqrt{3}}{2}i+\frac{1}{2}j$ 3) $\frac{i}{2}+\frac{\sqrt{3}}{2}j$ 4) $\frac{\sqrt{3}}{2}i-\frac{1}{2}j$

4. **Let** $\vec{a}=\hat{i}+\hat{j}+\hat{k}, \vec{b}=\hat{i}-\hat{j}+2\hat{k}$ **and** $\vec{c}=x\hat{i}+(x-2)\hat{j}-\hat{k}$. **If the vector** $\vec{c}$ **lies in the plane of** $\vec{a}$ **and** $\vec{b}$, **then** x **equals**

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

5. **The magnitude of mutually perpendicular forces a, b and c are 2,10, and 11 respectively. Then the magnitude of its resultant is**

1) 12 2) 15 3) 9 4) None

6. **A unit vector a makes an angle** $\frac{\pi}{4}$ **with z-axis. If** $\hat{a}+\hat{i}+\hat{j}$ **is a unit vector, then** $\hat{a}$ **is equal to**

1) $\frac{\hat{i}}{2}+\frac{\hat{j}}{2}+\frac{\hat{k}}{\sqrt{2}}$ 2) $\frac{\hat{i}}{2}+\frac{\hat{j}}{2}-\frac{\hat{k}}{\sqrt{2}}$ 3) $-\frac{\hat{i}}{2}-\frac{\hat{j}}{2}+\frac{\hat{k}}{\sqrt{2}}$ 4) None of these

7. **If the position vectors of A, B and C are respectively.** $2\hat{i}-\hat{j}+\hat{k}, \hat{i}-3\hat{j}-5\hat{k}$ **and** $3\hat{i}-4\hat{j}-4\hat{k}$, **then** $\cos^2 A$ **is equal to**

1) 0 2) $\frac{6}{41}$ 3) $\frac{35}{41}$ 4) 1

8. **If** a, b **and** c **are three non-zero vectors, no two of which are collinear. If the vector** $\overline{a}+2\overline{b}$ **is collinear with** $\vec{c}$, **and** $\vec{b}+3\vec{c}$ **is collinear with** $\vec{a}$, **then (**λ **being some non-zero scalar)** $\vec{a}+2\vec{b}+6\vec{c}$ **is equal to**

1) $\lambda\vec{a}$ 2) $\lambda\vec{b}$ 3) $\lambda\vec{c}$ 4) 0

9. **A particle acted by constant forces** $\overline{f}=4\hat{i}+3\hat{j}-3\hat{k}$ **and** $\overline{g}=3\hat{i}+\hat{j}-\hat{k}$ **experiences a displacement from the point** $\overline{a}=\hat{i}+2\hat{j}+3\hat{k}$ **to the point** $\overline{b}=5\hat{i}+4\hat{j}+\hat{k}$. **The total work done by the forces is**

1) 40 2) 42 3) 44 4) 46

10. $(a.\hat{i})\hat{i}+(a.\hat{j})\hat{j}+(a.\hat{k})\hat{k}=$

1) a 2) 2a 3) 0 4) 3a

11. If a,b,c are non-zero vectors such that $a.b = a.c$ then which statement is true

1) $b = c$ 2) $a \perp (b-c)$ 3) $b = c$ or $a \perp (b-c)$ 4) a parallel to $b-c$

12. Dot product of a vector $x\hat{i} + y\hat{j} + z\hat{k}$ with the vectors $3\hat{i} - 5\hat{k}, 2\hat{i} + 7\hat{j}$ and $\hat{i} + \hat{j} + \hat{k}$ vector is given by

1) $3\hat{i} - 2\hat{k}$ 2) $2\hat{i} + 3\hat{k}$ 3) $3\hat{i} + 2\hat{k}$ 4) none of these

13. The value of b such that scalar product of the vectors $i + j + k$ with the unit vector parallel to the sum of the vectors $(2i + 4j - 5k)$ and $(bi + 2j + 3k)$ is 1 is

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

14. If a unit vector lies in $yz-$plane and makes angles of 30^0 and 60^0 with the +ve y-axis and z-axis respectively. Then its components along the coordinate axes will be

1) $\frac{\sqrt{3}}{2}, \frac{1}{2}, 0$ 2) $0, \frac{\sqrt{3}}{2}, \frac{1}{2}$ 3) $\frac{\sqrt{3}}{2}, 0, \frac{1}{2}$ 4) $0, \frac{1}{2}, \frac{\sqrt{3}}{2}$

15. A vector whose modulus is $\sqrt{51}$ and makes the same angle with $\bar{a} = \frac{\hat{i} - 2\hat{j} + 2\hat{k}}{3}$ $\bar{b} = \frac{-4\hat{i} - 3\hat{k}}{5}$ and $c = \hat{j}$ will be

1) $5\hat{i} + 5\hat{j} + \hat{k}$ 2) $5\hat{i} + \hat{j} - 5\hat{k}$ 3) $5\hat{i} + \hat{j} + 5\hat{k}$ 4) $\pm(5\hat{i} - \hat{j} - 5\hat{k})$

16. The horizontal force and the force inclined at angle 60^0 with the vertical, whose resultant is in vertical direction of P kg are

1) P,2P 2) $P, P\sqrt{3}$ 3) $2P, P\sqrt{3}$ 4) $2P, 2\sqrt{3}P$

17. If ABCDEF is regular hexagon, the length of the whose side is a, then $\overrightarrow{AB}.\overrightarrow{AF} + \frac{\overrightarrow{BC}^2}{2} =$

1) a 2) a^2 3) $2a^2$ 4) 0

18. Let a,b and c be vectors with magnitudes 3,4 and 5 respectively and $a+b+c=0$, then the value of $a.b + b.c + c.a$ is

1) 47 2) 25 3) 50 4) -25

19. The non-zero vectors $\bar{a}, \bar{b}$ and $\bar{c}$ are related by $\vec{a} = 8\bar{b}$ and $\bar{c} = -7\bar{b}$. Then the angle between $\bar{a}$ & $\bar{c}$ is

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{2}$ 3) π 4) 0

20. The angle between $\bar{a}$ and $\bar{b}$ is $\frac{5\pi}{6}$ and the projection of $\bar{a}$ on $\bar{b}$ is $\frac{-9}{\sqrt{3}}$, then $|a|$ is equal to

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

<u>MATHEMATICS-IIB</u>

Syllabus: Errors and Approximations & Rate Measure

21. The approximate change in y when $y = x^2 + 2x, x = 3, \delta x = 0.01$

1) 3.6 2) 2.0 3) 0.08 4) 0.3

22. The differential of $f(x) = \sqrt{\frac{2-x}{2+x}}$ at $x = 0$ and $\delta x = 0.15$ is

1) 0.07 2) 0.075 3) -0.075 4) 0.015

23. The radius of height of a cylinder are measured as 5 cm and 10 cm and there is an error 0.02 cm is both the measurements by then the error in its volume is

1) 2.5π 2) 25π 3) 0.25π 4) 0.025π

24. While measuring the side of an equilateral triangle an error of 0.5% is made. The percentage error in its area is

1) 1 2) 1.5 3) 2 4) 2.5

25. When the radius of a sphere decreases from 3 cm 2.98 cm then the approximate decrease in volume of sphere is

1) $0.002\pi cm^3$ 2) $0.072\pi cm^3$ 3) $0.72\pi cm^3$ 4) $0.008\pi cm^3$

26. The height of a cylinder is equal to its radius. If an error of 1% is made in its height, then the percentage error in its volume is

