SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR MPC Time: Hours	DPP TEST - 21	Date: 05-05-2020 Max.Marks:80 M

MATHS-A

Syllabus: Binomial Theorem(Co-efficient)

1. $\sum_{r=0}^{n} {}^{2n}C_r =$

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

2. $\sum_{r=0}^{n} r\, {}^{2n}C_r = ---$

1) 2^{2n-1} 2) $n.2^{2n-1}$ 3) $n.2^{n-1}$ 4) $n.2^{2n-2}$

3. **If** $(1+x)^n = c_0 + c_1x + c_2x_2 + ----+c_nx_n$ then $(1+x)^n = c_0^2 + c_1^2 + c_2^2 + ----+c_n^2 =$

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

4. **If** $(1+x)^n = c_0 + c_1x + c^2x_2 + ----+c^nx_n$ **then** $\frac{C_0}{1} + \frac{C_2}{3} + \frac{C_4}{5} + \frac{C_6}{7} + --- =$

1) $\frac{2^{n+1}}{n+1}$ 2) $\frac{2^{n+1}-1}{n+1}$ 3) $\frac{2^n}{n+1}$ 4) none

5. **The greatest term in the expansion of $(1+3x)^{54}$ when** $x = \frac{1}{3}$ **is**

1) 28^{th} 2) 25^{th} 3) 26^{th} 4) 24^{th}

6. **If** $\left(5+2\sqrt{6}\right)^n = I + f, I \in N, n \in N$ **and** $0 \le f \le 1$**,then I=----**

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

7. **The coefficient of x^{100} in the expansion of** $\sum_{r=0}^{200} (1+x)^r = --$

1) ${}^{200}C_{100}$ 2) ${}^{201}C_{102}$ 3) ${}^{200}C_{101}$ 4) ${}^{201}C_{101}$

8. **In the binomial expansion of $(1+a)^{m+n}$, if the coefficients of a^m and a^n are A and B respectively then**

1) A= B 2) mA=nB 3) nA=mB 4) A=2B

9. **The coefficient of x^{20} in** $\left(1+3x+3x^2+x^3\right)^{20}, is -----$

1) ${}^{60}C_{40}$ 2) ${}^{30}C_{20}$ 3) ${}^{25}C_{20}$ 4) none of these

10. **In the expansionof $(x+a)^n$the sum of even terms is E and odd terms is O_1 then O^2+E^2=**

1) $(x+a)^{2n} + (x-a)^{2n}$ 2) $\frac{1}{2}\left\{(x+a)^{2n} + (x-a)^{2n}\right\}$

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

11. **The coefficient of x^n in the expansion of $(1+x)(1-x)^n$, is**

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

12. **If {x} denotes the fractional part of x; then** $\left\{\frac{3^{2n}}{8}\right\}, n \in N$, **is----**

1) $\frac{3}{8}$ 2) $\frac{7}{8}$ **3)** $\frac{1}{8}$ 4) none of these

13. **The remainder when 9^{103} is divided by 25 is equal to**

1) 5 2) 6 3) 4 4) none of these

14. **The sum of numerical coefficients in the expiation of** $\left(1+\frac{x}{3}+\frac{2y}{3}\right)^{12}$ **, is**

1) 1 2) 2 3) 2^{12} 4) none of these

15. **If** $a_n=\sum_{r=0}^{n}\frac{1}{^nC_r}$ **, then** $\sum_{r=0}^{n}\frac{r}{^nC_r}=--$

1) $(n-1)a_n$ 2) na_n 3) $\frac{n}{2}a_n$ 4) none of these

16. **If $a_r$is the coefficient of x^r in the expansion of $(1+x+x^2)^n$.then $a_1-3a_2+3a_3$------$2na_{2n}$**

1) 0 2) n 3) –n 4) 2n

17. **The total number of dissimilar terms in the expansion of $(x_1+x_2+---+x_n)^3$, is**

1) n^3 2) $\frac{n^3+3n^2}{4}$ 3) $\frac{n(n+1)(n+2)}{6}$ 4) $\frac{n^2(n+1)^2}{4}$

18. **If** $\sum_{r=0}^{2n}(-1)^r\left(^{2n}C_r\right)^2=a$ **, then** $\sum_{r=0}^{2n}(-1)^r(r-2n)\left(^{2n}C_r\right)^2=---$

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

19. **The power of x which has the greatestcoefficients the expansion of** $\left(1+\frac{x}{2}\right)^{10}$ **is**

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

20. **If f(x) is period with period t such that f(2x+3) +f(2x+7) =2 , then the coefficient of m^{-24} in the expansion of** $\left(m+\frac{b}{m^3}\right)^{4t}$ **is**

1) $^{16}C_{10}b^6$ 2) $^{16}C_6b^{10}$ 3) $^{16}C_6b^4$ 4) $^{16}C_6b^6$

MATHS-B

SYLLABUS : Parabola (Remaining part)

21. **If the tangents at t_1,t_2,t_3 on $y^2=4ax$ make angles $30^0,45^0,60^0$ with the axis then t_1,t_2,t_3 are in**

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

22. **If the tangents at p and q on the parabola $y^2=4ax$ meet in T and if S is the focus of the parabola then Sp,St,Sa are in**

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

23. **If the normal of 't' on y^2=4ax subtends a right angle at the focus then t^2** =

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

24. **P(-3,2) is one end of focus chord PQ of the parabola y^2+4x+4y=0 then slope of the normal at G is**

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

25. **The locus of middle points of all chords of the parabola y^2**=4ax passing through the vertex of the parabola is

1) $y^2 = 2ax$ 2) $y^2 = 2a(x-a)$ 3) $y^2 = a(x-a)$ 4) $2y^2 = ax$

26. **The tangents to the parabola** $y^2 = 4ax$ at p(t_1) and Q(t_2) interest at R. Then the area of ΔPQR is

