SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR MPC | **EAMCET UNIT-V** | **Date: 04-05-2020**

Time: 3 Hours | | **Max. Marks: 160**

Instructions:

For each question, you will be awarded 1 mark if you darken the bubble corresponding to the correct answer ONLY and zero marks if no bubbles are darkened.

MATHS – A

Syllabus: Quadratic equations, Theory of equation, Binomial theorem

1. **If α,β are the roots of $x^2-2x+4=0$ then $\alpha^5+\beta^5=$**

1) 8 2) 32 3) 24 4) 16

2. **If $x^2-(5m-2)x+4m^2+10m+25=0$ is a perfect square then m =**

1) 4, 9 2) $3,\frac{4}{3}$ 3) $8,\frac{-4}{3}$ 4) $2,\frac{3}{4}$

3. **If α,β are the roots of $x^2+x+1=0$, then the equation whose roots are α^2,β^2 is**

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

4. **The expression $2x^2+4x+7$ has minimum value 'm' at x = a; the ordered pair $(a,m)=$**

1) $(1,-6)$ 2) $(-1,-5)$ 3) $(-1,5)$ 4) $(1,5)$

5. **For the equation $|x^2|+|x|-6=0$, the roots are**

1) One and only one real number 2) Real with sum one
3) Real with sum zero 4) Real with product zero

6. **$x=\sqrt{5+\sqrt{5+\sqrt{5+......\infty}}}$ then**

1) x = 5 2) $0<x<1$ 3) $1<x<2$ 4) $2<x<3$

7. **Out of the roots of $x^2-2\lambda x+\lambda^2-1=0$ one is greater than 4 and the other root is less than 4, then the limits of λ are**

1) $3<\lambda<5$ 2) $\lambda<3$ 3) $\lambda<5$ 4) $5<\lambda<6$

8. **If the roots of the equation $(a^2+b^2)x^2+2(bc+ad)x+(c^2+d^2)=0$ are real then a^2,bd,c^2 are in**

1) AP 2) GP 3) HP 4) AGP

9. **The number of integral solution of $2\left[x^2+\frac{1}{x^2}\right]-7\left[x+\frac{1}{x}\right]+9=0$ when $x\neq0$ is**

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

10. **The maximum value of expression $\frac{x^2+x+1}{2x^2-x+1}$ for $x\in R$, is**

1) $\frac{7+2\sqrt{7}}{7}$ 2) $\frac{7-2\sqrt{7}}{7}$ 3) $\frac{7}{3}$ 4) $\frac{14+2\sqrt{7}}{7}$

11. **The internal values of k for which $x^2-2(4k-1)x+15k^2-2k-7>0$ for all $x\in R$**

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

12. **The harmonic mean of two numbers is $-\frac{8}{5}$ and their geometric mean is 2. The quadratic equation whose roots are twice those number is**

1) $x^2+10x+16=0$ 2) $x^2-10x+16=0$ 3) $x^2+5x+4=0$ 4) $x^2-5x+4=0$

13. **The value of 'a' for which the equations $x^3+ax+1=0$ and $x^4+ax^2+1=0$ have a common root is**

1) – 2 2) – 1 3) 1 4) 2

14. **Let** $\alpha \neq \beta$ **satisfy** $\alpha^2+1=6\alpha, \beta^2+1=6\beta$ **then, the quadratic equation whose roots are** $\frac{\alpha}{\alpha+1}, \frac{\beta}{\beta+1}$ **is**

1) $8x^2+8x+1=0$ 2) $8x^2-8x-1=0$ 3) $8x^2-8x+1=0$ 4) $8x^2+8x-1=0$

15. **In a triangle PQR** $\underline{|R} = \frac{\pi}{4}$. **If** $\tan\left[\frac{P}{2}\right]$ **and** $\tan\left[\frac{Q}{2}\right]$ **are the roots of the equation** $ax^2+bx+c=0$, **then**

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

16. **If** $\sqrt{5}+\sqrt{2}$ **is root of** $3x^5-4x^4-42x^3+56x^2+27x-36=0$ **then the rational root is**

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

17. **If** α, β **and 1 are the roots of** $x^3-2x^2-5x+6=0$ **then** (α, β)

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

18. α, β, γ **are the roots of** $x^3+ax+b=0$ **then** $(\alpha+\beta)^{-1}+(\beta+\gamma)^{-1}+(\gamma+\alpha)^{-1}=$

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

19. **Whose roots are** $\frac{\alpha}{3}, \frac{\beta}{3}, \frac{\gamma}{3}$ **is**

1) $x^3+6x^2-36x-81=0$ 2) $9x^3+6x^2-4x-1=0$
3) $9x^3+6x^2+4x+1=0$ 4) $9x^3-6x^2-4x-1=0$

20. **If** $px^3+qx^2+rx+s=0$ **is a R. E of second type then**

1) $p=s, q=r$ 2) $p=-s, q=-r$ 3) $p=s, q=-r$ 4) $p=-s, q=r$

21. **If** α, β, γ **are the roots of** $x^3-x-1=0$ **then the transformed equation having the roots** $\frac{1+\alpha}{1-\alpha}, \frac{1+\beta}{1-\beta}, \frac{1+\gamma}{1-\gamma}$ **is obtained by taking x =**

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

22. **Number of positive roots of** $x^4+3x^3-2x^2-3=0$ **is**

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

23. **If the roots of the equation** $x^3-7x^2+14x-8=0$ **are a geometric progression then the difference between the largest and the smallest root is**

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

24. **If** α, β, γ **are the roots of** $x^3-5x+4=0$ **then** $(\alpha^3+\beta^3+\gamma^3)^2=$

1) 12 2) 13 3) 169 4) 144

25. **If the roots of** $x^3-kx^2+14x-8=0$ **are in geometric progression then k =**

1) – 3 2) 7 3) 4 4) 0

26. **If** $f(x)=2x^4-13x^2+ax+b$ **is divisible by** x^2-3x+2 **then** (a,b)

1) $(-9,-2)$ 2) $(6,4)$ 3) $(9,2)$ 4) $(2,9)$

27. **If the coefficients of the equation whose roots are k times the roots of the equation** $x^3+\frac{1}{4}x^2-\frac{1}{16}x+\frac{1}{144}=0$, **are integers then a possible value of k is**

1) 3 2) 12 3) 9 4) 4

28. **If the equation** $x^5-3x^4-5x^3+27x^2-32x+12=0$ **has repeated roots, then the prime number that divides the non-repeated root of this equation is**

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

29. **The coefficient of x^4 in the expansion of $\left(1+x-2x^2\right)^6$ is**

1) – 81 2) – 45 3) 81 4) 91

30. **The middle term in the expansion of $\left(1-3x+3x^2-x^3\right)^{2n}$ is**

1) ${}^{6n}C_{3n}\left(-x\right)^{3n}$ 2) ${}^{6n}C_{3n}\left(-x\right)^{2n+1}$ 3) ${}^{4n}C_{3n}\left(-x\right)^{3n}$ 4) ${}^{6n}C_{3n}\left(-x\right)^{3n-1}$

31. **In the expansion of $\left(\sqrt[5]{3}+\sqrt[7]{2}\right)^{24}$ the rational term is**

1) T_{14} 2) T_{16} 3) T_{15} 4) T_7

32. **If $\left(1+x+x^2\right)^n=\sum_{r=0}^{2n}a_r x^r$ then $a_1-2a_2+3a_3-......-2n.a_{2n}=......$**

1) 0 2) 1 3) n 4) – n

33. **Expansion of $\frac{5}{2-x}+\frac{1}{1+3x}$ is valid of**

1) $-2<x<2$ 2) $x<-2\left(or\right)x>2$ 3) $x<\frac{1}{3}$ 4) $-\frac{1}{3}<x<\frac{1}{3}$

34. **If the coefficient of $\left(2r+4\right)^{th}$ term and $\left(r-2\right)^{th}$ terms in the expansion of $\left(1+x\right)^{18}$ are equal then r =**

1) 9 2) 4 3) 6 4) 3

35. **The coefficient of $x^2y^3z^4$ in $\left(ax-by+cz\right)^9$ is**

1) $1260a^2b^3c^4$ 2) $-1220a^2b^3c^4$ 3) $-1260a^2b^3c^4$ 4) $1220a^2b^3c^4$

36. **No. of distinct terms in $\left(a+b+c+d\right)^n$ $n\in N$ is**

1) ${}^{n+3}C_2$ 2) ${}^{n+3}C_3$ 3) ${}^{n+2}C_3$ 4) ${}^{n+4}C_3$

37. ${}^{29}C_5+\sum_{r=0}^{4}{}^{(33-r)}C_4=$

1) ${}^{32}C_4$ 2) ${}^{35}C_5$ 3) ${}^{34}C_4$ 4) ${}^{34}C_5$

38. **If $\left(1+x+x^2\right)^n=a_0+a_1x+a_2x^2+......+a_{2n}x^{2n}$ then $a_0+a_2+a_4+......+a_{2n}=$**

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

39. $3.C_0+7.C_1+11.C_2+......+\left(3+4n\right)C_n=$

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

40. **The remainder when $7^n-6n-50\left(n\in N\right)$ is divided by 36 is**

1) 22 2) 23 3) 1 4) 21

MATHS – B

Syllabus: Circles, System of Circles, Parabola up to tangents and normal.

