SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR EAMCET | **DPP -8** | **Date:14-04-2020**

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

MATHS A

1. **If** $f(x)=\alpha x+\beta$ **and** $f=\{(1,1),(2,3),(3,5),(4,7)\}$ **then the values of** α,β **are**

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

2. **If** $f(x)=\frac{x}{\sqrt{1+x^2}}$ **then** $(fofof)(x)=$

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

3. **The function** $f(x)$ **satisfying the condition** $f\left(x+\frac{1}{x}\right)=x^2+\frac{1}{x^2}$ **is** $f(x)=$

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

4. **If** $f:R\to R$ **is defined by** $f(x)=x^2-5x$ **then the inverse image set of** $\{-6\}$ **is**

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

5. **The domain of** $f(x)=\frac{2^x+2^{-x}}{2^x-2^{-x}}$ **is**

1) $R-\{0,1\}$ 2) $(0,\infty)$ 3) $R-\{0\}$ 4) $\{-\infty,0\}$

6. **The domain of** $\frac{1}{[x]-x}$ **is**

1) R 2) Z 3) $R-Z$ 4) $Q-\{0\}$

7. **The range of the function** $f(x)=3\cos x+4\sin x+5$ **is**

1) $[0,5]$ 2) $[-5,5]$ 3) $[-10,0]$ 4) $[-10,5]$

8. **The range of** $f(x)=\sqrt{x^2+4x+29}$ **is**

1) R 2) $(0,\infty)$ 3) $[5,\infty)$ 4) $(0,5)$

9. **If** $y=f(x)=\frac{5x+3}{4x-5}$ **then** $f(y)=$

1) $-x$ 2) x 3) $\frac{5x+3}{4x-5}$ 4) $2x$

10. **The domain of** $f(x)=\sqrt{1-|x|}$ **is**

1) $[-1,1]$ 2) $(-1,1)$ 3) $(0,1)$ 4) R

11. **The range of** $f(x)=3x^2+7x+10$ **is**

1) $\left[\frac{70}{3},\infty\right)$ 2) $\left[\frac{71}{12},\infty\right)$ 3) $[0,\infty)$ 4) $\left[-\infty,\frac{20}{3}\right)$

12. **Let** $f(x)=x^2$ **and** $g(x)=2^x$ **then the solution set of** $fog(x)=gof(x)$ **is**

1) R 2) $\{0,2\}$ 3) $\{0\}$ 4) $\{0,1\}$

13. **The domain of** $f(x)=\frac{1}{6}\sqrt{\log_{10}(5x-x^2)}$ **is**

1) $(0,\infty)$ 2) $\left[\frac{5-\sqrt{21}}{2},\frac{5+21}{2}\right]$ 3) $(1,3)$ 4) None

14. **Range of** $9^x-2.3^x+7$ **is**

1) $[5,\infty)$ 2) $[6,\infty)$ 3) $[7,\infty)$ 4) $[-\infty,6)$

15. **The range of** $f(x)=\frac{x}{1+x^2}$ **is**

1) $\left[-\frac{1}{2},\frac{1}{2}\right]$ 2) $[0,1]$ 3) $\left[0,\frac{1}{2}\right]$ 4) $[0,\infty]$

16. **If** $f(x+y,x-y)=x^2-y^2$ **then** $f(x^2,y^2)=$

1) x^2+y^2 2) x^2y^2 3) x^2-y^2 4) $(x+y)^2-(x-y)^2$

17. **If** $f(x+y)=f(x)f(y)$ **for all** $x,y\in R, f(1)=2$ **and** $x,y\in R, f(1)=2$ **then** $n=$

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

18. **If** $a^2+b^2+c^2=1$ **then the range of** $ab+bc+ca$ **is**

1) $[1,\infty)$ 2) $\left[-\frac{1}{2},\infty\right)$ 3) $\left(-\frac{1}{2},1\right)$ 4) $\left[-\frac{1}{2},1\right]$

