SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR EAMCET | **DPP -17** | **Date: 30-04-2020**

Time: 3 Hours | **Max Marks :**

MATHS-A

(Syllabus: Quadratic Equations)

1. The real roots of the equation $_7\log_7^{x^2-4x+5} = x-1$ **are**

1) $1,2$ 2) $2,3$ 3) $3,4$ 4) $4,5$

2. If α,β **are the roots of** $x^3 - p(x+1)+c=0$ **then** $(\alpha+1)(\beta+1)=$

1) $1-c$ 2) $1+c$ 3) $c-1$ 4) c

3. If α,β **are the roots of** $x^2-x+3=0$ **then** $\alpha^4+\beta^4=$

1) 10 2) 8 3) -10 4) 7

4. The condition that the roots of $\frac{x-a}{ax+1}-\frac{x+b}{b+x}=0$ **are reciprocal to each other is**

1) $a=0$ 2) $a+b=0$ 3) $a-b=0$ 4) $b=0$

5. If one root is the n^{th} **power of the other root of the equation** $x^2-ax+b=0$ **then** $b^{\frac{n}{n+1}}+b^{\frac{1}{n+1}}=$

1) ab 2) a^n 3) a 4) b^n

6. If $\sec\theta \, and \, \tan\theta$ **are the roots of** $ax^2+bx+c=0 (a,b\neq 0)$ **then the value of** $\sec\theta-\tan\theta$ **is**

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

7. If the root of $\frac{x^2-bx}{ax-c}=\frac{k-1}{k+1}$ **are numerically equal but opposite in sign, k=**

1) c 2) $\frac{1}{c}$ 3) $\frac{a+b}{a-c}$ 4) $\frac{a-b}{a+b}$

8. If $a>0$ **and** $b^2-4ac<0$ **then the graph of** $y=ax^2+bx+c$

1) lies entirely below the x-axis
2) lies entirely above the x-axis
3) cuts the x-axis
4) touches the x-axis and lies below it

9. If α,β **are the roots of** $x^2+x+1=0$ **then the equation whose roots are** $\frac{1}{\alpha^3},\frac{1}{\beta^3}$ **is**

1) $2x^2+x+1=0$ 2) $2x^2-x+1=0$ 3) $x^2-x+1=0$ 4) $x^2-2x+1=0$

10. If α,β **are the roots of equation** $x^2+2ax+b=0$ **then the quadratic equation with rational coefficient, one of whose is** $\alpha+\beta+\sqrt{\alpha^2+\beta^2}$ **is**

1) $x^2-4ax+2b=0$ 2) $x^2+4ax-2b=0$ 3) $x^2-4ax-2b=0$ 4) $x^2+4ax+2b=0$

11. If $3^x-3^{x-1}=6$ **,then** x^x **is equal to**

1) 2 2) 4 3) 9 4)1

12. The minimum value of $x^2-8x+17, x\in R$ **is**

1) 17 2) -1 3) 1 4) 2

13. The value of 'p' for which the difference between the roots of the equation $x^2+px+8=0$ **is 2, are**

1) ± 2 2) ± 4 3) ± 6 4) ± 8

14. **If** α *and* β **are the roots of** $3x^2+5x-7=0$ **then** $\frac{1}{(3\alpha+5)^2}+\frac{1}{(3\beta+5)^2}=$

1) $\frac{-17}{21}$ 2) $\frac{67}{21}$ 3) $\frac{67}{441}$ 4) $\frac{76}{441}$

15. **If m,n,k are rational and** $m=K+\frac{n}{K}$ **then the roots of** $x^2+mx+n=0$ **are**

1) $K,\frac{n}{K}$ 2) $K,\frac{-n}{K}$ 3) $-K,\frac{-n}{K}$ 4) $-K,\frac{n}{K}$

16. **If** α *and* β **are the roots of** $ax^2+bx+c=0$ **then** $\left(\frac{\alpha}{\beta}-\frac{\beta}{\alpha}\right)^2=$

1) $\frac{b^2\left(b^2-4ac\right)}{a^2c^2}$ 2) $\frac{b^2\left(b^2-4ac\right)}{a^2}$ 3) $\frac{b^2\left(b^2+4ac\right)}{a^2}$ 4) b^2-4ac

17. **The equation** $x^2-2\sqrt{2K}x+2.e^{2\log K}-1=0$ **has the product of roots equal to 31, then for what value of K it has real roots?**

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

18. **If** $\frac{1}{x}+\frac{1}{x+a}=\frac{1}{m}+\frac{1}{m+a}$ **has roots equal in magnitude but opposite in sign, then**

1) $a=2m$ 2) $a^2=2m^2$ 3) $a^2=4m$ 4) $a^2=4m^2$

19. **The root of the equation** $(x-2)(x-3)=\frac{155\times 78}{(77)^2}$

1) $\frac{309}{77}$ 2) $\frac{155}{77}$ 3) $\frac{78}{77}$ 4) $\frac{81}{77}$

20. **The equation whose roots are** $\frac{1}{3+\sqrt{2}}$ **and** $\frac{1}{3-\sqrt{2}}$ **is**

1) $7x^2-6x+1=0$ 2) $6x^2-6x+1=0$ 3) $x^2-6x+7=0$ 4) $x^2-7x+6=0$

MATHS-B

(Syllabus: Circle upto Tangents & Normals)

21. **The condition of the line** $lx+my+n=0$ **and** $l_1x+m_1y+n_1=0$ **to be conjugate with respect to the** circle $x^2+y^2=r^2$ is