1) $\frac{a^2}{2}(t_1-t_2)^2$ 2) $\frac{a^2}{2}(t_1-t_2)$ 3) $\frac{a^2}{2}(t_1-t_2)^3$ 4) $a^2(t_1-t_2)^2$

27. **PSQ is a focal chord of the parabola** $y^2 = 16x$. If P(1,4) then $\frac{SP}{SQ}$ =

1) $\frac{3}{4}$ 2) $\frac{2}{3}$ 3) $\frac{1}{9}$ 4) $\frac{1}{4}$

28. **L(1,3) ,L^1(1,-1) are ends of the latusrectum of a parabola. A is the vertex of parabola then area of triangle ALL^1**

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

29. **The name of the conic represented by the equation** $\sqrt{px} + \sqrt{qy} = 1$ where p,q $\in$ R and p,q>o is

1) Parabola 2) Ellipse 3) hyper bola 4) Circle

30. **If the normal at p(18,12) to the parabola y^2**=8x cuts it again at Q then $\bar{Q}$ =

1) $\left(\frac{242}{9}, \frac{-44}{3}\right)$ 2) $\left(\frac{121}{9}, \frac{-44}{3}\right)$ 3) $\left(\frac{-121}{9}, \frac{44}{3}\right)$ 4) $\left(\frac{121}{9}, \frac{-73}{3}\right)$

31. **The parabola y^2=kx passes through (9,6) then the length of subnormal at that point is**

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

32. **Let P be the point (1,0) and Q be a point of the locus y^2=8x. Then locus of midpoint of pairs**

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

33. **If a≠0 and the line 2bx+3cy+4d=0 passes through the points of intersection of the parabola y^2=4ax then**

1) $d^2 + (3b-2c)^2 = 0$ 2) $d^2 + (3b+2c)^2 = 0$

3) $d^2 + (2b-3c)^2 = 0$ 4) $d^2 + (2b+3c)^2 = 0$

34. **A point on the parabola y2=18x at which the ordinate increases at twise the rate of abscissa is**

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

35. **The shortest distance between the line y-x=1 and the curve x=y^2** is

1) $\frac{3\sqrt{2}}{8}$ 2) $\frac{2\sqrt{3}}{8}$ 3) $\frac{3\sqrt{2}}{5}$ 4) $\frac{\sqrt{3}}{4}$

36. **The slope of the focal chord of the parabola y^2=16x is 2 then the length of the focal chord is**

1) 8 2) 12 3) 20 4) 24

37. **The locus of the vertices of the family of parabolas** $y=\frac{a^3x^2}{2}+\frac{a^2x}{2}-2a$ is

1) $xy=\frac{105}{64}$ 2) $xy=\frac{3}{4}$ 3) $xy=\frac{35}{16}$ 4) $xy=\frac{64}{105}$

38. **The locus of a point which divides the line segment joining the point (0,-1) and a point on the parabola is x^2= 4y internally in the ratio 1:2 is**

1) $9x^2-3y=2$ 2) $9x^2-12y=8$ 3) $x^2-3y=8$ 4) $4x^2-3y=2$

39. **The length of the latusrectum of the parabola** $y^2+8xy-2y+17=0$ is

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

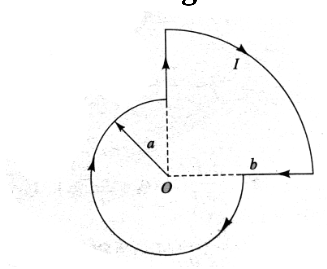
40. **The equation of the chord of y^2=6x with mid point at (-1,1) is**

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

PHYSICS

Syllabus : Moving Charges & Magnetism Biot-savart's law & its applications, Ampere's law

41. **The magnetic induction at the centre O (figure) is**



1) $\left(\frac{\mu_o I}{2a}+\frac{\mu_o I}{2b}\right)\otimes$ 2) $\left(\frac{3\mu_o I}{8a}+\frac{\mu_o I}{8b}\right)\otimes$ 3) $\left(\frac{3\mu_o I}{8a}+\frac{\mu_o I}{8b}\right)$□ 4) $\left(\frac{\mu_o I}{2a}+\frac{\mu_o I}{2b}\right)$□

42. **A square wire of each side *a* carries a current I. The magnetic field at the midpoint of the square is**

1) $3\sqrt{2}\frac{\mu_o}{4\pi}\frac{I}{a}$ 2) $8\sqrt{2}\frac{\mu_o}{4\pi}\frac{I}{a}$ 3) $16\sqrt{2}\frac{\mu_o}{4\pi}\frac{I}{a}$ 4) $32\sqrt{2}\frac{\mu_o}{4\pi}\frac{I}{a}$

43. **A uniform wire of resistance** $12\,\Omega$ **is bent in the form of a square. A cell of emf 6 V having negligible internal resistance connected across the diagonal of the square. The magnetic induction at its centre is (in tesla)**

1) 0 2) 10^{-7} 3) 5×10^{-7} 4) $\frac{\mu_o}{4\pi}\times5\times10^{-7}$

44. **Two identical coils carry equal currents have a common centre and their planes are at right angles to each other. The ratio of the magnitude of the resultant magnetic field at the centre and field due to one coil is**

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

45. In Bohr's model of hydrogen atom, the electron circulates round the nucleus in a path of radius $5\times10^{-11}\,m$ at a frequency of 6.8×10^{15} revolutions per second. The value of magnetic induction at the centre of the orbit is

1) 12.27 T 2) 10.8 T 3) 13.6 T 4) 14.6 T

46. The magnetic field due to current carrying loop of radius 3 cm at a point on axis at a distance of 4 cm from the centre is $54\,\mu\mathrm{T}$. Its valueat the centre of the loop is

1) $250\,\mu T$ 2) $150\,\mu T$ 3) $125\,\mu T$ 4) $75\,\mu T$

47. ABCD is a square of side L. A very long straight conductor carrying a current *i* passes through the vertex A of the square and is perpendicular to its plane. The minimum magnetic induction at a vertex of the square is