19. **If** $f(x)=\frac{\cos^2 x+\sin^4 x}{\sin^2 x+\cos^4 x}$ **for** $x\in R$ **then** $f(2002)=$

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

20. **For any integer** $n\geq 1,$ **the number of positive divisors of n is denoted by** $d(n)$, **then for a prime P,** $d\left(d\left(d\left(p^7\right)\right)\right)=$

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

MATHS - B

21. **The equation of the plane which is at a distance of** $2\sqrt{3}$ **unit from the origin and whose normal has d.c's** $\left(\frac{1}{\sqrt{3}},-\frac{1}{\sqrt{3}},\frac{1}{\sqrt{5}}\right)$ **is**

1) $x-y+z=6$ 2) $x-2y+z=13$
3) $3x-12y+4=26$ 4) $3x-12y+4z+26=0$

22. **The equation of the plane passing through the point** $(2,-3,5)$ **and parallel to zx plane is**

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

23. **The equation of the perpendicular bisecting plane of the line segment joining** $(-3,3,2)$, $(9,5,4)$ **is**

1) $x-y+4z-13=0$ 2) $2x-2y+7z-23=0$
3) $x-7y+2z-1=0$ 4) $6x+y+z-25=0$

24. **A plane** π **passes through the point** $(1,1,1)$. **If** b,c,a **are the Dr's of a normal to the plane, where** a,b,c $(a<b<c)$ **are the prime factors of 2001, then the equation of the plane** π **is**

1) $29x+31y+3z=63$ 2) $23x+29y-29z=23$
3) $23x+29y+32=55$ 4) $31x+37y+3z=71$

25. **The equation of the plane passing through the point** $(-2,-1,-3)$ **and parallel to the plane** $2x+y+z-9=0$ **is**

1) $2x+y+z+8=0$ 2) $2x+3y-z-7=0$
3) $2x+3y-z-9=0$ 4) $2x+3y-z+9=0$

26. The equation of the plane having intercepts $-4,5,6$ is _____

1) $15x-12y=10z+60=0$ 2) $15x+3y-6z=0$
3) $15x+3y-6z+12=0$ 4) $4x+3y-6z=0$

27. The perpendicular distance from the origin to the plane $3x+4y+12z-26=0$ is_____

1) 12 2) 6 3) 14 / 3 4) 2

28. The distance between the parallel planes $4x-4y+2z+5=0, 2x-2y+z+3=0$ is _____

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

29. The plane passing through the point $(1,1,1)$, $(1,-1,1)$ and $(-7,-3,-5)$ is parallel to

1) x-axis 2) y-axis 3) z-axis 4) none

30. The equation of the plane passing through the point $(-1,6,2)$ and perpendicular to the planes $x+2y+2z-5=0$ and $3x+3y+2z-8=0$ is

1) $2x-4y+3z+20=0$ 2) $2x+5y-2z+12=0$
3) $2x-4y+3z+23=0$ 4) $2x+5y-2z+12=0$

31. The image of $(7,14,5)$ in the plane $2x+4y-z=2$ is

1) $(-5,-10,11)$ 2) $(5,-10,11)$ 3) $(-5,10,11)$ 4) $(5,10,11)$

32. If the plane $56x+4y+9=2016$ meets the coordinate axis in A, B, C then the centroid of the triangle ABC is _____

1) $(12,168,224)$ 2) $(12,168,112)$ 3) $\left(12,168,\frac{224}{3}\right)$ 4) $\left(12,-168,\frac{224}{3}\right)$

33. A plane meets the coordinate axis at A, B, C so that the centroid of the triangle ABC is $(1,2,4)$. Then the equation of the plane is