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

27. Approximate volume of $\frac{1}{\sqrt[3]{8.08}}$

1) 0.49 2) 0.4983 3) 0.048 4) 0.483

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

1) 2 2) 1.4 3) 1.6 4) 1.8

29. A circular hole of 4 cms diameter and 12 cms deep in a metal block is rebored to increase the diameter to 4.12 cm then the amount of metal approximately removed is

1) 2.88π sq. cms 2) 3.99π sq. cms 3) 3.79π sq. cms 4) 3.725π sq cms

30. If $i=\alpha$, radians then the approximate value of $\cos\left(60^0 1'\right)$ is

1) $\frac{1}{2}+\frac{\alpha\sqrt{3}}{120}$ 2) $\frac{1}{2}-\frac{\alpha}{120}$ 3) $\frac{1}{2}-\frac{\alpha\sqrt{3}}{120}$ 4) $\frac{1}{2}+\frac{\alpha}{120}$

31. If the side of a cube increases at the rate of 0.02 cm/sec then the rate of increase in its volume when the side is 10 cm is

1) 6 c.c/sec 2) 2 c.c/sec 3) 3 c.c/sec 4) 10 c.c/sec

32. A kite flying at a height 'h' mts has x meters of string paid out at a time t seconds. If the kite moves horizontally with constant velocity v mts/sec then the rate at which the string is paid out is

1) $\sqrt{\frac{x^2-h^2}{v}}$ mt/sec 2) $\sqrt{x^2-h^2}$ mt/sec 3) $\frac{v\sqrt{x^2-h^2}}{x}$ mt/sec 4) $\sqrt{\frac{x^2-h^2}{h}}$ mt/sec

33. The velocity v of a particle moving along a straight line when it is at a distance x from the point of start is given by $a+bv^2=x^2$, then the acceleration is

1) $\frac{x}{b}$ 2) $\frac{x}{b^2}$ 3) $\frac{b}{x}$ 4) $\frac{b^2}{x}$

34. The displacement of a particle in time t is given by $s=t^3-t^2-8t-18$ the acceleration of the particle when its velocity is vanishes is

1) $15\,\text{units/sec}^2$ 2) $10\,\text{units/sec}^2$ 3) $5\,\text{units/sec}^2$ 4) $20\,\text{units/sec}^2$

35. If k is the diameter of a circle and A is the area of a sector of the circle whose vertical angle is θ then $\frac{dA}{dt}=$

1) $\frac{k^2}{8}\left(\frac{d\theta}{dt}\right)$ 2) $\frac{k^2}{8}\left(\frac{d\theta}{dt}\right)$ 3) $\frac{d\theta}{dt}$ 4) $k\left(\frac{d\theta}{dt}\right)$

36. The two measurements of a cylinder are varying in such away that the volume is kept constant, if the rates of change of the radius and height are equal and opposite in sign then which of the following is true

1) $r=2h$ 2) $2r=h$ 3) $r=h$ 4) $r=\frac{h}{3}$

37. An angle is increasing at a constant rate the rate of increases of tan when the angle is $\frac{\pi}{3}$ is

1) 4 times the increase of sine
2) 8 times the increase of cosine
3) 8 times the increase of sine
4) 4 times the increase of cosine

38. A wheel rotates so that the angle of rotation is proportional to the square of the time the first revolution was performed by the wheel for 8 seconds the angular velocity at this times is

1) π rad/sec
2) 2π rad/sec
3) $\frac{2}{\pi}$ rad/sec
4) $\frac{\pi}{3}$ rad/sec

39. Two cars started from a plane moving due east and other due to north with equal speed v, then the rate at which they were being separated from each other is

1) $\frac{\sqrt{2}}{v}$
2) $\frac{v}{\sqrt{2}}$
3) $\frac{1}{\sqrt{2}v}$
4) $\sqrt{2}v$

40. A man is approaching the foot of of a pole and height 'h' and at a speed of 6 min/sec the rate at which the man is approaching the peak of the pole when his distance from the foot is l units is

1) $\frac{b}{\sqrt{l^2+h^2}}$
2) $\frac{l}{\sqrt{l^2+h^2}}$
3) $\frac{l}{b\sqrt{l^2+h^2}}$
4) $\frac{lb}{\sqrt{l^2+h^2}}$

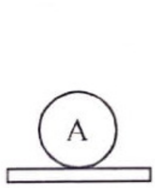
PHYSICS

Syllabus: Thermal properties of matter

41. Two rods of the same length and diameter having thermal conductivities K_1 and K_2 are joined in parallel. The equivalent thermal conductivity of the combination is

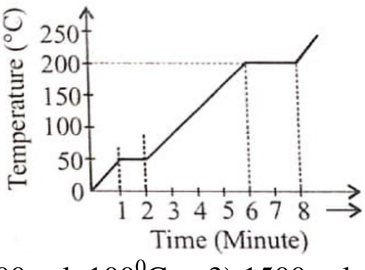
1) $\frac{K_1K_2}{K_1+K_2}$
2) K_1+K_2
3) $\frac{K_1+K_2}{2}$
4) $\sqrt{K_1K_2}$

42. Consider two identical iron spheres , one which lie on a thermally insulating plate, while the other hangs from an insulator thread. Equal amount of heat is supplied to the two spheres, then



1) temperature of A will be greater than B
2) temperature of B will be greater than A
3) their temperature will be equal
4) can't be predicted

43. A student takes 50gm wax (specific heat = 0.6 kcal/kg°C) and heats it till it boils. The graph between temperature and time is as follows. Heat supplied to the wax per minute and boiling point are respectively.



1) 500 cal, 50^0C
2) 1000 cal, 100^0C
3) 1500 cal, 200^0C
4) 1000 cal, 200^0C

44. Two rods of same length and area of cross-section A_1 and A_2 have their ends at the same temperature. If K_1 and K_2 are their thermal conductivities, c_1 and c_2 are their specific heats and d_1 and d_2 are their densities, then the rate of flow ahem is the same in both the rods if

1) $\frac{A_1}{A_2} = \frac{-k_1}{k_2}$ 2) $\frac{A_1}{A_2} = \frac{k_1 c_1 d_1}{k_2 c_2 d_2}$ 3) $\frac{A_1}{A_2} = \frac{k_2 c_1 d_1}{c_2 d_2 k_1}$ 4) $\frac{A_1}{A_2} = \frac{k_2}{k_1}$

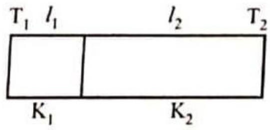
45. If α, β and γ are coefficient of linear, area and volume expansion respectively, then

1) $\gamma = 3\alpha$ 2) $\alpha = 3\gamma$ 3) $\beta = 3\alpha$ 4) $\gamma = 3\beta$

46. Two spheres of different materials one with double the radius and one-fourth wall thickness of the other are filled with ice. lithe time taken for complete melting lice in the larger sphere is 25 minute and for smaller one is 16 minute, the ratio of thermal conductivities of the materials of larger spheres to that of smaller sphere is