41. **The number of normal to the parabola $y^2=4x$ from (5, 2) is**

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

42. **The line $x-1=0$ is the directrix of the parabola $y^2-kx+8=0$ then one of the value of k is**

1) 4 2) $\frac{1}{4}$ 3) 8 4) $\frac{1}{8}$

43. **The equation of the parabola is given by $y^2+8x-12y+20=0$** then

1) Vertex= (-2, 6) 2) focus= (0, 6)
3) Latusrectum = 4 4) equation of the axis is x=2

44. Equation of the parabola whose axis is horizontal and passing through the points (-2, 1), (1, 2), (-1,3) is

1) $5y^2-2x+10y+20=0$ 2) $5y^2+2x-21y+20=0$

3) $5y^2+2x-21y+40=0$ 4) $3y^2-9x-10y-15=0$

45. The sum of the slopes of the tangents to the parabola $x^2=16y$ from (5, 1) is 'a' and the product of the slopes is 'b' then a-b=

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

46. The straight line $x+y=k+1$ touches the parabola $y=x(1-x)$ if

1) $k=-1$ 2) $k=0$ 3) $k=1$ 4) k takes any real value

47. The equation of the common tangent to the parabolas $y^2=32x$ and $x^2=256y$ is

1) $x+2y-32=0$ 2) $2x+y-32=0$ 3) $x+2y+32=0$ 4) $2x+y+32=0$

48. Equation of the normal to $y^2=4x$ which is perpendicular to $x+3y+1=0$ is

1) $3x-y-33=0$ 2) $3x-y+17=0$ 3) $3x-y+19=0$ 4) $3x-y+27=0$

49. Equation of the parabola whose latusrectum is 8, equation of the axis and tangent at the vertex are $x-y+1=0$, $x+y+3=0$ respectively is

1) $(x-y+1)^2=16\sqrt{2}(x+y+3)$ 2) $(x-y+1)^2=16(x+y+3)$

3) $(x+y+3)^2=8\sqrt{2}(x-y+1)$ 4) $(x-y+1)^2=8\sqrt{2}(x+y+3)$

50. If the equation $25\left[(x-5)^2+(y-3)^2\right]=(3x-4y+1)^2$ represents a parabola then its axis is

1) $4x+3y-10=0$ 2) $4x+3y-15=0$

3) $4x+3y-29=0$ 4) $4x+3y-17=0$

51. If PSQ is the focal chord of a parabola such that SP=2 and SQ=4 then the length of the latusrectum is

1) $\frac{8}{3}$ 2) $\frac{16}{3}$ 3) $\frac{25}{3}$ 4) $\frac{4}{3}$

52. Equation of the two tangents drawn from (1, 4) to the parabola $y^2=12x$ are

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

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

53. The area of the triangle formed by the normal to the parabola $y^2=16x$ whose slope is $\frac{1}{2}$ with the co-ordinate axes is

1) $\frac{9}{4}$ 2) $\frac{27}{4}$ 3) $\frac{54}{4}$ 4) $\frac{81}{4}$

54. The angle between the tangents drawn to the parabola $y^2=4x$ from the point (1, 4) is

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{3}$ 3) $\frac{2\pi}{5}$ 4) $\frac{\pi}{6}$

55. If (-1,-1) is the focus and $x+y+4=0$ is the directrix of a parabola, then its vertex is

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

56. For the circles $x^2+y^2+2\lambda x+c=0, x^2+y^2+2\mu x-c=0$, the number of common tangents

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

57. A circle 'C' of radius 3 units rolls outside the rim of the circle $x^2+y^2-4x+6y-12=0$, then locus of the Centre of the circle C is

1) $x^2+y^2-4x+6y+4=0$ 2) $x^2+y^2-4x+6y-51=0$

3) $x^2+y^2-4x+6y+9=0$ 4) $x^2+y^2-4x+6y+7=0$

58. There are two circles whose equations are $x^2+y^2=9$ and $x^2+y^2-8x-6y+n^2=0$, $n\in z$. If the two circles have exactly two common tangents then the number of possible value of 'n' is

1)2 2)8 3)9 4) 5

59. If the equation of the circle whose one diameter is the common chord of the circles $x^2+y^2+4x+2y-4=0$ and $x^2+y^2-2x-4y-4=0$ is $x^2+y^2+ax+by+c=0$ then $a+b-c=$

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

60. If the radical axis of the circles $x^2+y^2+2gx+2fy+c=0$ and $2x^2+2y^2+3x+8y+2c=0$ touches the circle $x^2+y^2+2x+2y+1=0$ then $(4g-3)(f-2)=$

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

61. The equation of the circle which cuts the circles $s_1=x^2+y^2-4=0$, $s_2=x^2+y^2-6x-8y+10=0$, $s_3=x^2+y^2+2x-4y-2=0$ at the extremities of diameters of these circles is

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

3) $x^2+y^2=25$ 4) $x^2+y^2+x+y+1=0$

62. The equation of a circle passing through the point of intersection of the circles $x^2+y^2-4x-6y-12=0$, $x^2+y^2+6x+4y-12=0$ and having radius $\sqrt{13}$ is

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

3) $x^2+y^2-2y-13=0$ 4) $x^2+y^2+2x-12=0$

63. If a circle S passing through the point (3, 4) cuts the circle $x^2+y^2=36$ orthogonally, then the locus of the Centre of S is

1) $x^2+y^2-6x-8y+11=0$ 2) $x^2+y^2-8x-6y+11=0$

3) $6x+8y-61=0$ 4) $6x+8y+11=0$

64. If the coordinates of the Centre of the circle are roots of the equation $6x^2-5x+1=0$ and radius is $\frac{5}{6}$ then its equation is

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

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

65. If $4a^2-5b^2+6a+1=0$ and the line $ax+by+1=0$ touches the fixed circle then

1) The centered circles is (4, 0) 2) The radius of the circle is $\sqrt{5}$

3) The circle passes through origin 4) None of the above

66. $x^2+y^2+4x-6y+4=0$ is the equation of the in circle of an equilateral triangle, then the equation of the circumcircle of the triangle is

1) $x^2+y^2+4x+6y-23=0$ 2) $x^2+y^2+4x-6y-23=0$

3) $x^2+y^2-4x-6y-23=0$ 4) None of the above

67. Two straight rods of length 2a and 2b move along the coordinate axes in such a way that their extremities are always concyclic. Then the locus of the centers of such circles is

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

68. The equation of the circle whose radius if 3 and which touches internally the circle $x^2+y^2-4x-6y-12=0$ at the point (-1,-1) is

1) $5x^2+5y^2+9x-6x-7=0$ 2) $5x^2+5y^2-8x-14y-32=0$

3) $5x^2+5y^2-6x+8y-8=0$ 4) $5x^2+5y^2+6x-8y-12=0$

69. The point of intersection of the common tangents drawn to the circles $x^2+y^2-4x-2y+1=0$ and $x^2+y^2-6x-6y+4=0$ is

1) $\left(\frac{5}{2},\frac{3}{2}\right)$ 2) $\left(\frac{6}{5},\frac{1}{5}\right)$ 3) $(0,-1)$ 4) $\left(\frac{12}{5},\frac{7}{5}\right)$

70. **The line** $3x+4y-5=0$ **cut the curve** $2x^2+3y^2=5$ **at A and B if 'O' is the Origin, the** $\angle AOB=$

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{2}$ 4) $\frac{\pi}{8}$

71. **Let A be the Centre of the circle** $x^2+y^2-2x-4y-20=0$. **If the tangents drawn at the points B(1,7) and D(4,-2) on the given circle meet at the point C, then the area of the quadrilateral ABCD is**