1) $x+2y+4z=12$ 2) $4x+2y+z=12$ 3) $x+2y+4=3$ 4) $4x+2y+z=3$

34. The ratio in which the plane $x+2yh+3z-5=0$ divides the line segment joining the points $(1,2,3),(-2,3,4)$ is

1) 3 : 5 2) 7 : 5 3) 9 : 11 externally 4) 11 : 9

35. The equation of the plane through the line of intersection of the planes $x-2y+3z-1=0$, $2x+y+z-2=0$ and the point $(1,2,3)$ is _____

1) $7x-9y+8z=0$ 2) $7x+y+8z=0$ 3) $x+3y-2z-1=0$ 4) None

36. The angle between the planes $3x-2y+z+7=0,\ x+2y+z-5=0$ is

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

37. A variable plane is at a constant distance 3p from the origin and meet the axis in A, B and C. The locus of the centroid of the triangle ABC is

1) $x^{-2}+y^{-2}+z^{-2}=p^{-2}$ 2) $x^{-2}+y^{-2}+z^{-2}=3p^{-2}$
3) $x^{-2}+y^{-2}+z^{-2}=9p^{-2}$ 4) $x^{-2}+y^{-2}+z^{-2}=16p^{-2}$

38. The plane $2x-2y-3z-14=0$ and the line joining $(1,2,4)$, $(3,3,0)$ intersect at

1) $(5,2,0)$ 2) $(5,4,-4)$ 3) $(-3,-1,-6)$ 4) $(10,-15,12)$

39. The equation of the parallel plane lying midway between the parallel planes $2x-3y+6z-7=0$ and $2x-3y+6z+7=0$

1) $2x-3y+6z+1=0$ 2) $2x-3y+6z+7=0$
3) $2x-3y+6z=0$ 4) $2x-3y+6z=11$

40. If the angle between the line $x=\frac{y-1}{2}=\frac{z-3}{\lambda}$ and the plane $x+2y+3z-4=0$ is $\cos^{-1}\left(\sqrt{\frac{5}{14}}\right)$. Then λ = ____

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

PHYSICS

41. A bomb at rest explodes the center of mass of the system

1) Describes a parabola 2) Vertically upwards 3) Horizontally 4) Is at rest

42. Two bodies of masses m_1 and m_2 are at distances x_1 and x_2 from then centre of mass. Then the correct statement of the following is

1) $\frac{m_1}{m_2}=\frac{x_1}{x_2}$ 2) $\frac{m_1}{m_2}=\sqrt{\frac{x_1}{x_2}}$ 3) $\frac{m_1}{m_2}=\frac{x_2}{x_1}$ 4) $\frac{m_1}{m_2}=\sqrt{\frac{x_2}{x_1}}$

43. A uniform wire of length 'L' is bent in the form of circle. The shift in centre of mass is

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

44. A wooden sphere and a copper sphere of same radius are kept in contact with each other their centre of the mass will be

1) At their point of contact 2) Outside of the spheres
3) With in copper sphere 4) Outside of the spheres

45. When no external force is acting on a system of particles, the centre of mass of the system

1) Remains at rest only 2) Moves with constant velocity only
3) Moves with constant velocity(or) will be at rest 4)Moves with variable velocity

46. The angular velocity of second's hand in a watch clock is (in rad/sec)

1) $\frac{\pi}{30}$ 2) $\frac{\pi}{60}$ 3) $\frac{\pi}{1800}$ 4) $\frac{\pi}{3600}$

47. A car is moving with a speed of 30 m/s on circular path of radius 500m. If its speed is increasing at the rate of $2m/s^2$, the net acceleration of the car is

1) $3.5m/s^2$ 2) $2.7m/s^2$ 3) $1.8m/s^2$ 4) $2m/s^2$

48. A particle of mass 'm' is moving in a horizontal circle of radius 'r' under a centripetal force $=-\frac{k}{r^2}$ Where 'k' is a constant. The total energy of the particle is