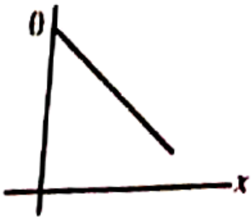
1) 4:5 2) 5:4 3) 25:8 4) 8:25

47. One end of a thermally insulated rod is kept at a temperature T_1, and the other at T_2. The rod is composed of two sections of length l_1 and l_2 and thermal conductivities K_1 and K_2 respectively. The temperature at the interface of the two sections is

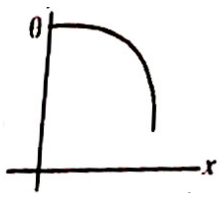


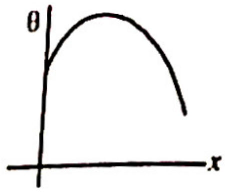
1) $\frac{(K_1 l_1 T_1 + K_2 l_2 T_2)}{(K_1 l_1 + K_2 l_2)}$ 2) $\frac{(K_2 l_2 T_2 - K_1 l_1 T_1)}{(K_1 l_1 + K_2 l_2)}$ 3) $\frac{(K_2 l_1 T_1 + K_1 l_2 T_2)}{(K_2 l_2 + K_1 l_2)}$ 4) $\frac{(K_1 l_2 T_1 + K_2 l_1 T_2)}{(K_1 l_2 + K_2 l_1)}$

48. A long metallic bar is carrying heat from one of its ends to the other end under steady-state. The variation of temperature θ along the length .v of the bar from its hot end is best described by which of the following figures?

1) 

2) 

3) 

4) 

49. Two rods of same length and transfer a given amount of heat 12 second, when they are joined as shown in figure (i). But when they are joined as shown in figure (ii), then they will transfer same heat in same conditions in

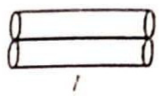


Fig (i)

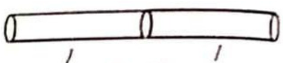
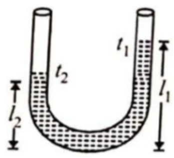


Fig. (ii)

1) 24 s 2) 13 s 3) 15 s 4) 48 s

50. In a vertical U-tube containing a liquid, the two arms are maintained at different temperatures t_1 and t_2. The liquid columns in the two arms have heights l_1 and l_2 respectively. The coefficient of volume expansion of the liquid is equal to



1) $\frac{l_1 - l_2}{l_2 t_1 - l_1 t_2}$ 2) $\frac{l_1 - l_2}{l_1 t_1 - l_2 t_2}$ 3) $\frac{l_1 + l_2}{l_2 t_1 + l_1 t_2}$ 4) $\frac{l_1 + l_2}{l_1 t_1 + l_2 t_2}$

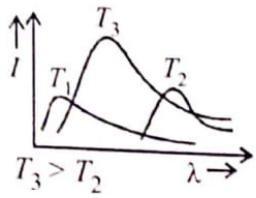
51. **Two rods, one of aluminum and the other made of steel, having initial length l_1 and l_2, are connected together to form a single rod of length l_1+l_2. The coefficients of linear expansion for aluminum and steel are α_a and α_s and respectively. If the length of each rod increases by the same amount when their temperature are raised by t^0C, then find the ratio $l_1/(l_1+l_2)$**

1) α_s/α_a 2) α_a/α_s 3) $\alpha_s/(\alpha_a+\alpha_s)$ 4) $\alpha_a/(\alpha_a+\alpha_s)$

52. **When the temperature of a rod increases from t to $t+\Delta t$, its moment of inertia increases from I to $I+\Delta I$. If α be the coefficient of linear expansion of the rod, then the value of $\frac{\Delta I}{I}$ is**

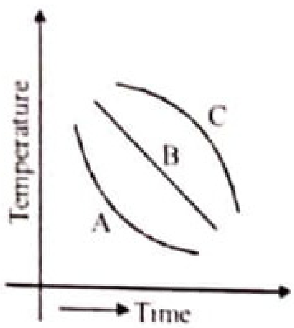
1) $2\alpha\Delta t$ 2) $\alpha\Delta T$ 3) $\frac{\alpha\Delta t}{2}$ 4) $\frac{\Delta t}{\alpha}$

53. **The plots or intensity versus wavelength for three black bodies at temperatures T_1, T_2, and T_3, respectively are as shown. Their temperature are such that**



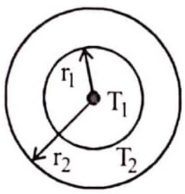
1) $T_1>T_2>T_3$ 2) $T_1>T_3>T_2$ 3) $T_2>T_3>T_1$ 4) $T_3>T_2>T_1$

54. **A block of steel heated to 100°C is left in a room to cool. Which of the curves shown in fig., represents the correct behavior?**



1) A 2) B 3) C 4) None of these

55. **The figure shows a system of two concentric spheres of radii r_1 and r_2 are kept at temperatures T_1 and T_2 respectively. The radial rate of flow of heat in a substance between the two concentric spheres is proportional to**



1) $\ln\left(\frac{r_2}{r_1}\right)$ 2) $\frac{(r_2-r_1)}{(r_1r_2)}$ 3) (r_2-r_1) 4) $\frac{r_1r_2}{(r_2-r_1)}$

56. **A wall has two layers A and B made of different materials. The thickness of both layers is the same. The thermal conductivity of A and B are K_A and K_B such that $K_A = 3K_B$. The temperature across the wall is 20^0C. In thermal equilibrium**

1) the temperature difference across A is 15^0C 2) the temperature difference across A is 15^0C

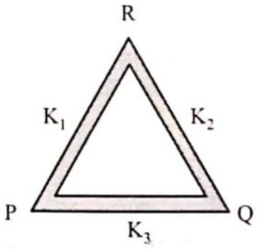
3) the temperature difference across A is 10^0C

4) the rate of transfer of heat through A is more than that through B

57. **A metallic rod l cm long, A square cm in cross-section is heated through t°C. If Young's modulus of elasticity of the metal is E and the mean coefficient of linear expansion is a per degree celsius, then the compressional force required to prevent the rod from expanding along its length is**

1) $EA\alpha t$ 2) $E\alpha t/(1+\alpha t)$ 3) $EA\alpha t/(1-\alpha t)$ 4) $El\alpha t$

58. **Three rods of same dimensions are arranged as shown in figure, have thermal conductivities K_1, K_2 and K_3 . The points P and Q arc maintained at different temperatures for the heat to flow at the same rate along PRQ and PQ. Then which of the following option is correct?**



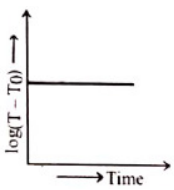
1) $K_3 = \frac{1}{2}(K_1 + K_2)$ 2) $K_3 = K_1 + K_2$ 3) $K_3 = \frac{K_1 K_2}{K_1 + K_2}$ 4) $K_3 = -2(K_1 + K_2)$

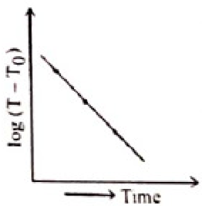
59. **If λ_m denotes the wavelength at which the radioactive emission from a block body at a temperature T K is maximum. Then**

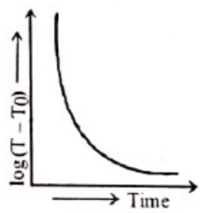
1) $\lambda_m \propto T^{-1}$ 2) $\lambda_m \propto T^4$

3) λ_m is independent of T 4) $\lambda_m \propto T$

60. **Which of the given graphs proves Newton's law of cooling?**

1) 

2) 

3) 

4) None of these

CHEMISTRY

Syllabus: Organic Chemistry

61. **Lassaigne's test is used in qualitative analysis to detect**

1) Nitrogen 2) Sulphur 3) Chlorine 4) All of these

62. **Kjeldahl's method is used in the estimation of**

1) Nitrogen 2) Halogens 3) Sulphur 4) Oxygen

63. **The best method for the separation of naphthalene and benzoic acid from their mixture is:**

1) distillation 2) sublimation 3) chromatography 4) crystallisation

64. **In a compound C, H and N atoms are present in 9 : 1 : 35 by weight. Molecular weight of compound is 108. Molecular formula of compound is**

1) $C_2H_6N_2$ 2) C_3H_4N 3) $C_6H_8N_2$ 4) $C_9H_{12}N_3$.