1) $r^2\left(ll_1+mm_1\right)=nn_1$ 2) $r^2\left(ll_1-mm_1\right)=n_1n$

3) $r^2\left(ll_1+mm_1\right)+nn_1=0$ 4) $r^2\left(lm_1+l_1m\right)=nn_1$

22. **The pole of the straight line** $9x+y-28=0$ **with respect to the circle** $2x^2+2y^2-3x+5y-7=0$ **is**

1) $(3,1)$ 2) $(3,-1)$ 3) $(-3,-1)$ 4) $(4,-8)$

23. **If the line is drawn through a fixed point** $P(\alpha,\beta)$ **to cut the circle** $x^2+y^2=a^2$ **at A and B then the value of PA.PB=______________**

1) $\alpha^2+\beta^2-a^2$ 2) $\alpha^2-\beta^2-a^2$ 3) $\alpha^2-\beta^2+a^2$ 4) $-\alpha^2-\beta^2+a^2$

24. **The abscissae of two points P,Q are the roots of the equation** $2x^2+4x-7=0$ **and their ordinate are the roots of the equation** $3x^2-12x-1=0$ **then the centre of the circle with PQ as a diameter is**

1) $(-1,2)$ 2) $(-2,6)$ 3) $(1,-2)$ 4) $(2,-6)$

25. **If the angle between a pair of tangents drawn from a point P to the circle** $x^2+y^2+4x-6y+9\sin^2\alpha+13\cos^2\alpha=0$ **is** 2α **then the equation of the locus of P is**

1) $x^2+y^2+4x-6y+4=0$ 2) $x^2+y^2+4x-6y-9=0$

3) $x^2+y^2+4x+6y-4=0$ 4) $x^2+y^2+4x-6y+9=0$

26. **The power of points** $B(-1,1)$ **with respect to the circle** $S=x^2+y^2-2x-4y+3=0$ **is P of the length of the tangents drawn from B to the circle** $S=0$ **is t then the point** $(2,3)$ **with respect to the circle** $S^1=0$ **having centre at** (P,t^2) **and passing through the origin**

1) lies inside the circle $S^1=0$ 2) lies outside the circle $S^1=0$

3) lies on the circle $S=0$ 4) is the centre of the circle $S^1=0$

27. **If the tangents drawn to the circle** $x^2+y^2=12$ **at the points where it intersect the circle** $x^2+y^2-5x+3y-2=0$ **then the coordinate of the point of intersection of these tangents are**

1) $\left(-6,\frac{18}{5}\right)$ 2) $\left(6,\frac{18}{15}\right)$ 3) $\left(-6,\frac{-18}{5}\right)$ 4) $\left(6,\frac{-18}{5}\right)$

28. **The normal to the circle** $x^2+y^2-2x-10y+k=0$ **which is perpendicular to** $x-3y+2=0$ **is**

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

29. **If** $(x,3)$ **and** $(3,5)$ **are the ends of the diameters of circle with centre at** $(2,y)$ **then** (x,y)

1) $(1,4)$ 2) $(4,1)$ 3) $(8,2)$ 4) $(2,8)$

30. **If the** Δ **be the area of the triangle formed the positive x-axis, the normal at the tangent to the circle** $x^2+y^2=4$ **at** $(1,\sqrt{3})$ **then the** Δ **=________**

1) $\frac{\sqrt{3}}{2}$ Sq. units 2) $2\sqrt{3}$ Sq. units 3) $\frac{1}{\sqrt{3}}$ Sq. units 4) 6 Sq. units

31. **If the two lines** $3x+4y+14=0$**,** $6x+8y-7=0$ **are tangents to the circle then the radius is**

1) 7 2) $\frac{7}{2}$ 3) $\frac{7}{4}$ 4) $\frac{7}{6}$

32. **A circle with centre** $(2,4)$ **is such that it cuts a chord of length 6units on the line x+y+2= 0 then the radius of the circle is**

1) $\sqrt{12}$ 2) $\sqrt{11}$ 3) $\sqrt{41}$ 4) $\sqrt{31}$

33. **If the line** $3x+y=0$ **is the tangent at** $(0,0)$ **to the circle of radius 1. Then the centre of the circle is**

1) $(3,0)$ 2) $\left(\frac{-1}{\sqrt{10}},\frac{3}{\sqrt{10}}\right)$ 3) $\left(\frac{3}{\sqrt{10}},\frac{-1}{\sqrt{10}}\right)$ 4) $\left(\frac{1}{\sqrt{10}},\frac{3}{\sqrt{10}}\right)$

34. **The equation of the circle concentric with circle** $S=x^2+y^2-6x+12y+15=0$ **and of double the area of** $S=0$ **is**

1) $x^2+y^2-6x+12y-15=0$ 2) $x^2+y^2-6x+12y-30=0$

3) $x^2+y^2-6x+12y-25=0$ 4) $x^2+y^2-6x+12y-20=0$

35. **If the intercept of the variable circle on the x-axis and y-axis are 2 and 4 units respectively then find the locus of centre of the circle**

1) $y^2-x^2=3$ 2) $x^2-y^2=6$ 3) $x^2+y^2=3$ 4) $2x^2-y^2=4$

36. **If the lines** $a_1x+b_1y+c_1=0$**,** $a_2x+b_2y+c_2=0$ **cut the coordinate axis in coneyclic points then**

1) $\left|\frac{a_1}{b_1}\right|=\left|\frac{a_2}{b_2}\right|$ 2) $|a_1b_1|=|b_1b_2|$ 3) $a_1b_1=a_2b_1$ 4) $a_1+b_2=a_2+b_2$

37. The equation of the normals to the circle $x^2+y^2-8x-2y+12=0$ at the points whose ordinate is -1

1) $2x+y-9=0, 2x-y-7=0$
2) $2x-y-9=0, 2x-y+7=0$
3) $2x+y+9=0, 2x+y+7=0$
4) $2x+y+9=0, 2x-y-7=0$