1) 60 2) 65 3) 70 4) 75

72. **If** $x+ky-4=0$ **and** $x-y-5=0$ **are conjugate lines with respect to the circle** $(x-1)^2+(y-1)^2=3$, **then k=**

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

73. **The equation of a circle touching the coordinate axes and the line** $3x-4y=12$ **is**

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

74. **The equation of the circle whose radius is 4, centre lies in the first quadrant and which touches x-axes, line** $4x-3y=0$ **is**

1) $x^2+y^2-4x-16y+4=0$ 2) $x^2+y^2-8x-4y+16=0$
3) $x^2+y^2-16x-8y+64=0$ 4) $x^2+y^2-4x-8y+4=0$

75. **The equation of the circles which pass through the origin and makes intercepts of lengths 4 and 8 on the X-axis and Y-axis respectively are**

1) $x^2+y^2\pm4x\pm8y=0$ 2) $x^2+y^2\pm2x\pm4y=0$ 3) $x^2+y^2\pm8x\pm16y=0$ 4) $x^2+y^2\pm x\pm y=0$

76. **If the tangent at the point P on the circle** $x^2+y^2+6x+6y=2$ **meets the straight line** $5x-2y+6=0$ **at a point Q on the Y-axis then the length of PQ is**

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

77. **The radius of the circle passing through the point (6,2) and having** $x+y=6$ **as a normal and** $x+2y=4$ **as a diameter is**

1) 10 2) $2\sqrt{5}$ 3) $5\sqrt{5}$ 4) $4\sqrt{5}$

78. **The tangent at any point P on the circle** $x^2+y^2=2$ **cuts the axes in L and M. The locus of middle point of LM is**

1) $\frac{1}{x^2}+\frac{1}{y^2}=2$ 2) $\frac{1}{x^2}+\frac{1}{y^2}=\frac{1}{2}$ 3) $\frac{1}{x^2}+\frac{1}{y^2}=1$ 4) $\frac{1}{x^2}+\frac{1}{y^2}=4$

79. **If the points** $(0,0),(2,3),(3,2),(k,k),(k\neq0)$ **are concyclic then** $k=$

1) $\frac{5}{13}$ 2) $\frac{13}{6}$ 3) $\frac{5}{6}$ 4) $\frac{13}{5}$

80. **The polar of the point** $(2,-4)$ **with respect to the circle** $3x^2+3y^2=2$ **divides the line segment joining** $(-1,2)$ **and** $(5,4)$ **in the ratio.**

1) $8:5$ 2) $-8:5$ 3) $5:8$ 4) $-5:8$

PHYSICS

Syllabus: Electric charges and fields, Electro static potential and capacitors, Current Electricity

81. **If a body is charged by rubbing, its weight**

1) Remains precisely constant 2) Increases slightly
3) Decreases slightly 4) May increase slightly or may decrease slightly

82. **When a brass plate is introduced between two charges, the force between the charges**

1) Decreases 2) Increases 3) Remains same 4) Becomes zero

83. The electric force between two electrons and the gravitational force between them bear a ratio of the order of

1) 10^{42} 2) 10^{36} 3) 10^{39} 4) 10^{19}

84. The pair of particles which experience same force in a uniform electric field is

1) Electron and proton 2) Proton and deuteron
3) Deutron and alpha particle 4) All the above

85. The path of a charged particle projected into a uniform transverse electric field is

1) Circle 2) Hyperbola 3) Parabola 4) Ellipse

86. If 10 million electrons are removed from a neutral body, then the charge on the body is

1) $1.2\times10^{-12}C$ 2) $+1.6\times10^{-12}C$ 3) $-1.6\times10^{-13}C$ 4) $10^{-12}C$

87. The force between two charges $2\mu C$ and is $4\mu C$ is 24, when they are separated by a certain distance in free space. The force if (a) distance between them is doubled and (b) distance is halved are

1) 16N, 80N 2) 8N, 72N 3) 6N, 96N 4) 10N, 68N

88. A force 'F' is acting between two charges in air. If the space between them be completely filled with medium having a dielectric constant K= 4, the force will be

1) F 2) 4F 3) $\frac{F}{4}$ 4) 2F

89. A sphere of radius 1 m encloses a charge of $5\mu C$. Another charge of $-5\mu C$ is placed inside the sphere. The net electric flux would be

1) Double 2) Four times 3) Zero 4) Three times

90. A charge Q is divided into two parts q_1 and q_2 such that they experience maximum force of repulsion when separated by certain distance. The ratio of Q, q_1 and q_2 is

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

91. Two charges of $50\mu C$ and $100\mu C$ are separated by a distance of 0.6m.The intensity of electric field at a point midway between them is

1) $50\times10^{6}V/m$ 2) $5\times10^{6}V/m$ 3) $10\times10^{6}V/m$ 4) $10\times10^{-6}V/m$

92. An infinitely long thin straight wire has uniform linear charge density of $\frac{1}{3}cm^{-1}$. Then the magnitude of the electric intensity at a point 18cm away is

1) $0.33\times10^{11}NC^{-1}$ 2) $3\times10^{11}NC^{-1}$ 3) $0.66\times10^{11}NC^{-1}$ 4) $1.32\times10^{11}NC^{-1}$

93. Potential at the point of a pointed conductor is

1) Maximum 2) Same as at any other point
3) Zero 4) Minimum

94. On the perpendicular bisector of an electric dipole, the electric intensity E and potential V are

1) $E=0,V=0$ 2) $E\neq0,V\neq0$ 3) $E\neq0,V=0$ 4) $E=0,V\neq0$

95. If an earthed plate is brought near positively charged plate, the potential and capacity of charged plate

1) increases, decreases 2) decreases, increases 3) decreases, decreases 4) increases, increases

96. The capacitance of a parallel plate condenser depends upon

1) area of the plates 2) medium between the plates
3) distance between the plates 4) all of the above

97. A capacitor works in

1) A.C. Circuits 2) D.C. circuits
3) Both the circuits 4) Neither in A.C nor in D.C. circuits

98. The potential energy of a proton is $3.2\times10^{-18}J$ at a particular point. The electric potential at this point is

1) 5V 2) 10V 3) 20V 4) 15V

99. Two protons are at a distance of $0.53\times10^{-10}m$. The potential energy of the system in eV is

1) + 13.6 2) + 27.2 3) + 6.8 4) + 20.4

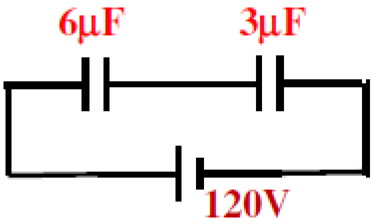
100. The capacity of a parallel plate condenser is 10μF without dielectric. Dielectric constant of 2 is used to fill half thickness between the plates the capacitance is .... μF

1) 10 2) 20 3) 15 4) 13.33

101. Sixty four spherical drops each of radius 2cm and carrying 5C charge combine to form a bigger drop. Its capacity is

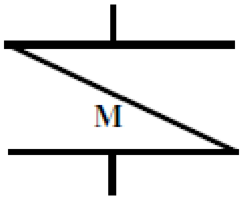
1) $\frac{8}{9}\times10^{-11}F$ 2) $90\times10^{-11}F$ 3) $1.1\times10^{-11}F$ 4) $9\times10^{11}F$

102. The potential difference across 3μF condenser is



1) 40 Volt 2) 60 Volt 3) 80 Volt 4) 120 Volt

103. A thin metal plate M is inserted between the plates of a parallel plate capacitor as shown in figure. The new capacitance if initial capacitance is 'C'

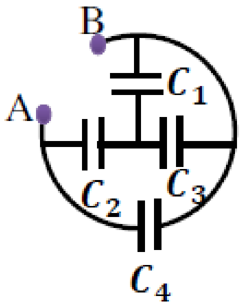


1) $\frac{C}{2}$ 2) 2C 3) 0 4) Infinity

104. Two spheres of radii 12 cm and 16 cm have equal charge. The ratio of their energies is

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

105. In the arrangement of capacitors shown in the figure, if each capacitor is 9pF, then the effective capacitance between the points A and B is



1) 10pF 2) 15pF 3) 20pF 4) 5pF

106. Material used for heating coils is

1) Nichrome 2) Copper 3) Silver 4) Manganin

107. The resistance of wire is R. Resistance of another wire of twice the length and twice the diameter is

1) R 2) 4R 3) $\frac{R}{2}$ 4) 8R

108. Among the following dependences of drift velocity V_d on electric field E. Ohm's law obeyed is

1) $V_d \alpha E$ 2) $V_d \alpha E^2$ 3) $V_d \alpha \sqrt{E}$ 4) $V_d = Cons\tan t$