65. **The ammonia evolved from the treatment of 0.30 g of an organic compound for the estimation of nitrogen was passed in 100 mL of 0.1 M sulphuric acid. The excess of acid required 20 mL of 0.5 M sodium hydroxide solution for complete neutralization. The organic compound is**

1) urea 2) benzamide 3) acetamide 4) thiourea

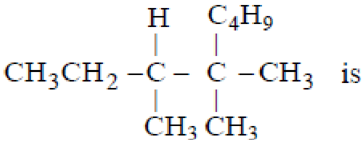
66. **The compound which has one isopropyl group is**

1) 2, 2, 3, 3 – Tetramethylpentane 2) 2, 2 - Dimethylpentane

3) 2, 2, 3- Trimethylpentane 4) 2- Methypentane

67. **Which of the following IUPAC names is correct?**

1) 2-Methyl-3-ethylpentane
2) 3-Ethyl-2-methylpentane
3) 2-Ethyl-3-methylpentane
4) 3-Methyl-2-ethylpentane

68. **The IUPAC name of**  is

1) 3, 4, 4- trimethylheptane
2) 3, 4, 4- trimethyloctane
3) 2- butyl -2-methyl-3-ethylbutane
4) 2-ethyl-3, 3- dimethylheptane

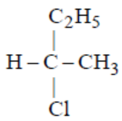
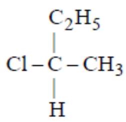
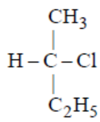
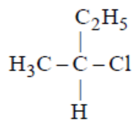
69. **IUPAC name of the given compound will be $(CH_3)_2C(CH_2CH_3)CH_2CH(Cl)CH_3$**

1) 5-chloro-3-, 3-dimethylhexane
2) 4-chloro-2-ethyl-2-methylpentane
3) 2-chloro-4-ethyl-4-methylpentane
4) 2-chloro-4, 4- dimethylhexane

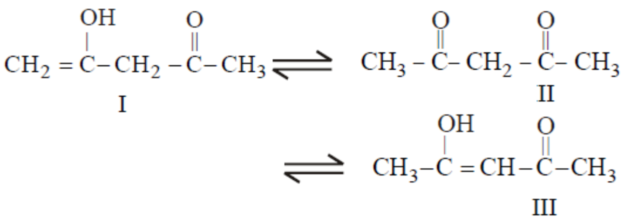
70. **$CH_3CH_2CH_2CH(CH=CH_2)CH_2CH_2CH_3$ is**

1) 4-ethenylheptane
2) 3-n-propyl-1-hexene
3) 4-ethenylhexane
4) 3-ethenylheptane

71. **$CH_3 – CHCl – CH_2 – CH_3$ has a chiral centre. Which one of the following represents its R-configuration?**

1) 
2) 
3) 
4) 

72. **The order of stability of the following tautomeric compounds is :**

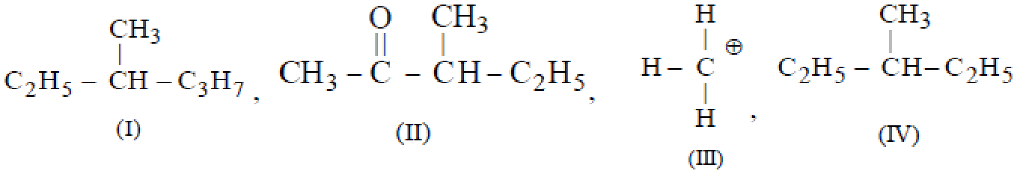


1) III > II > I
2) II > I > III
3)) II > III > I
4) I > II > III

73. **Which of the following does not show geometrical isomerism?**

1) 1,2-dichloro-1-pentene
2) 1,3-dichloro-2-pentene
3) 1,1-dichloro-1-pentene
4) 1,4-dichloro-2-pentene

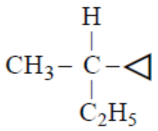
74. **Among the following four structures I to IV,**



it is true that

1) only I and II are chiral compounds
2) only III is a chiral compound
3) only II and IV are chiral compounds
4) all four are chiral compounds

75. **Amongst the following compounds, the optically active alkane having lowest molecular mass is**

1) 

2) $CH_3-CH_2-\underset{}{\overset{CH_3}{\overset{|}{C}H}}-CH_3$

3) $CH_3-CH_2-CH_2-CH_3$

4) $CH_3-CH_2-C\equiv CH$

76. **Markovnikov's rule is applicable to**

1) $CH_2 = CH_2$

2) $CH_3–CH_2–CH_3$

3) $CH_3–CH = CH–CH_3$

4) $(CH_3)_2C=C(CH_3)(C_2H_5)$

77. **Which alkene on ozonolysis gives CH3CH2CHO and CH3COCH3**

1) $CH_3CH_2CH=C(CH_3)_2$

2) $CH_3CH_2CH = CHCH_2CH_3$

3) $CH_3CH_2CH=CHCH_3$

4) $CH_3-\underset{\underset{CH_3}{|}}{C}=CHCH_3$

78. **Ozonolysis of C_7H_{14} gave 2-methyl-3-pentanone. The alkene is**

1) 2-ethyl-3-methyl-1-butene

2) 3-ethyl-2-methyl-3-butene

3) 2,5-dimethyl-3, 4-dimethylhex-3-ene

4) 3-ethyl-2-methyl-1-butene

79. **Baeyer's reagent is**

1) saturated $KMnO_4$ soln.

2) neutral $KMnO_4$ soln.

3) alkaline $KMnO_4$ soln.

4) acidic $KMnO_4$ soln.