38. The equation of the tangent to the circle $x^2+y^2-6x+4y=12$ which are parallel to the straight line $4x+3y+5=0$ are_____________

1) $4x+3y+19=0, 4x+3y+31=0$
2) $4x-3y+19=0, 4x+3y-31=0$
3) $4x+3y+19=0, 4x+3y-31=0$
4) $4x-2y+15=0, 3x-4y+19=0$

39. For the circle $S=x^2+y^2-25=0$ then the points $(-3,4)$ and $(3,-4)$ are

1) Inverse points
2) Conjugate points
3) ends of diameter
4) poles of lines $x+y+15=0$

40. If the points $A(2,0), B(0,1), C(4,0)$ and $D(0,K)$ are concyclic then the values of K

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

PHYSICS

(Syllabus: Electric charges and fields)

41. One million electrons are added to a glass rod. The total charge on the rod is

1) $10^{-13}C$
2) $-1.6\times10^{-13}C$
3) $+1.6\times10^{-12}C$
4) $10^{-12}C$

42. A charge 'q' is placed at the centre of the line joining two equal charges 'Q'. The system of three charges will be in equilibrium if 'q' is equal to

1) $-\frac{Q}{2}$
2) $-\frac{Q}{4}$
3) $+\frac{Q}{4}$
4) $\frac{Q}{2}$

43. A portion of mass 'm' charge 'e' is released from rest in a uniform electric field of strength 'E'. The time taken by it to travel a distance 'd' in the field is

1) $\sqrt{\frac{2de}{mE}}$
2) $\sqrt{\frac{2dm}{Ee}}$
3) $\sqrt{\frac{2dE}{me}}$
4) $\sqrt{\frac{2Ee}{dm}}$

44. In the region of space, the electric field is given by $\vec{E}=8\hat{i}+4\hat{j}+3\hat{k}$. The electric flux through a surface area 100 units in X-Y plane is

1) 300 *Units*
2) 800 *Units*
3) 400 *Units*
4) 1200 *Units*

45. A dipole consisting of $+10nc$ and $-10nc$ separated by a distance of 2cm oscillates in an electric field of strength $60,000\ Vm^{-1}$. The frequency of its oscillation is (M.I about the axis of oscillation is $3\times10^{-10}kgm^2$)

1) $20.2\,Hz$
2) $25.4\,Hz$
3) $31.83\,Hz$
4) $37.1\ Hz$

46. Q_1, Q_2 charges are separated by distance 'd'. F is the force between them. The value of Q_2 is halved. To have the same force between the charges, the distance of the separation should be

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

47. 'n' charges Q,4Q,9Q,16Q,………are placed at distances of 1,2,3….metre from a point '0'on the same straight line. The electric intensity at '0' is

1) $\frac{Q}{4\pi\epsilon_0 n^2}$
2) $\frac{Q}{4\pi\epsilon_0 n}$
3) Infinity
4) $\frac{nQ}{4\pi\epsilon_0}$

48. Point charges of $3\times10^{-9}C$ are situated at each of three corners of a square whose side is 15cm. The magnitude and direction of electric field at the vacant corner of the square is

1) $2296\ V/m$ along the diagonal
2) $9622\ V/m$ along the diagonal
3) $22.0\ V/m$ along the diagonal
4) Zero

49. A cylinder of radius 'R' and length 'L' is placed in the uniform electric field 'E' parallel to the cylinder axis . The total flux from the curved surface of the cylinder is given by

1) $2\pi R^2 E$ 2) $\frac{\pi R^2}{E}$ 3) $\frac{\pi R^2 - \pi R}{E}$ 4) $Zero$

50. A mass 'm' carrying a charge 'q' is suspended from a string and placed in a uniform horizontal electric field of intensity 'E'. The angle made by the string with vertical in the equilibrium position is

1) $\theta = \tan^{-1}\left(\frac{mg}{Eq}\right)$ 2) $\theta = \tan^{-1}\left(\frac{m}{Eg}\right)$ 3) $\theta = \tan^{-1}\left(\frac{Eq}{m}\right)$ 4) $\theta = \tan^{-1}\left(\frac{Eq}{mg}\right)$

51. Two charged particles of each of mass 3g and charge 0.2 μc stay in (vacuum) equilibrium on a horizontal surface with a separate of 20cm.The coefficient of friction is $\left[\frac{1}{4\pi \in_0} = 9\times10^9 Nm^2/c^2, g = 10ms^{-2}\right]$

1) 0.20 2) 0.18 3) 0.25 4) 0.30

52. An infinitely long thin straight wire has uniform linear charge density of $\frac{1}{3}$ c/m. Then the magnitude of the force acting on a charge 3 μc situated at a point of 18cm away from the wire is $\left[\frac{1}{4\pi \in_0} = 9\times10^9 Nm^2c^{-2}\right]$

1) $10^5 N$ 2) $2\times10^5 N$ 3) $\frac{1}{3}\times10^6 N$ 4) $3\times10^{11} N$

53. Two identical simple pendulums each of length 5cm are suspended from the same support. When the bobs are given equal charge of 2 μc each, distance between the bobs becomes 6cm. Mass of bob is $\left(g = 10m\,s^{-2}\right)$.