1) $\frac{\mu_o}{4\pi}\frac{2\sqrt{2}i}{L}$ 2) $\frac{\mu_o}{4\pi}\frac{\sqrt{2}i}{L}$ 3) $\frac{\mu_o}{4\pi}\frac{4\sqrt{2}i}{L}$ 4) $\frac{\mu_o}{4\pi}\frac{2i}{L}$

48. Due to straight current carrying conductor, a null point occurred at P on east of the conductor. The net magnetic induction at a point Q which is half the distance of P on north of the conductor is

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

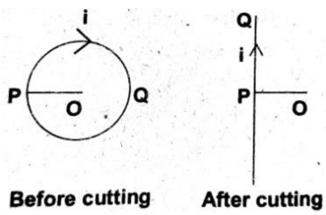
49. Two wires A and B are of lengths 40 cm and 30 cm. A is bent into a circle of radius r and B into an arc of radius r. A current i_1 is passed through A and i_2 through B. To have the same magnetic inductions at the centre, the ratio of $i_1 : i_2$ is

1) 3:4 2) 3:5 3) 2:3 4) 4:3

50. Two long straight insulated conductors with current i_1 and i_2 are placed alongX and Y –axis. The equation of locus of the point of zero magnetic induction is

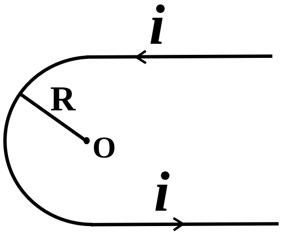
1) $y = x$ 2) $y = \frac{i_2 x}{i_i}$ 3) $y = \frac{x}{i_1 i_2}$ 4) $y = \frac{i_1 x}{i_2}$

51. The magnetic field at the centre point O of circular conductor PQ carrying current is B. If the conductor is cut open at Q and made straight, the magnetic field at the same point O will be (assume the same current is flowing in the conductor)



1) $\frac{B}{\pi}$ 2) πB 3) $\frac{B}{\sqrt{\pi^2+1}}$ 4) $\frac{B}{\sqrt{\pi+1}}$

52. An electric current is flowing in a very long wire as shown in the figure. The value of magnetic flux density at point O will be

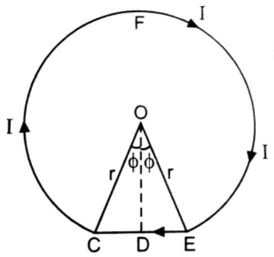


1) $\frac{\mu_o i}{4\pi R}[\pi+2]$ 2) $\frac{\mu_o i}{4\pi R}[\pi+1]$ 3) $\frac{\mu_o i}{4\pi R}[\pi-2]$ 4) $\frac{\mu_o i}{4\pi R}[\pi-1]$

53. **Two long straight parallel conductors 10 cm apart, carry equal currents of magnitudes 3 A in the same direction. Then the magnetic induction at a point midway between them is**

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

54. **The total magnetic induction at point O due to curved portion and straight portion in the following figure will be**

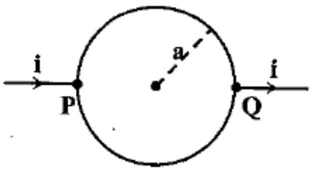


1) $\frac{\mu_o I}{2\pi r}[\pi-\phi+\tan\phi]$ 2) $\frac{\mu_o I}{2\pi r}$ 3) 0 4) $\frac{\mu_o I}{\pi r}[\pi-\phi+\tan\phi]$

55. **A long straight wire of radius a carries a steady current *i*. The current is uniformly distributed over its cross section. The ratio the magnetic fields B and B[1], at radial distances $\frac{a}{2}$ and $2a$ respectively, from the axis of the wire is**

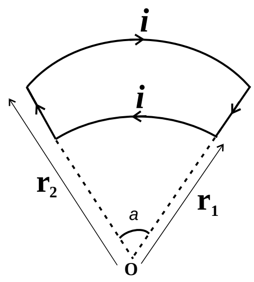
1) $\frac{1}{4}$ 2) $\frac{1}{2}$ 3) 1 4) 4

56. **If the resistance of upper half of a rigid loop is twice that of lower half the magnitude of magnetic induction at the centre is equal to**



1) zero 2) $\frac{\mu_o i}{4a}$ 3) $\frac{\mu_o i}{8a}$ 4) $\frac{\mu_o i}{12a}$

57. **The magnetic induction at centre O in the following figure will be(in figure** a **means** α)



1) $\frac{\mu_o i\alpha}{4\pi}\left[\frac{1}{r_1}-\frac{1}{r_2}\right]$□ 2) $\frac{\mu_o i\alpha}{4\pi}\left[\frac{1}{r_1}+\frac{1}{r_2}\right]\otimes$

3) $\frac{\mu_o i\alpha}{2\pi}\left[\frac{1}{r_1}-\frac{1}{r_2}\right]$□ 4) $\frac{\mu_o i\alpha}{2\pi}\left[\frac{1}{r_1}+\frac{1}{r_2}\right]\otimes$

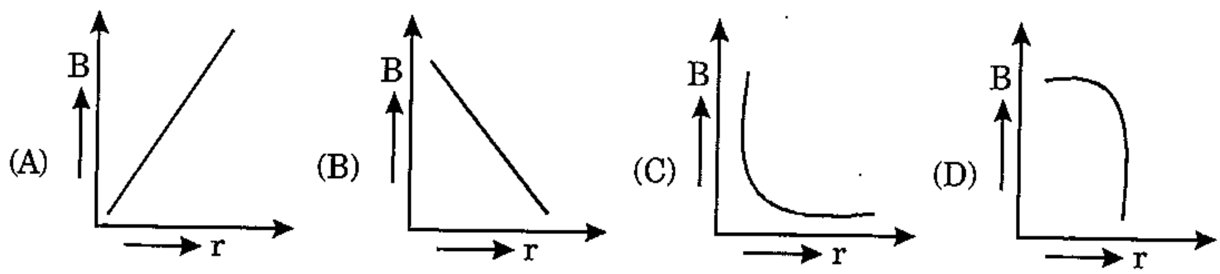
58. A long wire carries a steady current. It is bent into a circle of one turn and the magnetic field at the centre of the coil is B. It is then bent into a circular loop of n turns. The magnetic field at the centre of the coil will be