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

49. Length of seconds hand in a clock is 15cm. Change in the linear velocity of the tip of the hand after 15 sec is

1) $\frac{\pi}{\sqrt{2}}cm/\sec$ 2) $\sqrt{2}\pi$ cm/sec 3) $\frac{\pi}{2\sqrt{2}}cm/\sec$ 4) $\frac{\pi}{2}cm/\sec$

50. The speed of motor increases from 1200 rpm to 1800 rpm in 20 s. Number of revolutions made in this period of time

1) 400 2) 200 3) 500 4) 800

51. A simple pendulum is vibrating with angular amplitude of 90^0. For what value of 'θ' with vertical the acceleration is directed horizontally

1) $\cos^{-1}\frac{1}{3}$ 2) $\cos^{-1}\frac{1}{\sqrt{3}}$ 3) $\cos^{-1}\frac{1}{\sqrt{2}}$ 4) $\cos^{-1}\frac{2}{\sqrt{3}}$

52. A body of mass 'm' kg is rotating in a vertical circle at the end of a string of length 'r' meter. The difference in the kinetic energy at the top and the bottom of the circle is

1) $\frac{mg}{r}$ 2) $\frac{2mg}{r}$ 3) $2mgr$ 4) mgr

53. The velocity of a body revolving in a vertical circle of radius 'r' at the lowest point $\sqrt{7gr}$. The ratio of maximum to minimum tensions in the string is

1) $8:1$ 2) $4:1$ 3) $\sqrt{7}:1$ 4) $1:\sqrt{7}$

54. An inclined track ends in a circular loop of diameter 'D'. From what height on the track a particle should be released so that it completes that loop in the vertical plane?

1) $\frac{50}{2}$ 2) $\frac{20}{5}$ 3) $\frac{50}{4}$ 4) $\frac{40}{5}$

55. A body is moving in a vertical circle of radius 'r' by a string. If the ratio of maximum to minimum speed is $\sqrt{3}:1$, the ratio of maximum to tensions in the string is

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

56. A constant torque acting on a uniform circular wheel changes its angular momentum from 'L' to '4L' in 4 seconds. The torque acting on it is

1) 4L 2) 12L 3) $\frac{3L}{4}$ 4) $\frac{4L}{3}$

57. When a torque acting upon a system is zero, which of the following will be constant

1) Force 2) Linear momentum 3) Angular momentum 4) Linear impulse

58. An automobile engine develops 100kw when rotating at a speed of 1800 rev/min, what torque does it deliver?

1) 350 N-m 2) 440 N-m 3) 531 N-m 4) 628 N-m

59. A torque 0.5 Nm required to drive a screw into a wooden frame with the help of a screw driver. If one of the two forces of couple produced by screw driver is 50 N, the width of screw driver is

1) 0.5 cm 2) 0.75 cm 3) 1 cm 4) 1.5 cm

60. The handle of a door is at a distance 40 cm from axis of rotation. If a force 5N is applied on the handle in a direction 30^0 with plane of door, then the torque is

1) 0.8 Nm 2) 1 Nm 3) 1.6 Nm 4) 2 Nm

CHEMISTRY

61. 40 grams of a sample of carbon on combustion left 10% of it unreacted. The volume of oxygen required at S.T.P for this combustion reaction

1) 22.4 lit 2) 67.2 lit 3) 11.2 lit 4) 44.8 lit

62. In an oxidation reduction reaction dichromate $\left(Cr_2O_7^{-2}\right)$ ion reduced to Cr^{+3} ion. The equivalent weight of $K_2Cr_2O_7$ in this reaction is

1) $\frac{\text{molecular weight}}{3}$ 2) $\frac{\text{molecular weight}}{6}$ 3) $\frac{\text{molecular weight}}{1}$ 4) $\frac{\text{molecular weight}}{2}$

63. In the redox reaction $2KMnO_4+3H_2SO_4+5H_2C_2O_4 \rightarrow K_2SO_4+2MnSO_4+8H_2O+10CO_2$ the volume of 0.1 m $H_2C_2O_4$ solution