1) $\frac{4}{3}kg$ 2) $\frac{3}{4}kg$ 3) $\frac{5}{4}kg$ 4) $\frac{3}{5}kg$

54. Two point charges +8 μc and +12 μc repel each other with a force of 48N. When an additional charge of -10 μC is given to each of these charges without altering the distance, the new force is

1) Repulsive force of 24N 2) Attractive force of 24N
3) Repulsive force of 2N 4) Attractive force of 2N

55. A charged particle of mass $5\times10^{-6} kg$ is held stationary in space by placing it in an electric field of strength $10^6 Nc^{-1}$ directed vertically down wards, the charge on the particle is $\left(g = 10m\,s^{-2}\right)$

1) $-20\times10^{-5}\mu c$ 2) $20\times10^{-5}\mu c$ 3) $5\times10^{-5}\mu c$ 4) $-5\times10^{-5}\mu c$

56. Five point charges (+q each) are placed at the five vertices of a regular hexagon of side 2a. What is the magnitude of the net electric field at the centre of the hexagon is

1) $\frac{1}{4\pi \in_0}\frac{q}{a^2}$ 2) $\frac{q}{16\pi \in_0 a^2}$ 3) $\frac{\sqrt{2}q}{4\pi \in_0 a^2}$ 4) $\frac{5q}{16\pi \in_0 a^2}$

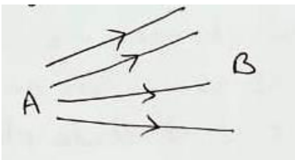
57. The break down electric intensity for air is $3\times10^6\, v/m$ .The maximum charge that can be held by a sphere of radius 1mm is

1) $0.33c$ 2) $0.33\,\eta c$ 3) $3.3c$ 4) $3.3\mu c$

58. **Two point charges** $-q$ *and* $+\frac{q}{2}$ **are situated at the origin and at the point (a,0,0) respectively. The point along the x-axis where the electric field vanishes is**

1) $x = \frac{a}{\sqrt{2}}$ 2) $x = \sqrt{2}a$ 3) $x = \frac{\sqrt{2}\,a}{\sqrt{2}-1}$ 4) $x = \frac{\sqrt{2}\,a}{\sqrt{2}+1}$

59. **If the electric lines of force are as shown in the figure and electric intensity at A and B are** E_A *and* E_B **respectively then**



1) $E_A > E_B$ 2) $E_A < E_B$ 3) $E_A = E_B$ 4) $E_A = E_B = o$

60. **Two concentric hollow conducting spheres of radii** R_1 *and* R_2 **have charges** Q_1 *and* Q_2 **respectively .If** $R_1 > R_2$ **then the electric intensity at a distance 'r' from the common centre** $(R_1 > r > R_2)$ **is**

1) $\frac{1}{4\pi \in_0}\frac{Q_1}{r^2}$ 2) $\frac{1}{4\pi \in_0}\frac{Q_2}{r^2}$ 3) $\frac{1}{4\pi \in_0}\frac{Q_1+Q_2}{r^2}$ 4) *Zero*

CHEMISTRY

(Syllabus: Solutions)

61. **4g of NaOH is present in 100ml of solution, its molarity is**

1) 1M 2) 2M 3) 0.1M 4) 0.2M

62. **The number of moles of solute present in 500ml of 0.2 M solution is**

1) 0.4 moles 2) 0.1 moles 3) 0.25 moles 4) 2.5 moles

63. **If 'M' is the molecular weight of** $CaCO_3$**, its equivalent weight is**

1) M 2) $\frac{M}{2}$ 3) $\frac{M}{3}$ 4) $\frac{M}{5}$

64. H_2SO_4 **is labelled as 0.98%** (w/v)**.Then the molarity of** H_2SO_4 **solution is**

1) $0.25M$ 2) $0.1M$ 3) $0.2M$ 4) $2.5M$

65. **10 milli equivalents of solute is present in 5ml of an aqueous solution. Then its normality is**

1) $1N$ 2) $0.5N$ 3) $2N$ 4) $0.25N$

66. 10^{-3} **gram equivalent weights of solute is present in 10ml of solution .Then its normality is**

1) $0.1N$ 2) $1N$ 3) $0.01N$ 4) $0.02N$

67. **4g of NaOH is dissolved in 1kg of water. The concentration of the solution is best expressed as**

1) $0.1M$ 2) $0.1N$ 3) $0.1m$ 4) $0.1F$

68. **The normality of 0.98%** (w/v) H_2SO_4 **solution is**

1) $0.1N$ 2) $0.2N$ 3) $0.4N$ 4) $1N$

69. **6g of urea is dissolved in 90g of water . The mole fraction of solute is**

1) $\frac{1}{5}$ 2) $\frac{1}{50}$ 3) $\frac{1}{51}$ 4) $\frac{1}{501}$

70. **Relative lowering of vapour pressure is maximum for**

1) 0.1 m Glucose 2) 0.2 m Glucose 3) 0.3 m Glucose 4) Equal in all cases

71. **The Van't Hoff factor for 0.1 M Barium nitrate is 2.74. The percentage of dissociation of Barium nitrate is**

1) 91.3% 2) 87% 3) 100% 4) 74%

72. Vapour pressure in mmHg of 0.1 mole of urea in 180 g of water at $25^0 c$ is (The vapour pressure of water at $25^0 c$ is 24mmHg)

1) 20.76 2) 23.76 3) 24.76 4) 2.376

73. An aqueous sucrose (molar mass=342) solution is labelled as 20%(w/w).What is the mole fraction of water in this solution

1) 0.955 2) 0.987 3) 0.961 4) 0.945

74. Which of them is not equal to zero for an ideal solution

1) ΔV_{mix} 2) ΔP 3) ΔH_{mix} 4) ΔS_{mix}

75. In what volume of water 20g of NaOH is to be dissolved such that 400ml of this solution exactly neutralises 4.9 g of H_2SO_4

1) 1 Lit 2) 2.5 Lit 3) 2 Lit 4) 3 Lit

76. The solubility of N_2 **in water at 300K and 500 torr partial pressure is 0.01g** L^{-1}**.The solubility(in g** L^{-1}**)at 750 torr partial pressure is**