80. **The most suitable catalyst for the hydrogenation of 2-Hexyne $\rightarrow$ 2-cis-Hexene is**

1) $Pd–BaSO_4$

2) $(Ph_3P)_3RhCl$

3) 10% Pd—C

4) Raney Ni

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SRIGAYATRI EDUCATIONAL INSTITUTIONS
INDIA

SENIOR
Time: 3 Hours

ASSIGNMENT

Date: 24-04-2020
Max. Marks:

KEY SHEET

MATHS-IIA

1) **3**	2) **3**	3) **3**	4) **4**	5) **2**	6) **3**	7) **3**	8) **4**	9) **3**	10) **1**
11) **3**	12) **4**	13) **4**	14) **2**	15) **4**	16) **3**	17) **4**	18) **4**	19) **3**	20) **2**

MATHS-IIB

21) **3**	22) **3**	23) **1**	24) **1**	25) **3**	26) **2**	27) **3**	28) **3**	29) **1**	30) **3**
31) **1**	32) **3**	33) **1**	34) **1**	35) **2**	36) **4**	37) **3**	38) **3**	39) **1**	40) **4**

PHYSICS

41) **3**	42) **2**	43) **3**	44) **4**	45) **1**	46) **4**	47) **4**	48) **1**	49) **4**	50) **1**
51) **3**	52) **1**	53) **2**	54) **1**	55) **4**	56) **2**	57) **1**	58) **3**	59) **1**	60) **2**

CHEMISTRY

61) **4**	62) **1**	63) **2**	64) **1**	65) **2**	66) **1**	67) **2**	68) **2**	69) **4**	70) **2**
71) **2**	72) **1**	73) **3**	74) **1**	75) **1**	76) **4**	77) **1**	78) **1**	79) **3**	80) **1**

HINTS & SOLUTOINS

MATHS-IIA

1. We have $\left|\vec{a}+\vec{b}\right|^2+\left|\vec{a}-\vec{b}\right|^2=2\left(\left|\vec{a}\right|^2+\left|\vec{b}\right|^2\right)$

$$\Rightarrow 400+900=2\left(121+\left|\vec{b}\right|^2\right)\Rightarrow\left|\vec{b}\right|^2=529$$

$$\Rightarrow\left|\vec{b}\right|=23$$

2. $$\begin{vmatrix}-\lambda^2 & 1 & 1\\ 1 & -\lambda^2 & 1\\ 1 & 1 & -\lambda^2\end{vmatrix}=0\Rightarrow\left(2-\lambda^2\right)\begin{vmatrix}1 & 1 & 1\\ 0 & -\lambda^2-1 & 0\\ 0 & 0 & -\lambda^2-1\end{vmatrix}=0$$

$$\Rightarrow\left(2-\lambda^2\right)\left(1+\lambda^2\right)=0\Rightarrow\boxed{\lambda=\pm\sqrt{2}}$$

3. $b=\cos 120^0 i+\sin 120^0 j\Rightarrow b=\dfrac{-\hat{i}}{2}+\dfrac{\sqrt{3}}{2}\hat{j}$

There $a+b=i-\dfrac{1}{2}i+\dfrac{\sqrt{3}}{2}j=\dfrac{i}{2}+\dfrac{\sqrt{3}}{2}j$

4. $\vec{a}=\hat{i}+\hat{j}+\hat{k},\vec{b}=\hat{i}-\hat{j}+2\hat{k}$ and

$\vec{c}=x\hat{i}+\left(x-2\right)\hat{j}-\hat{k}$

$$=\begin{vmatrix}x & x-2 & -1\\ 1 & 1 & 1\\ 1 & -1 & 2\end{vmatrix}=0\Rightarrow x=-2$$

5. Resultant $=\sqrt{4+100+121}=15$

6. Let $\hat{a}=l\hat{i}+m\hat{j}+n\hat{k}$ where $l^2+m^2+n^2=1$

$\Rightarrow a^n$ makes an angle $\dfrac{\pi}{4}$ with z-axis

$$\Rightarrow n=\cos\gamma=\cos\frac{\pi}{4}=\frac{1}{\sqrt{2}}\Rightarrow l^2+m^2=\frac{1}{2}\rightarrow(1)$$

$$\Rightarrow\hat{a}+\hat{i}+\hat{j}=\left(1+l\right)\hat{i}+\left(m+1\right)\hat{j}+\frac{k}{\sqrt{2}}$$

$\Rightarrow$ Its magnitude is 1, hence

$(l+1)^2+(m+1)^2 = \frac{1}{2} \rightarrow (2)$

From (1) & (2) $2lm = \frac{1}{2}$

$\Rightarrow l = m = \frac{1}{2}$; Hence $\hat{a} = \frac{-\hat{i}}{2} - \frac{-\hat{j}}{2} + \frac{\hat{k}}{\sqrt{2}}$

7. Let $\overrightarrow{OA} = 2\hat{i} - \hat{j} + \hat{k}$, $\overrightarrow{OB} = \hat{i} - 3\hat{j} - 5\hat{k}$ and $\overrightarrow{OC} = 3\hat{i} - 4\hat{j} - 4\hat{k}$

$\therefore a = |\overrightarrow{OA}| = \sqrt{6}, b = |\overrightarrow{OB}| = \sqrt{35}, c = |\overrightarrow{OC}| = \sqrt{41}$

$\cos A = \frac{b^2+c^2-a^2}{2\,b.c}$

$\Rightarrow \cos^2 A = \frac{35}{41}$

8. Let $\vec{a} + 2\vec{b} = x\vec{c}$ and $\vec{b} + 3\vec{c} = y\vec{a}$ then

$\Rightarrow a + 2b + 6c = (x+6)c$ and

$\Rightarrow a + 2b + 6c = (1+2y)a$

$\therefore (x+6)c = (1+2y)a$

$\because a \,\&\, c$ are non-zero and non collinear, we have $x+6=0$ and $1+2y=0$ i.e.,

$\Rightarrow x = -6$ and $y = -\frac{1}{2}$. In this case,

We have $\vec{a} + 2\vec{b} + 6\vec{c} = 0$

9. Resultant force $\vec{f} = 7i + 4j - 4k$

Displacement $\vec{d} = (5i+4j+k) - (i+2j+3k)$

$= 4i + 2j - 2k$

$w = \bar{f}.\bar{d} = 44$

10. Let $\bar{a} = xi + yi + zk.$ then

$(a.\hat{i})\hat{i} + (a.\hat{j})\hat{j} + (a.\hat{k})\hat{k} = a$

11. $a.b = a.c \Rightarrow a.b - a.c = 0 \Rightarrow a.(b-c) = 0$

$\Rightarrow$ either $b - c = 0$ or $a = 0$

$\Rightarrow b = c$ or $a \perp (b-c)$

12. None of those, because result of dot product is a scalar and not a vector

13. Parallel vector $= (2+b)i + 6j - 2k$

Unit vector $= \frac{(2+b)i + 6j - 2k}{\sqrt{b^2+4b+44}}$

According to the condition,

$1 = \frac{(2+b)+6-2}{\sqrt{b^2+4b+44}} \Rightarrow b = 1$

14. Let unit vector be $y\hat{j} + z\hat{k}$, then $\sqrt{y^2+z^2} = 1$

Since given that $\cos 30^0 = \frac{(y\hat{j}+z\hat{k}).(y\hat{j})}{|y\hat{j}+z\hat{k}||y\hat{j}|}$

$= \frac{y^2}{\left(\sqrt{y^2+z^2}\right)y} = \frac{\sqrt{3}}{2}$

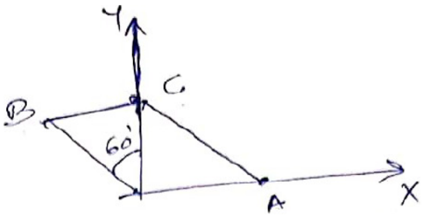
$\Rightarrow y = \frac{\sqrt{3}}{2}$; Similarly

$\Rightarrow \cos 60^0 = \frac{(y\hat{j}+z\hat{k}).(z\hat{j})}{|y\hat{j}+z\hat{k}||z\hat{j}|} = \frac{1}{2}$

Hence the components of unit vector are $0, \frac{\sqrt{3}}{2}, \frac{1}{2}$

15. Check with options

16. Let $\overrightarrow{OA} = p_1\hat{i}, \overrightarrow{CB} = -p_1\hat{i}, \overrightarrow{OB} = -p_1\hat{i} + p\hat{j}$