109. Back emf of a cell is due to

1) Electrolytic polarization 2) Peltier effect
3) Magnetic effect of current 4) All of the above

110. Temperature coefficient of resistance 'a' and resistivity 'r' of a potentiometer wire must be

1) High and low 2) Low and high 3) Low and low 4) High and high

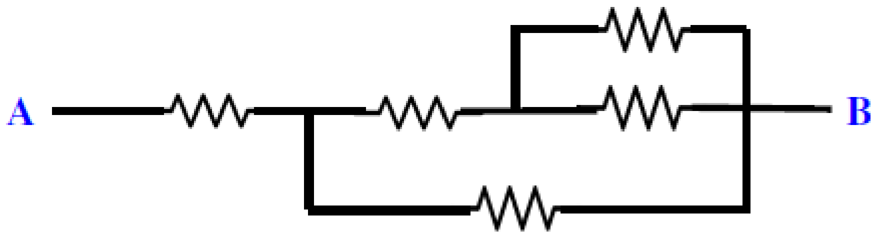
111. If the electron in H_2 atom makes 6.25×10^{15}rev/sec, the current is

1) 1A 2) 10^{-1}A 3) 1mA 4) $1\mu A$

112. Four wires made of same material have different lengths and radii. The wire having more resistance in the following is

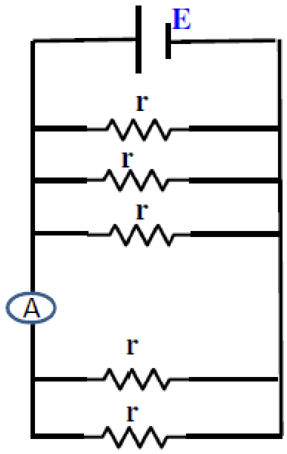
1) l = 100cm, r = 1mm 2) l = 50cm, r =2mm 3) l = 100cm, r = 1/2mm 4) l= 50cm, r =1/2mm

113. The equivalent resistance between A and B if each resistance is equal to 20 ohm is



1) 10Ω 2) 32Ω 3) 20Ω 4) 26.67Ω

114. An ammeter A is connected as shown in the diagram. Ammeter reading is



1) $\frac{2E}{r}$ 2) $\frac{5E}{r}$ 3) $\frac{E}{r}$ 4) $\frac{E}{2}$

115. 20 Cells each of 6V are connected in series. The emf of the combination is found to be 96V. How many cells are connected wrong?

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

116. The sequence of bands marked on a carbon resistor is brown, black, brown and gold. What is the value of the resistance?

1) $1\Omega \pm 11\Omega$ 2) $10\Omega \pm 10\Omega$ 3) $100\Omega \pm 5\%$ 4) $1000\Omega \pm 5\%$

117. A house is fitted with ten lamps of each 60W. Each lamp burns for 5 hours a day on an average. The cost of consumption in a month of 30 days at 2 rupees 80 paisa per unit is

1) Rs = 152 2) Rs = 252 3) Rs = 352 4) Rs = 452

118. P.D between A&B in the given branch of a circuit is

1) 6V 2) 12V 3) 9V 4) 0V

119. The resistances of 2 potentiometer wires of equal lengths are 2Ω and 4Ω respectively. If the currents flowing through them is same, the ratio of potential gradient is

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

120. A constant potential difference is applied between the ends of the wire. If the length of the wire. If the length of the wire is elongated 4 times, then the drift velocity is electrons will be

1) Increases 4 times 2) Decreases 4 times 3) Increases 2 times 4) Decreases 2 times

CHEMISTRY

Syllabus: Solutions, Solid state, Electro chemistry and Chemical kinetics and Surface chemistry complete.

121. 200 ml of a solution of Barium Hydroxide contains 171.4 mg of solute. The molarity of the solution will be (M.Wt of Ba $(OH)_2$ = 171.4)

1) $5\times10^{-2}M$ 2) 0.5 M 3) $5\times10^{-3}M$ 4) $5\times10^{-4}M$

122. Equivalent weight of $K_2Cr_2O_7$ in Acidic medium is (M= mol.wt)

1) $\frac{M}{5}$ 2) $\frac{M}{6}$ 3) M 4) $\frac{M}{3}$

123. The molality of 10 % $\left(\frac{w}{w}\right)$ NaOH solution is

1) 2.77 m 2) 5.54 m 3)0.0025 m 4) 2.5 m

124. The mole fractions of water and methanol In a solution containing 1 mole of water and 4 moles of methanol are

1) $0.2\,\&\,0.8$ 2) $0.8\,\&\,0.2$ 3) $\frac{1}{18}\,\&\,\frac{1}{8}$ 4) $\frac{1}{8}\,\&\,\frac{1}{18}$

125. Which one of the following is an isotonic pair of solutions?

1) 0.5 M NaCl and 0.1 M Na_2SO_4 2) 0.2 M urea and 0.1 M sugar
3) 0.1 M $BaCl_2$ and 0.2 M Urea 4)0.2 M $MgSO_4$ and 0.1 M NH_4Cl

126. For a very dilute aqueous solution of $K_4\left[Fe(CN)_6\right]$ vant hoff factor is

1) i = 11 2) i = 5 3) $i=\frac{1}{11}$ 4) i = 10

127. Solutions containing 6% glucose & 2% of X have the same lowering of vapour pressure. The molecular weight of 'X' is

1) 30 2) 40 3) 50 4) 60

128. An Aqueous solution freeze at -0.186° C (K_f=1.86 K_b=0.512) what is the Elevation in Boiling point?

1) 0.186 2) 0.512 3) 0.86 4) 0.0512

129. The packing fraction in a face – centered cube cell of crystals is

1) $\frac{\sqrt{3}}{8}a$ 2) $\frac{\pi}{6}$ 3) $\frac{\sqrt{2}}{6}\pi$ 4) $\frac{1}{2\sqrt{2}}\pi$

130. Which of the following system has/have not been correctly characterized?

1) Cubic $a=b=c$ $\alpha=\beta=\gamma=90°$ 2) tetragonal $a=b\neq c$ $\alpha=\beta=\gamma=90°$
3) Orthorhombic $a=b=c$ $\alpha=\beta=\gamma=90°$ 4) $a=b=c$ $\alpha=\beta=\gamma=90°$

131. Which of the following is a Berthollide Compound?

1) MgO 2) AhO_3 3) Na_2O 4) ZrH

132. In Solid has a Structure in which 'W' at are located at the corner of the unit cell 'O' atoms are located at the cube edge and 'Na' atoms at the cube centers. The form of the compound is.

1) Na_2WO_3 2) $NaWO_3$ 3) $Na_2W_2O_4$ 4) Na_2W_3

133. A metal has a body – centered cubic lattice and the length of the unit cell is 3 A°. If the densits is 10 gm. /cc calculate its Atomic weight

1) 27 2) 81 3) 40.5 4) 162

134. Potassium crystalizes in a BCC lattice hence the co-ordination number of potassium in potassium metal is

1) 0 2) 4 3) 6 4) 8

135. Copper cry stallises in a F.C.C lattice the length of the unit cell is 3.63 A°. The radius of Cu-atom is

1) 0.6 A° 2) 2.9 A° 3) 1.28 A° 4) 5.7 A°

136. One Ampere of current is passed for 9650 seconds through molten $AlCl_3$. What is the weight in grams of 'Al' deposited at cathode (Atomic weight of Al = 27)

1) 0.9 2) 90 3) 0.09 4) 90.0

137. The values Λ_{eq}^{α} for NH_4Cl, $NaOH$ and $NaCl$ respectively 149.74, 248.1 and 126. ohm^{-1} cm^2 equ^{-1}. The value of Λ_{eq}^{α} of NH_4OH

1) 371.44 2) 271.4 3) 1.44 4) 71.44

138. The charge required for the oxidation of one mole of Mn_3O_4 to MnO_4^{-2} in alkaline medium is (assume 100 % current efficiency)

1) $\frac{10}{3}F$ 2) 6 F 3) 10 F 4) 4 F

139. For cell reaction is $Mg_{(s)}+Cu_{(aq)}^{+2}\rightarrow Cu_{(s)}+Mg_{(aq)}^{+2}$ If the S.R.P values of Mg and Cu are 2.37 V and + 0.34 V respectively. The emf of the cell is