1) 0.0075 2) 0.005 3) 0.02 4) 0.015

77. 18g glucose $\left(C_6H_{12}O_6\right)$ **is added to 178.2g water. The vapour pressure of water is 760 Torr. Calculate the vapour pressure of aqueous solution**

1) 7.6 2) 76 3) 752.4 4) 759.0

78. 6g of non-volatile, non electrolyte 'x' is dissolved in 100g of water freezes at $-0.93^0 c$.The molar mass of x in $gmol^{-1}$ is $\left(K_f\ of\ H_2O = 1.86k\ kgmol^{-1}\right)$

1) 60 2) 140 3) 180 4) 120

79. The freezing point of a 1.0m aqueous solution of HF is found to be $-1.91^0 c$ **.The freezing point constant of water,** K_f **is 1.86k kg** mol^{-1} **.The percentage dissociation of HF at concentration is**

1) 2.7% 2) 10% 3) 5.2% 4) 30%

80. The osmotic pressure of a solution at $0^0 c$ **is 4atm. What will be its osmotic pressure at 546 K under similar conditions?**

1) $4atm$ 2) $9atm$ 3) $8atm$ 4) $6atm$

KEY SHEET

MATHS-A

1) **2** 2) **2** 3) **4** 4) **3** 5) **3** 6) **1** 7) **4** 8) **2** 9) **4** 10) **4**

11) **2** 12) **3** 13) **3** 14) **3** 15) **3** 16) **1** 17) **4** 18) **2** 19) **1** 20) **1**

MATHS-B

21) **1** 22) **2** 23) **1** 24) **1** 25) **4** 26) **1** 27) **4** 28) **3** 29) **1** 30) **2**

31) **3** 32) **3** 33) **4** 34) **1** 35) **1** 36) **2** 37) **1** 38) **3** 39) **3** 40) **3**

PHYSICS

41) **2** 42) **2** 43) **2** 44) **1** 45) **3** 46) **3** 47) **4** 48) **1** 49) **4** 50) **4**

51) **4** 52) **1** 53) **1** 54) **4** 55) **4** 56) **2** 57) **2** 58) **3** 59) **1** 60) **2**

CHEMISTRY

61) **1** 62) **2** 63) **2** 64) **2** 65) **3** 66) **1** 67) **3** 68) **2** 69) **3** 70) **3**

71) **2** 72) **2** 73) **2** 74) **4** 75) **3** 76) **4** 77) **3** 78) **4** 79) **1** 80) **3**

HINTS AND SOLUTIONS

MATHS-A

1. $x^2-4x+5=x-1\left(a^{\log_a^m}=m\right)$

2. $\alpha\beta+\alpha+\beta+1=c-p+p+1=c+1$

3. $\alpha^4+\beta^4=\left(\alpha^2+\beta^2\right)^2-2\alpha^2\beta^2$

4. $bx^2+x-abx-a-ax^2-x-abx-b=0$

   $\therefore$ Condition is coefficient of $x^2=$constant

5. $\alpha+\alpha^n=a$

   $\alpha\alpha^n=b\Rightarrow\alpha=\frac{1}{b^{n+1}}$

   $\therefore\frac{n}{b^{n+1}}+\frac{1}{b^{n+1}}=a$

6. $\sec\theta+\tan\theta=\frac{-1}{a}$

   $\sec\theta-\tan\theta=\frac{-a}{b}$

7. Coefficient of x = 0

8. Lies entirely above the x-axis

9. $\alpha=\omega,\beta=\omega^2\Rightarrow\frac{1}{\alpha^3}=1,\frac{1}{\beta^3}=1$

10. Some of the roots $2\left(\alpha+\beta\right)=-4a$

    Product of roots $=2\alpha\beta=2b$

11. Put 3^x-1

12. $\frac{4ac-b^2}{4a}\left(if\ a>0\right)$

13. $\alpha-\beta=2$

    $\Rightarrow\left(\alpha+\beta\right)^2-4\alpha\beta=4$

    $\Rightarrow p^2=36\Rightarrow p=\pm6$

14. $3\alpha+5=7/\alpha;3\beta+5=\frac{7}{\beta}$

15. $x^2+xK+\frac{nx}{K}+n=0$

    $x\left(x+K\right)+\frac{n}{K}\left(x+K\right)=0$

$\Rightarrow x = -K, \frac{-n}{K}$

16. $\left(\frac{\alpha}{\beta} - \frac{\beta}{\alpha}\right)^2 = \frac{(\alpha+\beta)^2(\alpha-\beta)^2}{(\alpha\beta)^2} \Rightarrow$ expand

17. Product of the roots $2e^{2\log k} - 1 = 31$

$2e^{\log k^2} - 1 = 31 \Rightarrow k^2 = 16 \Rightarrow k = \pm 4$

18. Coefficient of x = 0

19. By verification

20. $x^2 - x(\alpha+\beta) = 0$

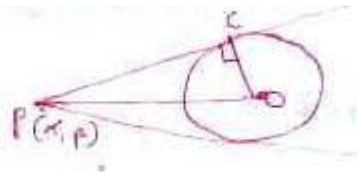
By using above formula and expand

MATHS-B

21. By concept

22. By using formula for pole of line into circle

23. $PA.PB = PC^2$



$= CP^2 - OC^2$

$= \alpha^2 + \beta^2 - C^2$

24. Let $P\{x_1, y_1\}, Q\{x_2, y_2\}$ are two points

$x_1 y_1$ are the roots of $2x^2 + 4x - 7 = 0 \Rightarrow x_1 + x_2 = -2$

$x_2 y_2$ are the roots of $3y^2 - 12y - 1 = 0 \Rightarrow y_1 + y_2 = 4$

$\overline{PQ}$ as diameter $\Rightarrow$ Centre = $\left(\frac{x_1 + y_1}{2}, \frac{y_1 + y_2}{2}\right) = (-1, 2)$