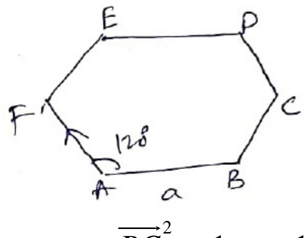
$\Rightarrow \frac{\overrightarrow{OB}.\hat{j}}{OB} = \cos 60^0 \Rightarrow \left(\frac{-p_1\hat{i} + p\hat{j}}{\sqrt{p_1^2+p^2}}\right) = \frac{1}{2}$

$\Rightarrow p_1 = p\sqrt{3}$

$\Rightarrow |\overrightarrow{OB}| = \sqrt{p^2+p_1^2} = \sqrt{p^2+3p^2} = 2p$

17. $\overrightarrow{AB}.\overrightarrow{AF} = |a||a|\cos 120^0 = \frac{-1}{2}a^2$ and

$\frac{\overrightarrow{BC}^2}{2} = \frac{1}{2}a^2$



$\overrightarrow{AB}.\overrightarrow{AF} + \frac{\overrightarrow{BC}^2}{2} = \frac{1}{2}a^2 - \frac{1}{2}a^2$

18. Since $\vec{a} + \vec{b} + \vec{c} = 0$ S.O.B.S

$\Rightarrow |a|^2 + |b|^2 + |c|^2 + 2(a.b + b.c + c.a) = 0$

$\Rightarrow 2(a.b + b.c + c.a) = -(9+16+25)$

$\Rightarrow (a.b + b.c + c.a) = -25$

19. $\cos\theta = \frac{\bar{a}.\bar{c}}{|a||c|}$ and direction of $\bar{a}$ and $\bar{c}$ are opposite to each other. So, angle between $\bar{a}$ and $\bar{c}$ $= \pi$

20. We have, projection of $\bar{a}$ and $\bar{b}$ $= \frac{-9}{\sqrt{3}}$

$$\Rightarrow \frac{\bar{a}.\bar{b}}{|b|} = \frac{-9}{\sqrt{b}} \Rightarrow (\bar{a}).\cos\left(\frac{5\pi}{6}\right) = \frac{-9}{\sqrt{3}} \Rightarrow |\vec{a}| = 6$$

MATHS-IIB

21. $\delta f = f(x+\delta x) - f(x)$

22. $df = f'(x).\delta(x)$

23. $v = \pi r^2 h$

$dv = \pi\left[2rh\delta r + r^2 8h\right]$

24. $A = \frac{\sqrt{3}}{4}x^2$

$\frac{dA}{A}\times 100 = 2\frac{dx}{x}\times 100$

25. $v = \frac{4}{3}\pi r^3,\ r = 3, \delta r = +0.02$

$\delta r \cong dv$

26. $h = r,\ v = \pi h^3,$

$\frac{dv}{v}\times 100 = 3\frac{dh}{h}\times 100$

27. $f(x) = \frac{1}{\sqrt[3]{x}},$

$x = 8,\ \delta x = 0.08$

$f(x+\delta x) \cong f(x) + f'(x)\delta x$

28. $f(x) = x^{3000}\quad x = 1, \delta x = 0.0002$

$f(x+\delta x) = f(x) + f'(x)\delta x \simeq 1.6$

29. $D = 4cm, h = 12cm, \delta D = 0.10cm$

$v = \pi r^2 h = \pi h\left(\frac{D}{2}\right)^2$

$v = \frac{\pi}{4}hD^2$

$\delta v = \frac{\pi h}{4}(2D\delta D) = 2.88$

30. $f(x+8x) = f(x) + f'(x)\delta x$

$v = x^3$

$\Rightarrow v = \frac{dy}{dt},\ h^2 + y^2 = x^2$

$y\frac{dy}{dt} = x\frac{dx}{dt}$

$\Rightarrow \frac{dx}{dt} = v.\frac{y}{x}$

$= v\frac{\sqrt{x^2 - h^2}}{x}$

31. $V = x^3$

32. $v = \frac{dy}{dt}, h^2 + y^2 = x^2$

$y\frac{dy}{dt} = x\frac{dx}{dt}$

$\Rightarrow \frac{dx}{dt} = v.\frac{y}{x}$

$= \frac{v\sqrt{x^2 - h^2}}{x}$

33. $a + bv^2 = x^2$

$b2v.\frac{bv}{dt} = 2x\frac{dx}{dt}$

$\frac{bv}{dt} = a = \frac{x}{b}$

34. $v = 0 \Rightarrow t = 2$ or $\frac{-4}{3}$

$a = 6t - 2$

at $t = 2 \Rightarrow a = 10$

35. $k = 2r, A = \frac{1}{2}r^2\theta = \frac{k^2\theta}{8}$

36. $\frac{dv}{dt} = \text{constant}$

$\frac{dh}{dt} = \frac{-dr}{dt}$

$v = \pi r^2 h$

37. $\frac{d\theta}{dt} = k,\ \theta = \frac{\pi}{3}$

$\frac{d}{dt}(\tan\theta) = \sec^2 a\frac{d\theta}{dt}$

$= 4\times\frac{d\theta}{dt}$

$= 8\left(\frac{1}{2}\times\frac{d\theta}{dt}\right)$

$= 8\frac{d}{dt}(\sin\theta)$

38. $\theta\alpha t^2$

$\theta = kt^2$

$k = \frac{2\pi}{64} \Rightarrow k = \frac{\pi}{32}$

$\frac{d\theta}{dt} = k.2t = \frac{\pi}{2}$ rad/sec

39. $\frac{dx}{dt} = \frac{dy}{dt} = v$

$x = y$

$D = \sqrt{x^2 + x^2} = \sqrt{2}x$

$\frac{dD}{dt} = \sqrt{2}v$

40. $\frac{dx}{dt} = b, x = l$

$y = \sqrt{h^2 + x^2}$

$\frac{dy}{dt} = \frac{lb}{\sqrt{h^2 + r^2}}$

PHYSICS

41. In parallel combination, the equivalent thermal conductivity is given by

$$K = \frac{K_1A_1 + K_2A_2 + K_3A_3 + ... + K_nA_n}{A_1 + A_2 + A_3 + ... + A_n}$$

For two rods of equal area,

$$K = \frac{(K_1 + K_2)A}{2A} \quad (\text{if } A_1 = A_2 = A)$$

$$\Rightarrow K = \frac{K_1 + K_2}{2}$$

42. Temperature of B will be higher because, due to expansion centre of mass B will come down same heat is supplied but in B, Potential energy is decreased therefore internal energy gain will be more.

43. Since specific heat

$= 0.6 \text{ kcal/g} \times {}^0C = 0.6 \text{ cal}/g \times {}^0 C$

From graph it is clear that in a minute, the temperature is raised from 0°C to 50°C

$\Rightarrow$ Heat required for a minute $= 50 \times 0.6 \times 50 = 1500\,cal.$

Also from graph, Boiling point of wax is $200^0C.$

44. $\frac{Q}{t} = K_1A_1\frac{d\theta}{dx} = K_2A_2\frac{d\theta}{dx}$

45. $V + \Delta V = (L + \Delta L)^3 = (L + \alpha L\Delta T)^3$

$= L^3 + (1 + 3\alpha\Delta T + 3\alpha^2\Delta T^2 + \alpha^3\Delta T^3)$

$\Rightarrow \alpha^2$ and α^3 terms are neglected.