1) nB 2) n^2B 3) $2nB$ 4) $2n^2B$

59. A circular coil of radius R carries a current *i*. The magnetic field at its centre is B. The distance from the centre on the axis of the coil where the magnetic field will B/8 is

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

60. Which of the graphs shown in the figure shows the variation of magnetic induction Bwith distance r from a long wire carrying a current



CHEMISTRY

Syllabus: Metallurgy, 15th group elements

61. The largest bond angle is in

1) ASH_3 2) PH_3 3) NH_3 4)H_2O

62. A blue liquid among the following is

1) N_2O_3 2) N_2O 3) N_2O_4 4) NO_2

63. Which of the following trihalides is not hydrolysed

1) NF_3 2) PCl_3 3) $ASCl_3$ 4) $SbCl_3$

64. Nitrolim is

1) CaC_2+N_2 2) $CaCN_2$+graphte 3) CaNCN 4) $CaCN+N_2$

65. Which of the following oxides is brown coloured gas

1) NO_2 2) NO 3) N_2O 4) N_2O_5

66. **Which of the following is rentered passive by Con. HNO_3** is

1) Al 2) Au 3) Zn 4) $ASCl_3$

67. **The trihalides which forms oxocations on hydrolysis is**

1) Ag^+ 2) PCl_3 3) $SbCl_3$ 4) $ASCl_3$

68. **Silver chloride dissolves in excess of NH_4OH. The cation present in solution**

1) Ag^+ 2) $\left[Ag\left(NH_3\right)_4\right]^+$ 3) $\left[Ag\left(NH_3\right)_2\right]^+$ 4) $\left[Ag\left(NH_3\right)_6\right]^+$

69. **The correct order of bond angle of** $NO_2^+, NO_2 and\ NO_2^-$ **is**

1) $NO_2^+ < NO_2 < NO_2^-$ 2) $NO_2^+ < NO_2^- < NO_2$

3) $NO_2^+ > NO_2 > NO_2^-$ 4) $NO_2^+ > NO_2 < NO_2^-$

70. **What is the hydrolysis product of hypophosphoric acids?**

1) $H_3PO_3, H_4P_2O_7$ 2) H_3PO_4 only 3) H_3PO_3 only 4) H_3PO_3, H_3PO_4

71. **What is the Slag formed in the extraction of iron**

1) CaO 2) $CaSiO_3$ 3) $MgSiO_3$ 4) SiO_2

72. **Which of the following element is extracted using I_2 as the reactant**

1) Ni 2) Zr 3) Ai 4)Cu

73. **Which one of the following ores is best concentrated by forth floation method**

1) Magnetite 2) Siderite 3) Galena 4) Malachite

74. **When baxuite is heated with NaOH solution , the water soluble compound formed is**

1) $NaAlO_2$ 2) NaAlO 3) $NaAlO_3$ 4) Al_2O_3

75. **In the extraction of copper the matte formed in the blast furnaces contains**

1) Cu_2S +little Fes 2) Cu_2S +little FeO

3) Cu_2O +little Fes 4) Cu_2O +little FeO

76. **Horn silver ore is leached with aqueous NaCN solution. The product formed is**

1) Silver metal 2) Silver chloride 3) Silver cyanide

4) Sodium argento cyanide

77. **Identify the metal which is not common to German silver and brass**

1) Cu 2)Zn 3) Fe 4) Ni

78. **Heating mixture of Cu_2O and Cu_2S will give**

1)$Cu+SO_2$ 2) $Cu+SO_3$ 3) $CuO+CU_2S$ 4)Cu_2S

79. **In the Hall – Heroult process , aluminium is formed at the cathode. The cathode is made out of**

1) Carbon 2) Copper 3) Pure aluminium 4)Platinum

80. **In Goldschmidt alumino thermic process which of the following reducing agent is used :**

1) Coke 2) Calcium 3) Sodium 4)Al-powder

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MATHS-A

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

MATHS-B

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

PHYSICS

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

CHEMISTRY

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

SOLUTIONS
MATHS-A

1. $\sum {}^{2n}C_r = \frac{1}{2}\sum\left({}^{2n}C_r + {}^{2n}C_r\right)$

$= \frac{1}{2}.2\sum\left({}^{2n}C_r + {}^{2n}C_{2n-r}\right)$

$= \frac{1}{2}.\left({}^{2n}C_0 + {}^{2n}C_1 + {}^{2n}C_n\right) + \left({}^{2n}C_n\right) + \left({}^{2n}C_{n+1} + - - + {}^{2n}C_{2n}\right) = \frac{1}{2}\left[2^{2n} + {}^{2n}C_n\right]$

2. $\sum r.{}^{2n}C_r = \sum r.\frac{2n}{r}.{}^{(2n+1)}C_{(r-1)}$

$= 2n\sum {}^{(2n-1)}C_{(r-1)}$

$= n\sum\left({}^{(2n-1)}C_{(r-1)} + {}^{(2n-1)}C_{(r-1)}\right)$

$= n\left[\left({}^{(2n-1)}C_0 + {}^{(2n-1)}C_1 + - - - - + {}^{(2n-1)}C_{2n-1}\right) + \left({}^{(2n-1)}C_n + {}^{(2n-1)}C_{n+1} + - - - + {}^{(2n-1)}C_{2n}\right)\right]$