25. $Tan\alpha = \frac{r}{\sqrt{S_{11}}}$ and simplify

26. $S = 0 \Rightarrow P = \sqrt{S_{11}}\ at\ B(-1,1) \Rightarrow P = 3$

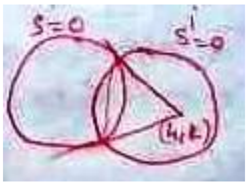
$t = \sqrt{P} = \sqrt{3}, Now\ C = (P, t^2) = (3,3)$

Req.circle $(x-3)^2 + (y-3)^2 = r^2$ is passing through $(0,0)$

To get $r^2 = 18 \Rightarrow (x-3)^2 6 + (y-3)^2 = 18$ verify the options

27. $S=0, S^3=0 \Rightarrow$ common chord of two circles $5x-3y-10=0$

Common chord of contact is $hx+ky-12=0$



Solving the above equation to get $(h,k)=\left(6,\frac{-18}{5}\right)$

28. $S=0, C=(-1,15)$

Slope of line $x-3y+2=0\ is\ \frac{1}{3}$

Req.Slope $m=3 \Rightarrow eq.Normal \Rightarrow 3x+y=2$

29.  $\left(\frac{x+3}{2},\frac{x+5}{2}\right)=(2,y) \Rightarrow (x,y)=(1,4)$

30. Tangents at $P \Rightarrow S^1=0 \Rightarrow x+\sqrt{3}y=4$

$y=0 \Rightarrow x=4$

Area of $\Delta OPA=\frac{1}{2}\begin{vmatrix}0 & 4 & 1\\ 0 & 0 & \sqrt{3}\\ 1 & 1 & 1\end{vmatrix}=2\sqrt{3}$

31. Given line are tangents and parallel

$d=\frac{7}{2} \Rightarrow r=\frac{7}{4}$

32. C $=(2,4)$

CM = $\perp$ distance from the centre to the line

$CM=\frac{8}{\sqrt{2}} \Rightarrow 6=2\sqrt{r^2-d^2} \Rightarrow r=\sqrt{41}$

33. $C(\alpha,\beta)\ r=1 \Rightarrow [slope\ CP]\times(Slope of\ line)=-1$

$\frac{\beta}{\alpha}\times\frac{1}{3}=-1 \Rightarrow \beta=3\alpha$

$d=r=1 \Rightarrow \frac{10\alpha}{\sqrt{10}}=1 \Rightarrow \alpha=\frac{1}{\sqrt{10}}, \beta=\frac{3}{\sqrt{10}}$

34. Let circle $S=C, S^1=0$ are concentric circle

Area of the circle $S=0=2\ C=(3,-8), r=\sqrt{x} \Rightarrow r^2=60 \Rightarrow (x-3)^2+(y+8)^2=60$

$x^2+y^2-6x+12y-15=0$

35. $\sqrt[2]{y^2-c}=2, \sqrt[2]{f^2-c}=4$, $g^2-c=1, f^2-c=4$ $\Big\}$ $f^2-g^2=3$, $y^2-x^2=3$

36. By using concept

37. Ordinate $y=1 \Rightarrow x^2-8x+15=0 \Rightarrow x=5,3$

The points are $(5,-1)(3,-1) \Rightarrow$

Req.normal tangents $2x+y-9=0, 2x-y-7=0$

38. $S=0$, r be the radius

Let the equation of the tangents $4x+9y+k=0 \Rightarrow r=d$ simplify to get k =19 ,-31

39. For $S=0 \Rightarrow P(-3,4), Q(3,-4)$ *lies on* $S=0$

$\overline{PQ}$ is the diameter of $S=0$

Midpoint of $\overline{PQ}$ = centre of the circle

40. $\overline{AB}=\overline{CD}$ and the points are concyclic to find the equation of $\overline{AB}=\overline{CD}$ by $a_1a_2=b_1b_2$

PHYSICS

41. $Q=\pm ne$

$Q=-10^6\times 1.6\times 10^{-19}\left[\therefore \text{Addition of } \bar{e} \text{ is} -ve\right]$

$Q=-1.6\times 10^{-13}c$

42. Net force on

$$\begin{array}{ccc} Q & q & Q \\ \leftarrow \frac{r}{2} \rightarrow & & \\ & \longleftarrow r \longrightarrow & \end{array}$$

Q is zero

$$F=\frac{KQ^2}{r^2}+\frac{KQq}{\left(\frac{r}{2}\right)^2}$$

$$O=\frac{KQ^2}{r^2}+\frac{4KQq}{r^2}$$

$$\frac{4KQq}{r^2}=\frac{-KQ^2}{r^2}$$

$$q=-\frac{Q}{4}$$

43. $F_e=Ee=ma$

$a = \frac{Ee}{m}$

from $s = ut + \frac{1}{2}at^2$

$d = 0 + \frac{1}{2}\left[\frac{Ee}{m}\right]t^2$

$t = \sqrt{\frac{2dm}{Ee}}$

44. $\phi = \overline{E}.\overline{A}$

$\phi = \left(8\hat{i} + 4\hat{j} + 3\hat{k}\right).\left(100\hat{k}\right)$

$= 0 + 0 + 300 = 300 units$

45. Dipole moment

$p = q\left(2a\right)$

$= 10 \times 10^{-9} \times 2 \times 10^{-2}$

$= 2 \times 10^{-10} c - m$

Frequency $\left(f\right) = \frac{1}{2\pi}\sqrt{\frac{PE}{I}}$

$= \frac{1}{2 \times 3.14}\sqrt{\frac{2 \times 10^{-10} \times 6 \times 10^{4}}{3 \times 10^{-10}}}$