$\Rightarrow l + \gamma\Delta T = 1 + 3\alpha\Delta T$

$\therefore \gamma = 3\alpha$

46. Radius of small sphere = r

Thickness of small sphere = t

Radius of bigger sphere = 2r

Thickness of bigger sphere = t/4

Mass of ice melted = (volume of sphere) x (density of ice)

Let K_1 and K_2 be the thermal conductivities of larger and smaller sphere.

For bigger sphere,

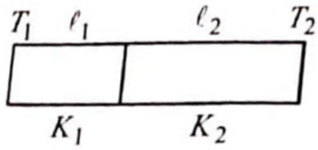
$$\frac{K_1 4\pi(2r)^2 \times 100}{t/4} = \frac{\frac{4}{3}\pi(2r)^3 \rho L}{25 \times 60}$$

For smaller sphere,

$$\frac{K_2 \times 4\pi r^2 \times 100}{t} = \frac{\frac{4}{3}\pi r^3 \rho L}{16 \times 60}$$

$$\therefore \frac{K_1}{K_2} = \frac{8}{25}$$

47. Let T the temperature of the interface. As the two sections are in series, the rate of flow of heat in them will be equal.



where A is the area of cross-section.

or, $K_1A(T_1 - T_2)l_2 = K_2A(T - T_2)l_2$

or, $K_1T_1l_1 - K_1T_1l_2 = K_2Tl_1 - K_2T_2l_1$

or, $(K_2l_1 + K_1l_2)T = K_1T_1l_2 + K_2T_2l_1$

$$\therefore T = \frac{K_1T_1l_2 + K_2T_2l_1}{K_2l_1 + K_1l_2} = \frac{K_1l_2T_1 + K_2l_1T_1}{K_1l_2 + K_2l_1}$$

48. The heat flow rate is given by $\frac{dQ}{dt} = \frac{kA(\theta_1 - \theta)}{x}$

$\Rightarrow \theta_1 - \theta = \frac{x}{kA}\frac{dQ}{dt} \Rightarrow \theta = \theta_1 - \frac{x}{kA}\frac{dQ}{dt}$

where θ is the temperature of hot end and θ i; temperature at a distance x from hot end. The above equation can be graphically represented In option

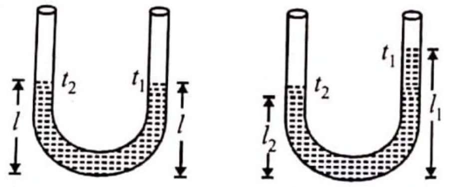
49. $t \propto \frac{l}{A} t' \propto \frac{2l}{A/2}$

$\frac{t'}{t} = 4\frac{l/A}{l/A}$

$t' = 4 \times t$

$3/t' = 48\,s$

50. Suppose, height of liquid in each arm before rising the temperature is l.



With temperature rise height of liquid in each arm increases i.e. $l_1 > l$ and $l_2 > l$

Also $l = \dfrac{l_1}{1+\gamma t_1} = \dfrac{l_2}{1+\gamma t_2}$

$\Rightarrow l_1 + \gamma l_1 t_2 = l_2 + \gamma l_2 t_1 \Rightarrow \gamma = \dfrac{l_1 - l_2}{l_2 t_1 - l_1 t_2}$

51. The lengths of each rod increases by the same amount

$\therefore \Delta l_a = \Delta l_s \Rightarrow l_1 \alpha_a t = l_3 \alpha_s t$

$\Rightarrow \dfrac{l_2}{l_1} = \dfrac{\alpha_a}{\alpha_s} \Rightarrow \dfrac{l_2}{l_1} + 1 = \dfrac{\alpha_a}{\alpha_s} + 1$

$\Rightarrow \dfrac{l_2 + l_1}{l_1} = \dfrac{\alpha_a + \alpha_s}{\alpha_s} \Rightarrow \dfrac{l_1}{l_1 + l_2} = \dfrac{\alpha_s}{\alpha_a + \alpha_s}$

52. Moment of inertia of a rod,

$I = \dfrac{1}{12} ML^2$

Differentiating w r.t. to ΔL, we get

$\dfrac{\Delta I}{\Delta L} = \dfrac{1}{12} \times 2ML$

$\Delta I = \dfrac{1}{12} 2ML\Delta L \quad \therefore \dfrac{\Delta l}{I} = \dfrac{\Delta L}{L}$

As we know, $\Delta L = L\alpha\Delta t$ or $\dfrac{\Delta L}{L} = \alpha \Delta t$

Substituting the value $\dfrac{\Delta L}{L}$, we get

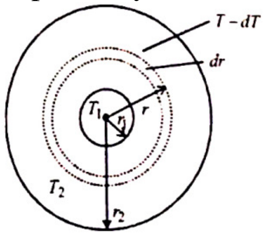
$\dfrac{\Delta l}{I} = 2\alpha\Delta t$

53. According to Wien's law $\lambda_m \propto \dfrac{1}{T}$ and from the figure

$(\lambda_m)_1 < (\lambda_m)_3 < (\lambda_m)_2$ therefore $T_1 > T_3 > T_2$.

54. According to Newton's law of cooling if temperature difference between body & surrounding is large, then rate of cooling is also fast hence cline A shows correct behavior.

55. Consider a shell of thickness (dr) and of radius (r) and let the temperature of inner and outer surfaces of this shell be T and (T- dr) respectively



$\dfrac{dQ}{dt}$ = rate of flow of heat through it

$= \dfrac{KA\left[(T - dT) - T\right]}{dr} = \dfrac{-KAdT}{dr}$

$= -4\pi K r^2 \dfrac{dT}{dr} \quad (\because A = 4\pi r^2)$

To measure the radial rate of heat flow, integration technique is used since the area of the surface through which heat will flow is not constant.

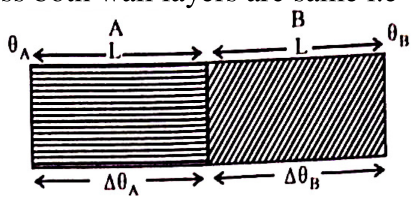
Then, $\left(\dfrac{dQ}{dt}\right)\displaystyle\int_{r_1}^{r_2} \dfrac{1}{r^2} dr = -4\pi K \int_{T_1}^{T_2} dT$

$\dfrac{dQ}{dt}\left[\dfrac{1}{r_1} - \dfrac{1}{r_2}\right] = -4\pi K\left[T_2 - T_1\right]$

or $\dfrac{dQ}{dt} = \dfrac{-4\pi K r_1 r_2 (T_2 - T_1)}{(r_2 - r_1)}$

$\therefore \quad \dfrac{dQ}{dt} \propto \dfrac{r_1 r_2}{(r_2 - r_1)}$

56. The wall of two layers A and B are connected in series. Then, heat flowing per second across both wall layers arc same i.e



$H_1 = H_2$

$\dfrac{K_A A \Delta\theta_A}{L} = \dfrac{K_B A \Delta\theta_B}{L} \Rightarrow K_A \Delta\theta_A = K_B \Delta\theta_B$

$\Rightarrow 3K_B \Delta\theta_A = K_B \Delta\theta_B$ (as $K_A = 3K_B$)

$\Rightarrow 3\Delta\theta_A = \Delta\theta_B$ ....(i)

Also $\Delta\theta_A + \Delta\theta_B = 20°\,C$ ....(ii)

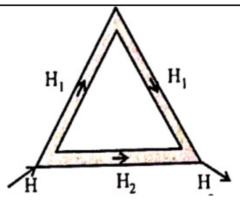
From (i) & (ii)

$\therefore\ \Delta\theta_A + 3\Delta\theta_A = 20°C \Rightarrow 4\Delta\theta_A = 20°C$

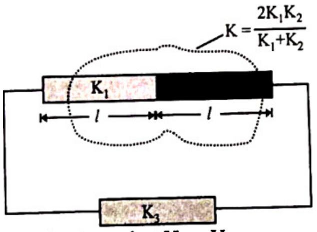
$\Rightarrow \Delta\theta_A = 5°C$

57. $E = \dfrac{F/A}{\Delta l/I} = \dfrac{\text{stress}}{\text{strain}}$ where $\Delta l = (l' - l) = l\alpha t$

so $F = EA\alpha t$

58. 