$= n.2^{n-1}$

3. $(1+x)^n = c_0 + c_1 x + c^2 x_2 + - - - - - + c^n x_n$ then $(1+x)^n = c_0^2 + c_1^2 + c_2^2 + - - - - - + c_n^2$

Compare the coefficient of x^n on both sides

4. $\frac{1}{n+1}\sum(n+1)(2n+1) = \left[2^{(n+1)-1}\right] = \frac{2n}{n+1}$

5. $\frac{T_r + 1}{T_r} = \frac{{}^{54}C_r}{{}^{54}C_{r-1}}(3x)^2$

$\frac{T_r + 1}{T_r} = \frac{55-r}{r} \geq 1$

$r < \frac{55}{2} \Rightarrow r < 27-5 \Rightarrow r = 27$

$T_{r+1} = T_{2s}$ terms is greatest one

6. Let G= $\left(5+2\sqrt{6}\right)^n$

If F+G=$\left(5+2\sqrt{6}\right)^n + \left(5-2\sqrt{6}\right)^n$

=even integer

F+G=1

⇨ I+F=$\left(5+2\sqrt{6}\right)^n$

⇨ I=$\left(5+2\sqrt{6}\right)^n - F$

⇨ $I = \frac{1}{\left(5+2\sqrt{6}\right)^n} - f \Rightarrow I \frac{1}{1-f} - f$

7. $\sum_{r=0}^{200}(1+x)^r = 1+(1+x)+(1+x)^2 ----+(1+x)^{200} = \frac{1}{x}\left\{(1+x)^{201}-1\right\}$

Coefficients of x^{100} in $(1+x)^{200}$= ${}^{200}C_{101}$

8. $A = {}^{(m+n)}C_m = \frac{(m+n)}{m!n!}$

$B = {}^{(m+n)}C_n = \frac{(m+n)}{m!n!}$

=> A=B

9. $\left(1+3x+3x^2+x^3\right)^{20} = \left\{(1+x)^3\right\}^{20} = (1+x)^{60}$

10. O+E= $(x+a)^n$

O - E= $(x - a)^n$

O^2+E^2= $\frac{1}{2}\left\{(O+E)^2-(O-E)^2\right\} = \frac{1}{2}\left\{(x+a)^{2n}-(x-a)^{2n}\right\}$

11. $(1+x)(1+x)^n$ =$(1\text{-}x)^n$+x$(1\text{-}x)^n$

Coefficient of x^n in $(1+x)(1-x)^n$

=> Coefficient of x^n in $(1-x)^n$+ coefficientof x^{n-1}in $(1-n)^n$

=>$(-1)^n\ {}^nC_n + (-1)^n\ {}^nC_{n-1} = (-1)^n + (-1)^n\ n = (-1)^n\ (1-n)$

12. $\frac{3^{2n}}{8} = \frac{(1+8)^n}{8} = \frac{1}{8} + \left(c_1 + c_2 8 + c_3 8^2 + ----\right)$

13. 9^{103}=9x$(81)^{51}$

=9$[1+80]^{51}$

=9[25k+(51x80+1)]

=25λ+36729=25λ+25x1064+4

14. Put x=y=1 ,$\left(1+\frac{x}{3}+\frac{2y}{3}\right)^{12}$ =2^{12}

15. Let $a_n = \sum_{r=0}^{n}\frac{r}{{}^nC_r} \Rightarrow -x = \sum\frac{n-r-n}{{}^nC_r - r}$

=> -x= $\sum_{r=0}^{n}\frac{n-r}{^nC_r-r}-n\sum\frac{1}{^nC_r}\Rightarrow -x=x-a_n\Rightarrow x=\frac{n}{2a_n}$

16. $(1+x+x^2)^n= a_0+2a_1x+3a_2x^2$-------$a_{2n}x^{2n}$

=>$(1+x+x^2)^{n-1}(1+2x)== a_0+2a_1x+3a_2x^2$-------$2na_{2n}x^{2n-1}$

(an differentiating on both sides)

Put x=-1 on both sides

=> -n $=a_1-2a_2+3a_3$-------$2na_{2n}$

17. Total no. of terms in $(x_1+x_2+\text{---}+x_n)^3$, is $^{(n+r-1)}C_{r-1}$

1) n^3 2) $\frac{n^3+3n^2}{4}$ 3) $\frac{n(n+1)(n+1)}{6}$ 4) $\frac{n^2(n+1)^2}{4}$

18. Let β=$\sum_{r=0}^{2n}(-1)^r\left({}^{2n}C_r\right)^2 -----(1)$

$$=-\sum_{r=0}^{2n}(-1)^r(2n-r)\left({}^{2n}C_{2n-r}\right)^2$$

$$\sum_{r=0}^{2n}(-1)^r r\left({}^{2n}C_r\right)^2 -----(2)$$

Adding (1) &(2)

$$2\beta=-\sum_{r=0}^{2n}(-1)^r 2n\left({}^{2n}C_r\right)^2$$

$$=-2n\sum_{r=0}^{2n}(-1)^r\left({}^{2n}C_r\right)^2=-2n\alpha\Rightarrow\beta=-n\alpha$$

19. $\frac{T_{r+1}}{T_r}\Rightarrow r<\frac{11}{3}\Rightarrow r=3\Rightarrow T_{r+1}=T_{3+1}={}^{10}C_3\left(\frac{1}{2}\right)^3x^3$

20. Put x=x+2

f(2(x+2)+3)+f(2(x+2)+7)=2

Substract it from given equation => f(2x+11)=f(2x+3)

F(2(X+4)+3 =f(2x+3)