1) +2.03 V 2) -2.03 V 3) +2.71 V 4) -2.71 V

140. $E^{\circ}_{\frac{zn^{+2}}{zn}}=-0.76V$ The EMF of the cell $\frac{zn}{zn^{+2}}(M)\,||\,HCl\left(P^H=2\right)\,||\,H_2\left(1atom\right)$ Pt is

1) 0.878 V 2) 0.642 V 3) -0.878 V 4) 0.701 V

141. The rate expression for a reaction is $\frac{dx}{dt}=K\left[A\right]^{\frac{1}{2}}B^{\frac{3}{2}}$ the overall order of the reaction is

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

142. The hydrolysis of Ethyl acetate $CH_3COOC_2H_5+H_2O\xrightarrow{N^+}CH_3COOH+C_2H_5OH$ is a reaction of

1) Pseudo first order 2) Second order 3) Third order 4) Zero order

143. Thresholds energy (TE), Internal Energy of reactant (IE) and energy of Activation (AE) are related as

1) $AE=TE+IE$ 2) $TE=AE+IE$ 3) $IE=AE-TE$ 4) $TE=AE=IE$

144. For a first order reaction, the half lib is equal to

1) 0.693 x K 2) $\frac{0.693}{k}$ 3) $\frac{k}{0.693}$ 4) $\frac{2.303}{k}$

145. The rate of the reaction at 40°C is 5 units the ratio of same reaction at 80°C is (temperature co-efficient is 2)

1) 10 units 2) 80 units 3) 20 units 4) 625 units

146. For a reaction $2A+B\rightarrow C+D$

$\frac{-d\left(A\right)}{dt}=K\left(A\right)^2\left(B\right)$. **The expression for $\frac{d\left(B\right)}{dt}$ will be**

1) $K\left(A\right)^2\left(B\right)$ 2) $\frac{1}{2}K\left(A\right)^2\left(B\right)$ 3) $K\left(A\right)^2\left(2B\right)$ 4) $K\left(2A\right)\left(B\right)$

147. The unit of rate constants obeying the rate expressions $r=k\left(A\right)^1\left(B\right)^{\frac{2}{3}}$ is

1) $moles^{-\frac{2}{3}}lites^{\frac{2}{3}}tim^{-1}$ 2) $moles^{\frac{2}{3}}lites^{-\frac{2}{3}}tim^{-1}$ 3) $moles^{-\frac{5}{3}}lites^{\frac{2}{3}}tim^{1}$ 4) None

148. As lead storage battery is charged.

1) Lead dioxide dissolver
2) Sulphuric acid regenerated
3) Lead electrode becomes coated with lead sulphate
4) The concentration of sulfuric acid decreases

149. Aluminum oxide may be electrolyzed at 1000˚C to furnish aluminum metal. (Atomic mass = 27 amu, 1 Faraday =96500 columns)

The cathode reaction is $Al^{+3}+3\bar{e}\rightarrow Al$

To prepare 5.12 kg of Aluminum metal by this method would require.

1) $5.49\times10^{1}C$ of electricity
2) $5.49\times10^{4}C$ of electricity
3) $1.83\times10^{7}C$ of electricity
4) $5.49\times10^{7}C$ is electricity

150. Total volume of gases evolved at STP when 36 g of H_2O are completely electrolyzed between platinum electrode

1) 22.4 lit
2) 44.8 lit
3) 33.6 lit
4) 67.2 lit

151. Catalyst used in the manufacture of HNO_3 by Ostwald's process is

1) Rb
2) Pd
3) Fe
4) Pt

152. In which of the following reactions a catalyst is required

1) $S+O_2\rightarrow SO_2$
2) $C+O_2\rightarrow CO_2$
3) $2SO_2+O_2\rightarrow 2SO_3$
4) All of the above

153. The catalyst used in the hydrogenation of oil is

1) V_2O_5
2) Pe
3) Co
4) Ni

154. Which is an aerosol?

1) Cloud
2) Blood
3) Milk
4) Gold Sol

155. Which cannot act as emulsifier?

1) Soap
2) Egg albumin
3) Gelatin
4) Water

156. Gold sol is

1) Aerosol
2) aquasd
3) lyophilic sol
4) emulsion

157. According to freundlich adsorption isotherm which of the following is correct

1) $\frac{x}{m}\alpha P^{\circ}$
2) $\frac{x}{m}\alpha P^{1}$
3) $\frac{x}{m}\alpha P^{\frac{1}{n}}$
4) All of the above

158. For coagulation of Arsenious Sulphide so which one of the following salt solution will be most effective.

1) Na_3PO_4
2) $AlCl_3$
3) $BaCl_2$
4) $NaCl$

159. Zeolite takes up a gas by

1) Adsorption only
2) absorption only
3) sorption
4) dissorption

160. Freundlisch adsorption isotherm in the logarithmic forms is

1) $\frac{1}{n}\log P=\log\left(\frac{x}{m}\right)+\log k$
2) $\log k=\log P+\frac{1}{n}\log\left(\frac{x}{m}\right)$
3) $\log\left(\frac{x}{m}\right)=\frac{1}{n}\log k+\log P$
4) $\log\left(\frac{x}{m}\right)=\frac{1}{n}\log P+\log k$

KEY SHEET

MATHS – A

1	2	**2**	3	**3**	3	**4**	3	**5**	3	**6**	4	**7**	1	**8**	2	**9**	1	**10**	1
11	3	**12**	1	**13**	1	**14**	3	**15**	1	**16**	1	**17**	1	**18**	1	**19**	2	**20**	2
21	2	**22**	3	**23**	3	**24**	4	**25**	2	**26**	3	**27**	2	**28**	3	**29**	2	**30**	1
31	3	**32**	4	**33**	4	**34**	4	**35**	3	**36**	2	**37**	4	**38**	4	**39**	1	**40**	2

MATHS – B

41	3	**42**	1	**43**	2	**44**	2	**45**	4	**46**	2	**47**	3	**48**	1	**49**	4	**50**	3
51	2	**52**	1	**53**	4	**54**	2	**55**	1	**56**	2	**57**	2	**58**	3	**59**	1	**60**	4
61	1	**62**	4	**63**	3	**64**	2	**65**	2	**66**	2	**67**	4	**68**	2	**69**	3	**70**	3
71	4	**72**	1	**73**	3	**74**	3	**75**	1	**76**	4	**77**	2	**78**	1	**79**	4	**80**	2

PHYSICS

81	4	**82**	4	**83**	1	**84**	1	**85**	3	**86**	2	**87**	3	**88**	3	**89**	3	**90**	4
91	2	**92**	1	**93**	2	**94**	3	**95**	2	**96**	4	**97**	3	**98**	3	**99**	2	**100**	4
101	1	**102**	3	**103**	4	**104**	2	**105**	2	**106**	1	**107**	3	**108**	1	**109**	1	**110**	2
111	3	**112**	3	**113**	2	**114**	1	**115**	1	**116**	3	**117**	2	**118**	1	**119**	1	**120**	2

CHEMISTRY

121	3	**122**	2	**123**	1	**124**	1	**125**	1	**126**	2	**127**	4	**128**	4	**129**	3	**130**	3
131	4	**132**	2	**133**	2	**134**	4	**135**	3	**136**	1	**137**	2	**138**	3	**139**	3	**140**	2
141	1	**142**	1	**143**	2	**144**	2	**145**	2	**146**	2	**147**	1	**148**	2	**149**	4	**150**	4
151	4	**152**	3	**153**	4	**154**	1	**155**	4	**156**	2	**157**	4	**158**	4	**159**	3	**160**	4