The given arrangement of rods can be redrawn as follows



It is given that $H_1 = H_2$

$$\Rightarrow \frac{KA(\theta_1-\theta_2)}{2l} = \frac{K_3A(\theta_1-\theta_2)}{l} \Rightarrow K_3 = \frac{K}{2} = \frac{K_1K_2}{K_1+K_2}$$

59. From Wein's displacement law

$\lambda_m T = \text{constant}$

$\Rightarrow \lambda_m \propto T^{-1}$

60. When hot water temperature (T) and surrounding temperature (T_0) readings are noted, and log(T- T_0) is plotted versus time, we get a straight line having a negative slope; as a proof of Newton's law of cooling.

CHEMISTRY

61. Nitrogen, sulphur and halogens are tested in an organic compound by Lassaigne's test. The organic compound is fused with sodium metal as to convert these elements into ionisable inorganic substances,

$Na + C + N \longrightarrow NaCN$

$2Na + S \longrightarrow Na_2S$

$2Na + X_2 \longrightarrow 2NaX$

The cyanide, sulphide or halide ions can be confirmed in aqueous solution by usual test.

62. Kjeldahl's method is suitable for estimating nitrogen in those compounds in which nitrogen is linked to carbon and hydrogen. The method is not used in case of nitro, azo and azoxy compound. This method is basically used for estimating nitrogen in food fertilizers and agricultural products.

63. Among the given compounds naphthelene is volatile but benzoic acid is non-volatile (it forms a dimer). So, the best method for their separation is sublimation, which is applicable to compounds which can be converted directly into the vapour phase from its solid state on heating and back to the solid state on cooling.Hence it is the most appropriate method.

64. According to given molecular weight.

65. H2SO4 is dibasic.

$0.1\,M\,H_2SO_4 = 0.2N\,H_2SO_4$

M_{eq} of H_2SO_4 taken = $= 100 \times 0.2 = 20$

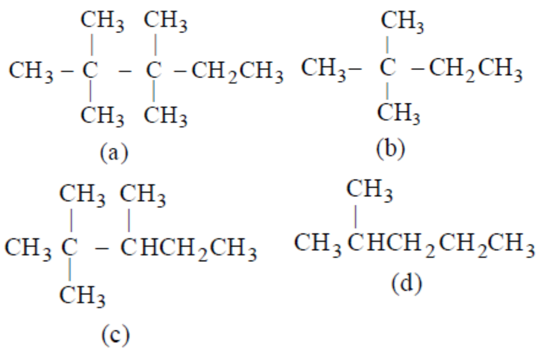
M_{eq} of H_2SO_4 neutralised by NaOH $= 20 \times 0.5 = 10$

M_{eq} of H_2SO_4 neutralised by NH_3 $= 12 - 10 = 10$

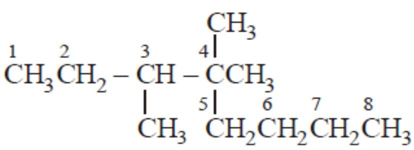
$$\% \text{ of } N_2 = \frac{1.4 \times M_{eq} \text{ of acid neutrialised by } NH_3}{\text{wt. of organic compound}}$$

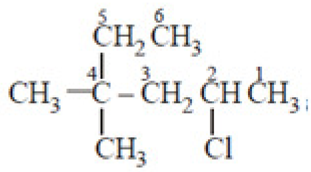
$$= \frac{1.4 \times 10}{0.3} = 46.6$$

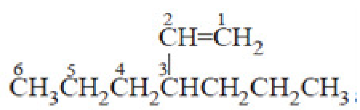
$$\% \text{ of nitrogen in urea} = \frac{14 \times 2 \times 100}{60} = 46.6$$

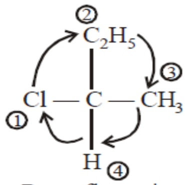
66. 

67. When the sum of locants is same, viz. 2 + 3 = 5, lower alkyl group should be given lower numeral number, i.e., here it should be 2-methyl and 3-ethyl and not the reverse.
Further, in writing the IUPAC name, prefix should be arranged in the alphabetic order, i.e., 3-ethyl should be written first followed by 2-methyl.

68. 

69. 

70. 

71. 
R-configuration

72. Enolic form predominates in compounds containing two carbonyl groups separated by a-CH_2 group. This is due to following two factors.
(i) Presence of conjugation which increases stability.
(ii) Formation of intramolecular hydrogen bond between enolic hydroxyl group and second carbonyl group which leads to stablisation of the molecule. Hence the correct answer is
III > II > I.

73. $(Cl)_2C = CH\text{-}CH_2 - CH_2CH_3$
does not show geometrical isomerism due to presence of two similar Cl atoms on the same C-atom.

74. A chiral object or structure has four different groups attached to the carbocation.

75. Only 2- cyclopropyl butane has a chiral centre.

76. Markovnikov's rule is applicable only to unsymmetrical alkenes, which is option (*d*) here

77. In such questions follow the following points:
(i) write down the structure of the given carbonyl compound(s),
(ii) remove oxygen atoms of the two carbonyl compounds,
(iii) join the two carbon atoms of the two carbonyl groups to each other to get the structure of the parent alkene

$$CH_3CH_2\underset{|}{\overset{}{C}}(H) = O + O = \underset{|}{C}(CH_3) - CH_3 \longleftarrow CH_3CH_2\underset{|}{C}(H) = \underset{|}{C}(CH_3) - CH_3$$

78. Since the ozonolysis product, 2-methyl-3-pentanone, contains only six carbon atoms, while the alkene has seven carbon atoms, the other ozonolysis product should be CH2O, the only carbonyl compound having one carbon atom. Hence, the structure of the alkene C_7H_{14} can be established as below

$$CH_3 - \overset{CH_3}{\overset{|}{CH}} - \overset{CH_2CH_3}{\overset{|}{C}} = O + O = CH_2$$
2–Methyl–3pentanone

$$\xleftarrow{\text{ozonolysis}} CH_3 - \overset{CH_3}{\overset{|}{CH}} - \overset{CH_2CH_3}{\overset{|}{C}} = CH_2$$
2–Ethyl–3–methyl–1–butene

79. Conceptual

80. Reduction of alkynes with Lindlar's catalyst (Pd-$BaSO_4$) gives cis-alkenes