Period of f(x), t=4

MATHS-2B

21. $\tan 30^0,\tan 45^0,\tan 60^0=\frac{1}{\sqrt{3}},1,\sqrt{3}$ are in gp

22. $SP=at_1^2+a, SQ=at_2^2+a$ and $T=\left[at_1t_2, a[t_1+t_2\right]$

$ST^2=SP.SQ$

23. Normal at p(t) subtends 90^0 at the focus $\Rightarrow at^2=2at\Rightarrow t=2$

24. Slope of tangent at p=slope of normal at q

25. Use $S_1=S_{11}$ *and passes through* $(0,0)$

26. $P=\left(at_1^2,2at_1\right)$ $Q=P=\left(at_2^2,2at_2\right), R=\left(at_1t_2,a(t_1+t_2)\right)$ find area of ΔPQR

27. $\frac{1}{SP}+\frac{1}{SQ}=\frac{1}{a}\Rightarrow 1+\frac{SP}{SQ}=\frac{SP}{a}$

28. $\Delta = \frac{1}{2} LL^1 AS$

29. px+qy+ $2\sqrt{px}\sqrt{qy}=1 \Rightarrow (px+qy-1)^2 = 4pqxy \Rightarrow \Delta \neq 0, h^2 = ab$

30. $t_2 = -t_1 + \frac{2}{t_1}$

31. S_{11}=0 => find k, now L.S.N=$|y_1 m|$

32. P(1,0), Q($2x_1$-1,$2y_1$) is on y^2=8x

33. Point of statement (0,0) (4a,4a) substitute is 2bx+3cy+4d=0

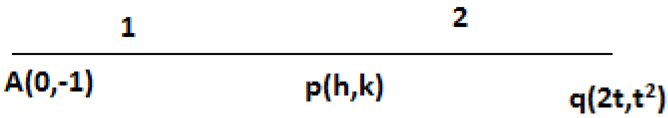
34. $\frac{dy}{dt} = 2\frac{dx}{dt}, 2y\frac{dy}{dt} = 18\frac{dx}{dt} \Rightarrow 2y\frac{dx}{dt} = 9\frac{dx}{dt} \Rightarrow y = \frac{9}{2}, x = \frac{9}{8}$

35. Slope of the tangent m_t=m=t the point is $\left(\frac{a}{m^2}, \frac{2a}{m^2}\right)$ use $d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2+b^2}}$

36. Length of the focal chord =4acosec^{2}θ , here tanθ=2

37. partial differential with respect to $x = \frac{-3}{4a}, y = \frac{35a}{16}, ay = \frac{105}{64}$

38.



⇨ 3h=2t and 3k==t2-2

⇨ 3y=$\left(\frac{3x}{2}\right)^2 - 2 \Rightarrow 12y = 9x^2 - 8$

39. Use =$\left|\frac{coefficent\ of\ x}{coefficient\ of\ y^2}\right|$

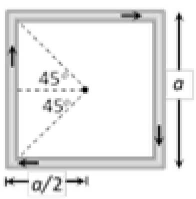
40. Equation of the chord S_1=S_{11}

PHYSICS

41) $B = B_a \otimes + B_b \otimes$

$$B = \frac{3}{4}\left(\frac{\mu_o I}{2a}\right) \otimes + \frac{1}{4}\left(\frac{\mu_o I}{2a}\right) \otimes = \left(\frac{3\mu_o I}{8a} + \frac{\mu_o I}{8a}\right) \otimes$$

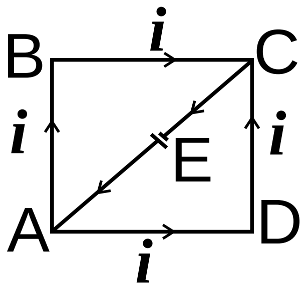
42)



$$B_O = 4B_{Side} = 4\frac{\mu_o}{4\pi}\frac{i}{r}\left[\text{Sin}\,\theta_1 + \text{Sin}\,\theta_2\right]$$

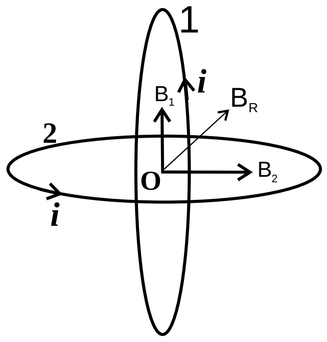
$$B_O = 4\frac{\mu_o}{4\pi}\frac{I}{a/2}\left[\text{Sin}\,45^0 + \text{Sin}\,45^0\right] = 8\sqrt{2}\frac{\mu_o}{4\pi}\frac{I}{a}$$

43)



Resistance of arms AB, BC, CD and AD are equal
So same current pass through all arms
Net magnetic induction at centre of the square due to arms AB and BC is B into plane of paper ⊗
Net magnetic induction at centre of the square due to arms CD and DA is B out of plane of paper
So net magnetic induction at centre of the square is zero.

44)



$$B_1 = B_2 = B$$

$$B_R = \sqrt{B_1^2 + B_2^2} = \sqrt{2}B$$

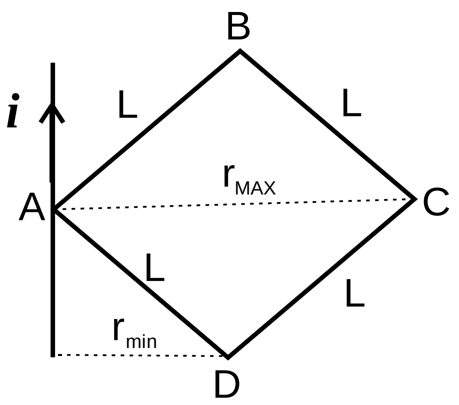
$$B_R : B_1 = \sqrt{2} : 1$$

45) $i = q\,f = 1.6\times10^{-19}\times6.8\times10^{15}$

$$B = \frac{\mu_o}{2}\frac{i}{r} = \frac{4\pi\times10^{-7}}{2}\times\frac{1.6\times10^{-19}\times6.8\times10^{15}}{5\times10^{-11}} = 13.6\,\text{T}$$