HINTS & SOLUTIONS

MATHS – A

1. Roots $-2w, -2w^2$

   $\alpha^5+\beta^5=(-2w)^5+\left(-2w^2\right)^5$

   $=-2^5\left(w^2+w\right)=-32(-1)=32$

2. $\Delta=0 \Rightarrow m=8, \frac{-4}{3}$

3. $f\left(\sqrt{x}\right)=0$

4. $a=\frac{-b}{2a}=\frac{-4}{4}=-1$

5. $x \geq 0 \Rightarrow x^2+x-6=0 \Rightarrow x=-3,2$

   $x<0 \Rightarrow x^2-x-6=0 \Rightarrow x=3,-2$

6. $x^2=5+\sqrt{5+\sqrt{5+\ldots\ldots}}$

7. Roots = $\frac{2\lambda \pm \sqrt{4\lambda^2-4\lambda+1}}{2}=\lambda \pm 1$

   $\lambda+1>4, \lambda-1<4 (or) \lambda+1<4, \lambda-1>4$

   $\Rightarrow \lambda>3 (or) \lambda<5 \qquad \lambda<3, \lambda>5$

   Not possible

8. $(ax+d)^2+(bx+c)^2=0$

   $ac+d=0$ and $bx+c=0$

   $\Rightarrow x=\frac{-d}{a}=\frac{-c}{b} \Rightarrow ac=bc$

   $(ac)^2=(bd)^2$

9. Put $x+\frac{1}{x}=t \Rightarrow 2\left(t^2-2\right)-7t+9=0$

$\Rightarrow t = 1, \frac{5}{2}$

$If\ \ t = \frac{5}{2} \Rightarrow x = 2$

10. $y = \frac{x^2 + x + 1}{2x^2 - x + 1}$

$x^2(2y-1) - x(y+1) + y - 1 = 0$

$b^2 - 4ac \geq 0$

$\Rightarrow |y| \leq \frac{7 \pm 2\sqrt{7}}{2}$

$\Rightarrow Maxvalue \Rightarrow \frac{7 + 2\sqrt{7}}{2}$

11. Disc < 0

$\Rightarrow k^2 - 6k + 8 < 0$

$\Rightarrow (k-2)(k-4) < 0$

12. $\frac{2ab}{a+b} = \frac{-8}{5}, \sqrt{ab} = 2$

$\Rightarrow a + b = -5, ab = 4$

$\Rightarrow a = -1, b = -4$

13. $x^3 + ax + 1 = 0 - - - - - - (1)$

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

X = 1 is the common root

$\Rightarrow a = -2$

14. α, β are the roots $x^2 - 6x + 1 = 0$

$\therefore \alpha + \beta = 6 \quad \alpha\beta = 1$

$\therefore$ Sum of the roots = $\frac{2+6}{1+6+1} = \frac{8}{8} = 1$

P. f $\frac{\alpha\beta}{\alpha\beta + (\alpha+\beta) + 1} = \frac{1}{1+6+1} = \frac{1}{8}$

The equation is $8x^2 - 8x + 1 = 0$

15. $\tan\left(\frac{P}{2}\right) + \tan\left(\frac{Q}{2}\right) = \frac{-b}{a}$

$\tan\left(\frac{P}{2}\right).\tan\left(\frac{Q}{2}\right) = \frac{c}{a}$

16. Roots are

$\sqrt{5}+\sqrt{2}, \sqrt{5}-\sqrt{2}, \sqrt{2}-\sqrt{5}, -\sqrt{2}-\sqrt{5}$

Sum of the roots = $\frac{4}{3}$

17. $\alpha + \beta = 1, \alpha\beta = -6 \Rightarrow \alpha = 3, \beta = -2$

18. $\alpha + \beta + \gamma = 0$

$\Rightarrow \sum(\alpha+\beta)^{-1} = \frac{-1}{\gamma} - \frac{1}{\beta} - \frac{1}{\alpha}$

$= -\left[\frac{a}{-b}\right] = \frac{a}{b}$

19. $f(3x) = 0$

20. Let $p = -s, q = -r$

21. $y = \frac{1+\alpha}{1-\alpha}; y = \frac{1+x}{1-x}$

$\Rightarrow y - 1 = x + xy; x = \frac{y-1}{y+1}$

22. $f(x) = + + - -$

Maximum number of +ve roots = 1

23. Roots 1, 2, 4

Largest – smallest = 4 – 1 = 3

24. $x^3 - 5x + 4 = 0 \Rightarrow \alpha + \beta + \gamma = 0$

$s_1 = 0, s_2 = -5, s_3 = -4$

$\alpha^3 + \beta^3 + \gamma^3 = 3\alpha\beta\gamma$

$\Rightarrow (\alpha^3 + \beta^3 + \gamma^3)^2 = 9(\alpha\beta\gamma)^2$

$= 9(-4)^2 = 16(9) = 144$

25. $\frac{a}{r}, a, ar$ are roots

$s_3 = \frac{a}{r}.a.r = 8 \Rightarrow a^3 = 2^3 \Rightarrow a = 2$

$\Rightarrow f(2) = 0 \Rightarrow k = 7$

26. $x-1, x-2$ are the factors of $f(x)$

$\Rightarrow f(1) = 0, f(2) = 0$

$\Rightarrow (a,b) = (9,2)$

27. $f\left(\frac{x}{k}\right) = 0 \Rightarrow k = 12$

28. $f(1) = 0, f^1(1) = 0 \Rightarrow$ 1 is repeated root

$\therefore$ Then $x^2 - 2x + 1 = 0$

($Then\ x^5 - 3x^4 - 5x^3 + 27x^2 - 32x + 12 = 0$

devide $x^2 - 2x + 1 = 0$ by symthetic)

By symthetic division we get

$f(x) = x^3 - x^2 - 8x + 12 = 0$ and

$f^1(x) = 3x^2 - 2x - 8 = 0$

$\Rightarrow x = 2, -\frac{4}{3}$

$\therefore f(x) = 0 \Rightarrow$ 2 is repeated root

$\therefore 1 + 1 + 2 + 2 + \beta = 3$

$\therefore \beta = -3$

Divided by 3(Prime number)

29. ${}^6C_0(1+x)^6 + {}^6C_1(1+x)^5(-2x^2) +$

${}^6C_2(1+x)^4(-2x^2)^2$

Coefficient of x^4 is

${}^6C_2 + 6(-2)\,{}^5C_2 + {}^6C_2(4)\,{}^4C_0 = -45$

30. If n is even the middle term is $\left(\frac{n}{2}+1\right)^{th}$ term

31. ${}^{24}C_r\left(3^{\frac{1}{5}}\right)^{24-r}\left(2^{\frac{1}{7}}\right)^r \Rightarrow r=14$

32. Differentiate and put x = -1

33. Values of x for which $\left|\frac{x}{2}\right|<1$ and $|3x|<1$ satisfies

34. ${}^{18}C_{3r+3}={}^{18}C_{r-3}$

35. Coefficient of $x^p y^q z^r$ in $(ax+by+cz)^n=\frac{n!}{p!q!r!}a^p b^q c^r$

36. $(a+b+c+d)^n$ no. of distinct terms ${}^{(n+3)}C_3$ formula
No. of terms in $(x_1+x_2+......+x_r)^n$ is ${}^{(n+r-1)}C_{r-1}$

37. ${}^{29}C_5+{}^{29}C_4+{}^{30}C_4+{}^{31}C_4+{}^{32}C_4+{}^{33}C_4$
$\left[{}^nC_r+{}^nC_{r-1}={}^{n+1}C_r\right]$ formula

38. $\frac{f(1)+f(-1)}{2}$

39. $3C_0+7C_1+11C_2+......+(3+4n)C_n$
$a=3 \quad d=4$
$Formula\ (2a+nd)^{2n-1}$
$\Rightarrow(6+4d)2^{n-1}$
$\Rightarrow(2n+3)2^n$

40. $7^n-6n-50$
$=(1+6)^n-6n-50$
$=1+6n+36(Integer)-6n-50$
$=36(Integer)-49-23+23$
$=36(Integer)+23$

MATHS – B

41. a=1
Equation of the normal at 't' is $y+xt=2at+at^3$ ---------(1)
Sub (5,2) in (1)
$t^3-3t+2=0$
$t=1,1,2$
Number of normal = 2

42. $y^2-kx+8=0$
$y^2=k\left(x-\frac{8}{k}\right)$
Equation of directrix is $x=\frac{8}{k}-\frac{k}{4}$
$\therefore\frac{8}{k}-\frac{k}{4}=1 \Rightarrow$ K=4,-8

43. $(y-6)^2=-8(x-2)$
Focus = (a + h, k) = (0, 6)

44. By verification sub. The points in options

45. $m_1+m_2=\frac{x_1}{a}$, $m_1m_2=\frac{y_1}{a}$

46. Solving $x+y=k+1$ and $y=x(1-x)$
$x^2-2x+k+1=0$
$\Delta=0$

47. $y^2=32x$, $x^2=256y$
$a=8, b=64$
$a^{\frac{1}{3}}x+b^{\frac{1}{3}}y+(ab)^{\frac{2}{3}}=0$

48. $a=1, x+3y+1=0$
Slope = $-\frac{1}{3}$
Slope =Perpendicular m = 3
Eq. of the normal is $y=mx-2am-am^3$