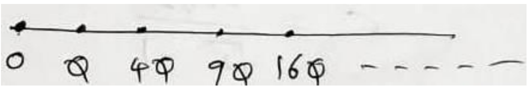
$= \frac{1}{2 \times 3.14}\left(2 \times 10^{2}\right)$

$= \frac{100}{3.14} = 31.83 Hz$

46. $F = \frac{1}{4\pi \in_0}\frac{Q_1 Q_2}{r^2}, r^2 \alpha Q_2$

$\left(\frac{r_1}{r_2}\right)^2 = \frac{Q_2}{\frac{Q_2}{2}}$

$\frac{d^2}{r_2^2} = 2 \Rightarrow r_2 = \frac{d}{\sqrt{2}}$

47. 

$E = \frac{1}{4\pi \in_0}\left[\frac{Q_1}{r_1^2} + \frac{Q_2}{r_2^2} + ...\right]$

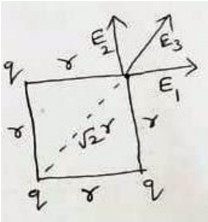
$$= \frac{1}{4\pi \in_0}\left[\frac{Q}{1^2} + \frac{4Q}{2^2} + \frac{9Q}{3^2} + ...\right]$$

$$= \frac{Q}{4\pi \in_0}\left[1+1+1+....n\right]$$

$$= \frac{nQ}{4\pi \in_0}$$

48. $E_1 = \frac{1}{4\pi \in_0}\frac{q}{r^2} = E$

$E_2 = \frac{1}{4\pi \in_0}\frac{q}{r^2} = E$



$$E_3 = \frac{1}{4\pi \in_0}\frac{q}{\left(\sqrt{2}r\right)^2}$$

$$E_3 = \frac{1}{4\pi \in_0}\frac{q}{2r^2}$$

$$E_{net} = E_1 \cos 45^0 + E_2 \cos 45^0 + E_3$$

$$= \frac{E}{\sqrt{2}} + \frac{E}{\sqrt{2}} + \frac{E}{2}$$

$$= E\left[\sqrt{2} + \frac{1}{2}\right]$$

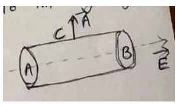
Where $E = \frac{1}{4\pi \in_0}\frac{q}{r^2} = \frac{9\times10^9 \times 3\times10^{-9}}{15\times15\times10^{-4}}$

$= 1200$

$E_{net} = 1200\left[1.414 + 0.5\right]$

$= 2296\, v/m \text{ along diagonal}$

49. Flux from 'C'

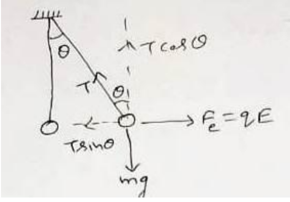


$\phi = EA\cos\theta$

$\phi = EA\cos 90^0$

$\phi = 0$

50. $T\sin\theta = qE$



$$T\cos\theta = mg$$

$$Tan\theta = \frac{qE}{mg}$$

$$\theta = Tan^{-1}\left(\frac{qE}{mg}\right)$$

51. $F_e = f$

$$\frac{1}{4\pi\in_0}\frac{q^2}{r^2} = \mu mg$$

$$\frac{9\times10^9\times0.2\times10^{-6}\times0.2\times10^{-6}}{20\times10^{-2}\times20\times10^{-2}} = \mu\times3\times10^{-3}\times10$$

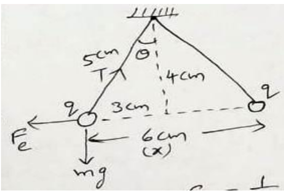
$$\mu = 0.30$$

52. $E = \frac{\lambda}{2\pi\in_0 r}$ *and* $F = qE$

$$F = \frac{3\times10^{-6}\times\frac{1}{3}\times18\times10^9}{18\times10^{-2}}$$

$$F = 10^5 N$$

53. $T\sin\theta = F_e = \frac{1}{4\pi\in_0}\frac{q^2}{x^2}$



$$T\cos\theta = mg$$

$$Tan\theta = \frac{\frac{1}{4\pi\in_0}\frac{q^2}{x^2}}{mg}$$

$$\frac{3}{4} = \frac{9\times10^9\times4\times10^{-12}}{m\times10\times36\times10^{-4}}$$

$$m = \frac{4}{3}kg$$

54. $F\,\alpha\; q_1q_2$

$$\frac{F_1}{F_2} = \frac{q_1 q_2}{q_1^1 q_2^1}$$

$$\frac{+48}{F_2} = \frac{8\times 12}{(-2)(+2)}$$

$$\frac{48}{F_2} = \frac{96}{-4}$$

$$F_2 = -2N \ i.e \ Attractive$$

$$F = 10^5 N$$

55. $mg = qE$

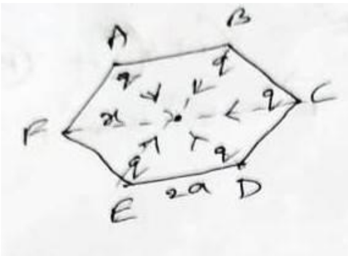
$$5\times 10^{-6} \times 10 = q \times 10^6$$

$$q = 50\times 10^{-12} c$$

Hence ‘q’ should be negative $q = -5\times 10^{-5} \mu c$

56. Due to symmetry field is only

Due to charge at c



$$E_{net} = \frac{1}{4\pi \in_0} \frac{q}{x^2} = \frac{1}{4\pi \in_0} \frac{q}{(2a)^2}$$