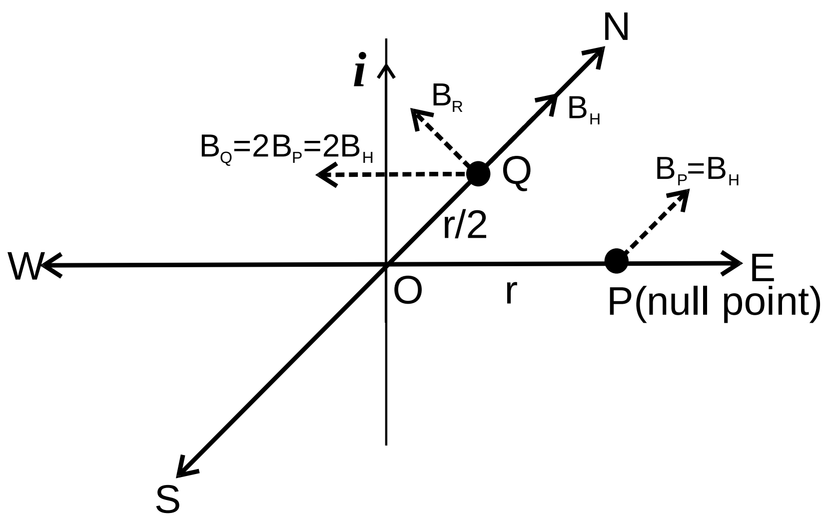
46) $\frac{B_o}{B_x} = \frac{\left(R^2+x^2\right)^{3/2}}{R^3} \Rightarrow \frac{B_o}{54} = \frac{\left(3^2+4^2\right)^{3/2}}{3^3} \Rightarrow B_o = 250\,\mu T$

47)



$$B_{min} = \frac{\mu_o}{2\pi}\frac{i}{r_{max}} = \frac{\mu_o}{2\pi}\frac{i}{\sqrt{2}L} = \frac{\mu_o}{4\pi}\frac{\sqrt{2}i}{L}$$

48)



$$B \propto \frac{1}{R} \Rightarrow B_Q = 2B_P$$

$$B_R = \sqrt{B_Q^2 + B_H^2} = \sqrt{5}B_H$$

49) $r_A = r_B = r$,

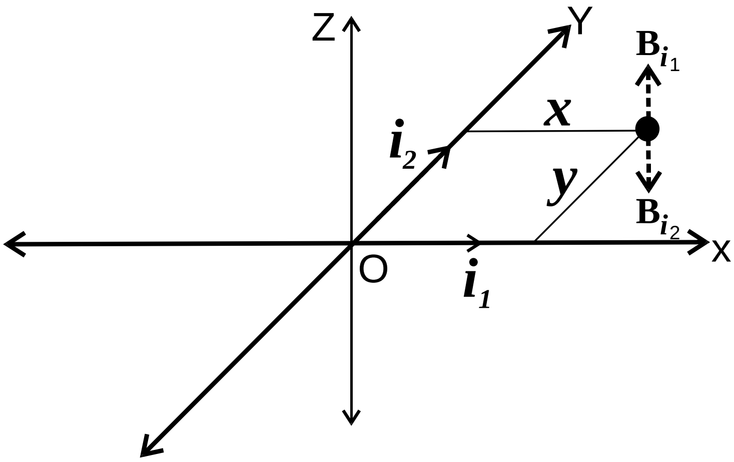
For wire A, $2\pi r = 40\,cm$ ----(1)

For wire B, $r\theta = 30\,cm$ -----(2)

$$\frac{(2)}{(1)} \Rightarrow \frac{\theta}{2\pi} = \frac{30}{40}$$

$$(B_A)_{closed} = (B_B)_{curve} \Rightarrow \frac{\mu_o}{2}\frac{i_1}{r_A} = \frac{\mu_o}{4\pi}\frac{i_2}{r_B}(\theta) \Rightarrow \frac{i_1}{i_2} = \frac{\theta}{2\pi} = \frac{3}{4}$$

50)



$B_{null\ point} = 0$

$i_1 = \frac{i}{3}$ & $i_2 = \frac{2i}{3} \propto \frac{1}{R}$

$B_{i_1} = B_{i_2} \Rightarrow \frac{\mu_o}{2\pi}\frac{i_1}{y} = \frac{\mu_o}{2\pi}\frac{i_2}{x} \Rightarrow y = \frac{xi_1}{i_2}$

51) $B_c = \frac{\mu_o}{2}\frac{i}{r}$

$B_{open} = \frac{\mu_o}{4\pi}\frac{i}{r}\left[\text{Sin}\,\theta_1 + \text{Sin}\,\theta_2\right]$

$B_{open} = \frac{\mu_o}{4\pi}\frac{i}{r}\left[\frac{\pi R}{\sqrt{\pi^2+1}} + \frac{\pi R}{\sqrt{\pi^2+1}}\right] = \frac{\mu_o}{2}\frac{i}{r}\frac{1}{\sqrt{\pi^2+1}} = \frac{B}{\sqrt{\pi^2+1}}$

52) $B = \frac{\mu_o}{4\pi}\frac{i}{R}\pi + 2\frac{\mu_o}{4\pi}\frac{i}{R} = \frac{\mu_o}{4\pi R}i\left[\pi+2\right]$

53) Field at midpoint due two conductors equal and opposite in direction. So $B_{net} = 0$

54) $B = B_{curved} + B_{straight} = \frac{\mu_o}{4\pi}\frac{i}{r}(\theta) + \frac{\mu_o}{4\pi}\frac{i}{R}\left[\text{Sin}\,\theta_1 + \text{Sin}\,\theta_2\right]$

$B = \frac{\mu_o}{4\pi}\frac{i}{r}(2\pi - 2\phi) + \frac{\mu_o}{4\pi}\frac{i}{r\,\text{Cos}\,\phi}\left[2\,\text{Sin}\,\phi\right] = \frac{\mu_o}{2\pi}\frac{i}{r}\left[\pi - \phi + \text{Tan}\,\phi\right]$