49. $LL^1=4a=8$
(Perpendicular distance from $P(x_1,y_1)$ to axis)^2
= L.L.R (Perpendicular distance from P to the tangent at vertex)

50. $S(5,3)$, equation of directrix is $3x-4y+1=0$ axis is perpendicular to directrix and passes through $S(5,3)$
$b(x-x_1)-a(y-y_1)=0$

51. $\frac{1}{SP}+\frac{1}{SQ}=\frac{1}{a}$
$a=\frac{4}{3}$
L.L.R = 4a

52. Equation of the tangent $y=mx+\frac{3}{m}$ it passes through (1, 4)

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

m = 1, 3

53. $y^2 = 16x$

$a = 4$

$m = \frac{1}{2}$

Equation of the normal is

$y = mx - 2am - am^3$

$x - 2y - 9 = 0$

$area = \frac{c^2}{2|ab|}$

54. Equation of the tangent $y = mx + \frac{a}{m}$ passes through (1, 4)

$y^2 = 4x$

$a = 1$

$\Rightarrow m^2 - 4m + 1 = 0$

$m = 2 \pm \sqrt{3}$

$m_1 = 2 + \sqrt{3}, m_2 = 2 - \sqrt{3}$

$Tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2}$

$Tan\theta = \sqrt{3}$

$\theta = \frac{\pi}{3}$

55. $\perp^{er}$ Distance from focus to the directrix

$= \left|\frac{-1-1+4}{r_2}\right| = \sqrt{2}$

$2a = \sqrt{2}$

$a = \frac{1}{\sqrt{2}}$

By verification the distance from vertex to focus $= a = \frac{1}{\sqrt{2}}$

56. The two circles intersecting orthogonally So number of common tangents = 2.

57. $x^2 + y^2 - 4x + 6y - 12 = 0$

$radius = \sqrt{4+9+12=5}$

$c(2,-3), r = 5 + 3 = 8$

$(x-2)^2 + (y+3)^2 = 64$

58. $c_1c_2 < r_1 + r_2$

59. $x^2 + y^2 + 4x + 2y - 4 + \lambda(x+y) = 0$

Sub $c\left[\frac{-(\lambda+4)}{2}, \frac{-(\lambda+2)}{2}\right]$ in

$x + y = 0$

$\lambda = -3$

$x^2 + y^2 + x - y - 4 = 0$

$a + b - c = 1 - 1 + 4 = 4$

60. The equation of R.A of the circles is

$(4g-3)x + (4f-8)y = 0$ ----- (1)

Eq.(1) is tangent to

$x^2 + y^2 + 2x + 2y + 1 = 0$

$\Rightarrow \left|\frac{(4g-3)(-1) + (4f-8)(-1)}{\sqrt{(4g-3)^2 + (4f-8)^2}}\right| = 1$

$(4g-3)(f-2) = 0$

61. Required circles bisects circumference of three circles (Centre lies on common chord)

62. Radical axes is $x + y = 0$

Req. equation is

$x^2 + y^2 - 4x - 6y - 12 + \lambda(x+y) = 0$ ---(1)

$c = \left[-\left(\frac{\lambda-4}{2}\right), -\left(\frac{\lambda-6}{2}\right)\right]$

Given $r = \sqrt{13}$

$\left(\frac{\lambda-4}{2}\right)^2 + \left(\frac{\lambda-6}{2}\right)^2 + 12 = 13$

$\lambda^2 - 10\lambda + 24 = 0$

$\lambda = 4, 6$ $sun\lambda = 6$ in (1)

63. $(-g, -f) = (x_1, y_1)$

$2gg^1 + 2ff^1 = c + c^1$

C = - 36

$x^2 + y^2 + 2gx + 2fy - 36 = 0$

$sub(3,4)$

$6g + 8f - 61 = 0$

$6x + 8y - 61 = 0$

64. The roots of $6x^2 - 6x + 1 = 0$ are $\frac{1}{2}, \frac{1}{3}$

Centre $= \left(\frac{1}{2}, \frac{1}{3}\right)$ or $= \left(\frac{1}{3}, \frac{1}{2}\right)$

Required circles is

$\left(x - \frac{1}{2}\right)^2 + \left(y - \frac{1}{3}\right)^2 = \frac{25}{36}$

65. $4a^2 - 5b^2 + 6a + 1 = 0$

$4a^2 + 6a + 1 = 5b^2$

$9a^2 + 6a + 1 = 5b^2 + 5a^2$

$(3a^2)+2(3a)(1)+(1)^2=5\left[a^2+b^2\right]$

$(3a+1)^2=5(a^2+b^2)$

$=\frac{|3a+1|}{\sqrt{a^2+b^2}}=\sqrt{5}$ ---- (1)

$ax+by+1=0$ Touches the circle

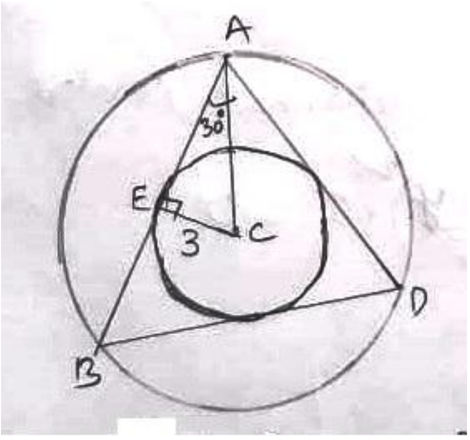
$\Rightarrow r=\perp^{er}$ Distance from c(h,k) to line $ax+by+1=0$

$r=\frac{|ah+bk+1|}{\sqrt{a^2+b^2}}$ ---- (2)

From (1) & (2) c(3,0), $r=\sqrt{5}$

66. $x^2+y^2+4x-6y+4=0$ is the in circle

$c(-2,3), r=3$



In Triangle ACE

$Sin30°=\frac{3}{AC}$

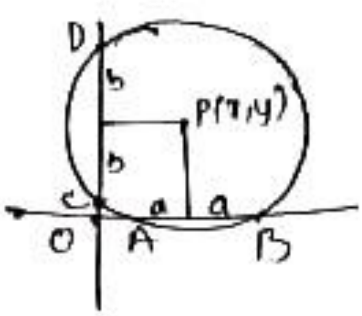
$\frac{1}{2}=\frac{3}{AC}$

$R=AC=6$

$c(-2,3)$

$(x+2)^2+(y-3)^2=6^2$

67.



Since the ends of rods are concyclic

OA.OB=OC.OD

$(x-a)(x+a)=(y-b)(y+b)$

$x^2-y^2=a^2-b^2$

68. Equation of the circles

$x^2+y^2-4x-6y-21=0$

$c_1(2,3), r_1=5$

Let $c_2(h,k), r_2=3$

$c_2=\left(\frac{mx_2+nx_1}{m+n},\frac{my_2+ny_1}{m+n}\right)$

$c_2=(h,k)=\left(\frac{4}{5},\frac{7}{5}\right)$

$\left(x-\frac{4}{5}\right)^2+\left(y-\frac{7}{5}\right)^2=9$

69. $c_1(2,1), r_1=2$

$c_2(3,2), r_2=3$

$c_1c_2=\sqrt{2}$

$|r_1-r_2|\prec c_1c_2<r_1r_2$

Point of intersection is the external centre.