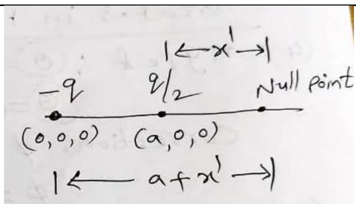
$$E_{net} = \frac{1}{16\pi \in_0} \frac{q}{a^2}$$

57. $E = \frac{1}{4\pi \in_0} \frac{q}{R^2}$

$$3\times 10^6 = 9\times 10^9 \times \frac{q}{(10^{-3})^2}$$

$$q = 0.33\times 10^{-9} = 0.33 nc$$

58. $x^1 = \frac{a}{\sqrt{\frac{q}{\frac{q}{2}} - 1}}$

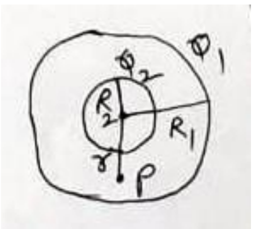


$$x^1 = \frac{a}{\sqrt{2}-1}$$

$$c = a + \frac{a}{\sqrt{2}-1} = \frac{a\sqrt{2}}{\sqrt{2}-1}$$

59. Conceptual

60. Electric Field at 'P' is only due to inner sphere



$$E = \frac{1}{4\pi \in_0} \frac{Q_2}{r^2}$$

CHEMISTRY

61. $M = \frac{wt}{G.M.W} \times \frac{100}{V\, in\, ml}$

$$M = \frac{4}{40} \times \frac{1000}{100}$$
$$M = 1$$

62. $M = n \times \frac{1000}{V in\, ml}$

$$0.2 = x \times \frac{1000}{500}$$
$$x = 0.1 moles$$

63. $Equvalent\ \ wt = \frac{Mol\, wt}{Total\, charge\ on\ cation}$

$$Eq.wt = \frac{M}{2}$$
$$\left[CaCO_3 \to Ca^{+2} + CO_3^{-2}\right]$$

64. $M = \frac{\%(w/v) \times 10}{G.M.W}$

$$M = \frac{0.98 \times 10}{98}$$
$$M = 0.1M$$

65. $$N = \frac{no\ of\ \ gram\ equvalents \times 100}{V\ in\ ml}$$

$$N = \frac{10^{-2} \times 1000}{5}$$

66. $$N = \frac{no\ of\ \ gram\ equvalents \times 1000}{V\ in\ ml}$$

67. $$m = \frac{wt}{G.M.W} \times \frac{1000}{wt\ of\ solvent\ in\ gms}$$

$$m = \frac{4}{40} \times \frac{1000}{1000}$$
$$m = 0.1m$$

68. $$N = \frac{\%(w/v) \times 10}{G.E.W}$$

$$N = \frac{0.98 \times 10}{49} = 0.2N$$

69. $$X_u = \frac{n_u}{n_u + n_{H_2O}}$$

$$n_u = \frac{6}{60}, n_{H_2O} = \frac{90}{18}$$
$$n_u = 0.1, n_{H_2O} = 5$$
$$X_u = \frac{0.1}{0.1+5} = \frac{1}{51}$$

70. R.L.V.P α concentration

71. $Ba(NO_3)_2 \rightarrow Ba^{+2} + 2NO_3^-$

No of Ions produced = 3 = n

i= 2.74

$$\alpha = \frac{i-1}{n-1} \times 100$$
$$\alpha = \frac{2.74-1}{3-1} \times 100 = 87\%$$

72. According to Raoults law:-

$\frac{P^0 - P_S}{P^0} = Mole\ fraction\ of\ solute$

$\frac{P^0 - P_S}{P^0} = \frac{n_{urea}}{n_{urea} + n_{H_2O}}$

$\frac{24 - x}{24} = \frac{0.1}{0.1 + 10}$

$x = 23.76\, mmHg$

73. $X_{H_2O} = \frac{n_{H_2O}}{n_{H_2O} + n_S}$

$\left[n_{H_2O} = \frac{80}{18}, n_S = \frac{20}{342} \right]$

$\therefore X_{H_2O} = \frac{4.44}{4.44 + 0.06} = 0.98$

74. For an ideal solution

$\Delta S_{mix} > 0, While\ \Delta H_{mix} = 0$

$\Delta V_{mix} = 0, \Delta P = 0$

75. $N = \frac{wt}{Eq.wt} \times \frac{1000}{V\ in\ ml}$

$N = \frac{4.9}{49} \times \frac{1000}{400} = 0.25N$

$V = \frac{wt}{G.E.W} \times \frac{1000}{N}$

$V = \frac{20}{40} \times \frac{1000}{0.25} = 2lit$

76. According to the Henry's Law:-

$\frac{P_1}{p_2} = \frac{S_1}{S_2}$ [$S, of\, S_2$ Solubility of gas in g/L]

$\frac{500}{750} = \frac{0.01}{x}$

$x = 0.015 g / L$

77. $\frac{P^0 - P_S}{P^0} =$ mole fraction of solute

$\frac{P^0 - P_S}{P^0} = \frac{18/180}{\frac{18}{180} + \frac{178.2}{18}}$

$\frac{760 - x}{760} = \frac{0.1}{0.1 + 9.9}$

$760 - x = \frac{76}{10}$

$x = 752.4$

78. $\Delta T_f = K_f.m$

$$T_0 - T_S = K_f.\frac{wt}{G.M.W} \times \frac{1000}{wt\,of\ solvent\,in\,gms}$$

79. $\Delta T_f = i.K_f.m$

$i = 1.0268$

$$\infty = \frac{i-1}{n-1} = 0.0268 = 2.68\%$$

80. $\frac{\pi_1}{\pi_2} = \frac{T_1}{T_2}$