55) $I \propto r^2 \Rightarrow \frac{i}{i_1} = \frac{a^2}{\left(a/2\right)^2} \Rightarrow i_1 = \frac{i}{4}$

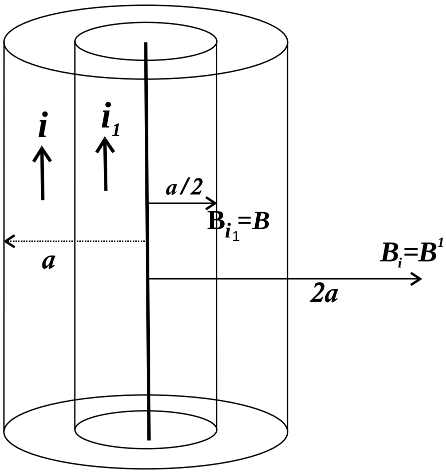
From ampere's law, for cylinder of radius $\frac{a}{2}$

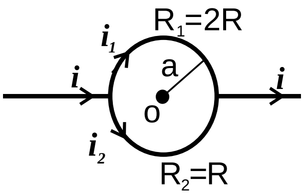
$\oint B\,dl = \mu_o\left(\frac{i}{4}\right) \Rightarrow B\left(2\pi\frac{a}{2}\right) = \mu_o\left(\frac{i}{4}\right) \Rightarrow B = \frac{\mu_o}{4\pi}\left(\frac{i}{a}\right)$

for cylinder of radius $2a$

$\oint B^1\,dl = \mu_o(i) \Rightarrow B^1\left(2\pi(2a)\right) = \mu_o(i) \Rightarrow B^1 = \frac{\mu_o}{4\pi}\left(\frac{i}{a}\right)$

$\therefore \frac{B}{B^1} = 1$

56) 



From $i \propto \frac{1}{R}, \quad i_1 = \frac{i}{3}$ & $i_2 = \frac{2i}{3}$

$$B_i = 0$$

$$B_{i_1} = \frac{\mu_o}{4\pi}\frac{i_1}{r}(\theta) = \frac{\mu_o}{4\pi}\frac{i/3}{a}(\pi) \otimes$$

$$B_{i_2} = \frac{\mu_o}{4\pi}\frac{i_2}{r}(\theta) = \frac{\mu_o}{4\pi}\frac{2i/3}{a}(\pi) \square$$

$$B = \left[B_{i_2} - B_{i_1}\right] = \frac{\mu_o}{4\pi}\frac{i}{a}(\pi)\left[\frac{2}{3} - \frac{1}{3}\right] = \frac{\mu_o}{12}\frac{i}{a} \qquad \left(\because B_{i_2} > B_{i_1}\right)$$

57) $$B_1 = \left[\frac{\mu_o}{4\pi}\frac{i}{r_1}(\alpha)\right]\square$$

$$B_2 = \left[\frac{\mu_o}{4\pi}\frac{i}{r_2}(\alpha)\right]\otimes$$

$$r_1 < r_2 \Rightarrow B_1 > B_2$$

$$B = B_1 - B_2 = \frac{\mu_o}{4\pi} i\alpha\left[\frac{1}{r_1} - \frac{1}{r_2}\right]\square$$

58) $$2\pi r_1 = n(2\pi r_2) \Rightarrow \frac{r_1}{r_2} = n$$

$$B \propto \frac{N}{r} \Rightarrow \frac{B_2}{B_1} = \frac{N_2}{N_1}\frac{r_1}{r_2} \Rightarrow \frac{B_2}{B} = \frac{n}{1}\frac{n}{1} \Rightarrow B_2 = n^2 B$$

59) $B_o = \frac{\mu_o}{2}\frac{Ni}{R}, B_x = \frac{\mu_o}{2}\frac{NiR^2}{\left(R^2+x^2\right)^{3/2}}$

$$\frac{B_x}{B_o} = \frac{R^3}{\left(R^2+x^2\right)^{3/2}} \Rightarrow \frac{B/8}{B} = \frac{R^3}{\left(R^2+x^2\right)^{3/2}} \Rightarrow x = \sqrt{3}R$$

60) $From\, B \propto \frac{1}{r}$

CHEMISTRY

61) As E.N decrease down the gp the electron density on C atom of hydride decrease and thus repulsion b/w b.p &lp of

$\bar{e}$ decrease H-M-H bond angle

62) N_2O_3 is blue coloured liquid

63) Because NF_3 is a stable halide

64) $CaC_2 + N_2 \rightarrow \underset{nitro\lim}{CaCN_2} + C$

65) Presence of unpaired electron

66) Al rendered passive on treatment with Con.HNO_3

67) $SbCl_3 + H_2O \rightarrow \underset{Oxocation}{SbOCl} + 2HCl$

68) $AgCl + 2NH_4OH \rightarrow \left[Ag\left[NH_3\right]_2\right]Cl + 2H_2O$

69) $NO_2^+ - 180^0; \quad NO_2^- - 180^0; \quad NO_2 - 132,$

70) $H_4P_2O_6 + H_2O \rightarrow H_3PO_3 + H_3PO_4$

71) $CaO + SiO_2 \rightarrow CaSiO_3\left(Slag\right)$

72) Van-Ankel method

$Zr + 2I_2 \rightarrow ZrI_4 \xrightarrow[let]{180K} Zr + 2I_2$

73) Forth floating method is used for the concentrate ion of sulphide ores(pbs —>galena)

74) $2NaAlO_2\,/(ar) + 3H_2O_{(v)}$

75) Copper matte is mixture of Cu_2S + little .FeS

76) $AgCl + 2NaCN \rightarrow \left(Na\left(CN\right)_2\right) + NaCl$ (salium arguendo cyanidro)

77) German silver -> Ni+Zn+Cu

Brass –Cu+Zn

78) $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

79) Cathode is made up of carbon

80) $Al + Fe_2O_3 \rightarrow Al_2O_3 + 2Fe$