70. Homogenise $2x^2+3y^2-\left(\frac{3x+4y}{5}\right)^2.5=0$

$x^2+y^2-24xy=0$

$\Rightarrow a+b=0$

$\Rightarrow \theta=90°$

71. $A(1,2)B(1,7)D(4,-2)$

Tangent at (1,7) to the circle is y=7

Tangent at (4,-2) to the circle is x=16

C (16,17)

$Aver=\frac{1}{2}\begin{vmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{vmatrix}$

72. $r^2(l_1l_2+m_1m_2)=(l_1g+m_1f-n_1)(l_2g+m_2f-n_2)$

73. Given line $3x-4y-12=0$

By verification $\boxed{r=d}$

$x^2+y^2-6x+9=0$

$r=3, d=3$

74. centre = (h , 4)

Verify r = d

75. $x^2+y^2+2gx+2fy+c=0$ ---- (1)

Sub (0, 0) in (1) $\Rightarrow c=0$

Given $2\sqrt{g^2-c}=4$

$g=\pm 2$

Given $2\sqrt{f^2-c}=8$

$f=\pm 4$

$x^2+y^2\pm 4x\pm 8y=0$

76. Put $x=0$ in $5x-2y+6=0$

$y=3$

$Q(0,3)$

PQ =Length of tangent from (0, 3)

$=\sqrt{s_{11}}$

77. Solve normal and diameter
C = Centre = (8,-2)
A (6, 2)
R = CA

78. $S_1=0 \Rightarrow xx_1+yy_1=2$

$A=\left(\frac{2}{x_1},0\right),B\left(0,\frac{2}{y_1}\right)$

Locus point $(x_2,y_2)=$ mid-point of AB

$(x_2,y_2)=\left(\frac{1}{x_1},\frac{1}{y_1}\right)$

$x_1=\frac{1}{x_2},y_1=\frac{1}{x_2}$

$\left(\frac{1}{x_2}\right)^2+\left(\frac{1}{y_2}\right)^2=2$

$\frac{1}{x^2}+\frac{1}{y^2}=2$

79. The equation of the circle passing through $(0,0),(a,b),(b,a)$ is

$\frac{(x^2+y^2)}{a^2+b^2}-\frac{(x+y)}{a+b}=0$

80. $S_1=0$
In the ratio = -L11: L22

PHYSICS

81. Conceptual
82. Conceptual
83. Conceptual
84. Conceptual
85. Conceptual
86. $Q=+ne$
87. $F\alpha\frac{1}{r^2}$
88. $F^1=\frac{F}{K}=\frac{F}{4}$
89. $\phi_E=\frac{q_{net}}{\varepsilon_0}$
90. $q_1=q_2=\frac{Q}{2}$
91. $E=\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1}{(r/2)^2}-\frac{q_2}{(r/2)^2}\right]$
92. $E=\frac{\lambda}{2\pi\varepsilon_0}r$

$\lambda=\frac{1}{3};R=18\times10^{-12}$

93. Conceptual
94. Conceptual
95. Conceptual
96. Conceptual
97. Conceptual
98. $w=vq$

$\Rightarrow v=\frac{w}{q}$

99. $u=\frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r}$
100. $C=\frac{\varepsilon_0A}{d-t+\frac{t}{k}}$

$k=2,C=\frac{\varepsilon_0A}{d}$

101. $C^1=n^{\frac{1}{3}}C$

$C=4\pi\varepsilon_0R$

102. $V_2=\frac{VC_1}{C_1+C_2}$
103. V = 0
104. $U=\frac{q^2}{2C}$
105. Parallel and series combination
106. Conceptual
107. Conceptual
108. Conceptual
109. Conceptual
110. Conceptual
111. $i=\frac{qw}{2\pi}$
112. $R\alpha\frac{1}{l^2}$
113. Series and parallel combination
114. $R_{eff}=\frac{r}{5}$

$i=\frac{5E}{R}$

$i^1=\frac{2E}{R}$

115. $E^1=(n-2m)E$

116. Conceptual

117. No. of units $=\frac{10\times60\times5\times30}{1000}=90units$

$\cos c=90\times2.8=252$

118. $V_A-2+-4-3-6-V_B=0$

119. $\frac{V}{L}\alpha R$

120. $V_d\alpha\frac{1}{l}$

CHEMISTRY

121. $M=\frac{G}{GMW}\times\frac{1000}{V}$

G=171.4 mg

V=200 ml

$M=\frac{171.4}{171.4\times10^{+13}}\times\frac{1000}{200}=5\times10^{-3}M$

122. $Cr_2O_7^{-2}\rightarrow2Cr^{+3}$

$E.Wt=\frac{G.M.W}{Changeofoxidationstate}$

123. $10\%\left(\frac{w}{w}\right)NaOH$ means

10 grams of NaOH present in 90 grams of solvent.

$m=\frac{wt.ofsolute}{G.M.W.ofsolute}\times\frac{1000}{wt.ofsolvent}$

$\frac{10}{40}\times\frac{1000}{90}=\frac{0.25\times100}{9}\Rightarrow2.77m$

124. $x_{H_2O}=?\,x_{CH_3OH}=?$

$x_{H_2O}=\frac{n_{H_2O}}{n_{H_2O}+n_{CH_3OH}}$

$=\frac{l}{5}\Rightarrow0.2$

Total mole fraction $x_{H_2O}+x_{CH_3OH}=1$

$x_{CH_3OH}=1-x_{H_2O}$

=1-0.2

=0.8

125. $\pi_{NaCl}=\pi_{Na_2SO_4}$

$iMRT=iMRT$

$2\times0.15=3\times0.1$

$0.3=0.3$

126. $k_4\left[Fe(CN)_6\right]\rightarrow4k^++\left[Fe(CN)_6\right]$

=4+1

i=5

127. Two solutions having same LV.P so

$n_{Glucose}=n_x$

$x=\frac{2\times180}{6}\Rightarrow60$

128. $\Delta Tf=-0.186°C$

$\Delta Tb=?$

$K_f=1.86$

$K_b0.512$

$\frac{\Delta Tf}{\Delta Tb}=\frac{K_f}{K_b}$

$\Delta Tb=\frac{K_b\times Tf}{K_f}=\frac{-0.186\times0.512}{1.86}\Rightarrow0.0512$

129. Conceptual

130. Conceptual

131. Conceptual

132.

	Corner	Edge	Centre
Atom	W	O	Na
Present	8	12	1
Shared by atom	$\frac{1}{8}$	$\frac{1}{4}$	1
So. No. of Atom	$8\times\frac{1}{8}$	$12\times\frac{1}{4}$	1x1

$\boxed{Na_1W_1O_3}$

133. BCC Cubic lattice

A=3A°

D=10 gm/cc

Atomic weight (M)=?

$d=\frac{2M}{N_0\times a^3}$

$10=\frac{2\times M}{\left(6.023\times10^{23}\right)\times\left(3\times10^{-80}\right)^3}$

$M=\frac{10\times6.023\times10^{23}\times27\times10^{-20}}{2}=813\times10^{-1}$

$\Rightarrow81.3gm$

134. Conceptual

135. In Fcc

$r=\frac{\sqrt{2}}{4}a=\frac{1.414}{4}\times3.63A°\Rightarrow1.28A°$

136. $m=\frac{M.wt\times c\times t}{valency\times96500}=\frac{27\times1\times9650}{3\times96500}$

$\Rightarrow0.9gm$

137. $\Lambda_{eq}^{\alpha}NH_4Cl=149.74\ ohm^{-1}\ cm^2\ equ^{-1}$

$\Lambda_{eq}^{\alpha}NaOH=248.1\ ohm^{-1}\ cm^2\ equ^{-1}$

$\Lambda_{eq}^{\alpha}NaCl=126.4\ ohm^{-1}\ cm^2\ equ^{-1}$

Λ_{eq}^{α} of NH_4OH =?

$\Lambda_{eq}^{\alpha} NH_4OH = \Lambda_{eq}^{\alpha} NH_4Cl + \Lambda_{eq}^{\alpha} NaOH - \Lambda_{eq}^{\alpha} NaCl$

=149.74+248.1-126.4

=271.40

138. Change in O.N per mole of $Mn_3O_4 = 10$

1 mole of $Mn_3O_4 = 10eq$

=10F

139. $E_{ceu}^{o} = E_{Cathode} - E_{Anode}$

$= 0.34 - (-2.37)$

$= 0.34 + 2.37$

$= 2.71y$

Note: Electrode with lower SRP is always taken by anode (LHS)

140. $E = E^{\circ} - \frac{0.0591}{n} \log K$

141. Order $= \frac{1}{2} + \frac{3}{2}$ =2

142. Conceptual

143. Conceptual

144. Conceptual

145. For every rise in 10˚C temperature rate constant become double.

$\frac{k_2}{k_1} = (u)^{\frac{AT}{10}}$

$\frac{k_2}{5} = 2^4$

$k_2 = 80$

146. Conceptual

147. Conceptual

148. Conceptual

149. $9_{grams} \rightarrow 96500C$

$5.12kg(or)5.12 \times 10^3 g \rightarrow ?$

$= \frac{5.12 \times 10^3 gm}{9gm} \times 96500$

$= 5.49 \times 10^7$

150. $2H_2O \rightarrow 2H_2 + O_2$

2moles 2mole+1mole

36gm→3moles x 22.4 (STP)

$\Rightarrow 67.2 lits$

151. Conceptual

152. Conceptual

153. Conceptual

154. Conceptual

155. Conceptual

156. Conceptual

157. Conceptual

158. Conceptual

159. Conceptual

160. Conceptual

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