1) 25 L 2) 125 ml 3) 25 ml 4) 1.25 L

64. An organic compound containing 'C' and 'H' has 92.3% of carbon, its emperical formula is

1) CH 2) CH_3 3) CH_2 4) CH_4

65. What is the oxidation state of 'Fe' in the product formed when Acidified Potassium Ferro Cyanide is treated with H_2O_2

1) +2 2) +6 3) +1 4) +3

66. In a flask 'v' litres 0.2 moles of O_2, 0.4 moles of N_2, 0.1 moles of NH_3 and 0.3 moles of 'He' gases are present at 27^0C. If total pressure exerted by these non-reacting gases at 1 atm, the partial pressure exerted by N_2 gas is

1) 0.4 atm 2) 0.3 atm 3) 0.2 atm 4) 0.1 atm

67. What is the temperature at which the kinetic energy of 0.3 moles of Helium is equal to the kinetic energy of 0.4 moles of Argon at 400k

68. The most probable velocity of a gas molecule at 298 k is 300 m/s. Its R.M.S velocity in m/s^{-1} is

1) 420 2) 245 3) 402 4) 367

69. 138 grams of Ethyl Alcohol is mixed with 72 grams of water. The ratio of mmole fraction of Alcohol to water is

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

70. A certain mass of a gas occupies a volume of 2 litres at S.T.P. To what temperature the gas must be heated to double its volume keeping the pressure constant

1) 100 k 2) 273 k 3) 273^0C 4) 546^0C

71. The equilibrium constant for the reaction $\underset{(g)}{SO_2}+\frac{1}{2}\underset{(g)}{O_2}\rightleftharpoons\underset{(g)}{SO_3}$ is $5\times10^{-3}atm^{-1}$. The equilibrium constant for the reaction $2\underset{(g)}{SO_3}+\rightleftharpoons2\underset{(g)}{SO_2}+\underset{(g)}{O_2}$ would be

1)100 atm 2) 200 atm 3) 4×10^4atm 4) 6.25×10^4atm

72. What is the equation for the equilibrium constant (K_C) for the following equation

$$\frac{1}{2}A_{(g)}+\frac{1}{3}B_{(g)}\overset{T(k)}{\rightleftharpoons}\frac{2}{3}C_{(g)}$$

1) $K_C=\frac{[A]^{\frac{1}{2}}[B]^{\frac{1}{3}}}{[C]^{\frac{3}{2}}}$ 2) $=\frac{0.5\times25}{0.5}=25ml$ 3) $K_C=\frac{[C]^{\frac{2}{3}}}{[A]^{\frac{1}{2}}[B]^{\frac{1}{3}}}$ 4)

73. **Which of the following is not a property of chemical equilibrium**

1) Rate of forward reaction is equal to backward reaction at equilibrium

2) After reaching the chemical equilibrium the concentrations of reactants and products unchaged

3) For $\underset{(g)}{A}\rightleftharpoons\underset{(g)}{B}$ is 10^{-2} if this reaction is carried out in the presence of a catalyst, the value of K_C decreases

4) After reaching the equilibrium, both forward and backward reactions continue to take place

74. In which of the following reactions the concentration of reactant is equal to concentration of product at equilibrium (k = equilibrium constant)

1) $A\rightleftharpoons B$ k = 0.001 2) $M\rightleftharpoons N$ k = 10 3) $X\rightleftharpoons Y$ k = 0.005 4) $R\rightleftharpoons P$ k = 0.01

75. In the reaction $\underset{(g)}{PCl_5}\rightleftharpoons\underset{(g)}{PCl_3}+\underset{(g)}{Cl_2}$. The equilibrium concentration of PCl_5 and PCl_3 are 0.4 and 0.2 mole/lit respectively. If the value of K_C is 0.5, what is concentration of Cl_2 in moles/litre

1) 2.0 2) 1.3 3) 1.0 4) 0.5

76. One mole of $A_{(g)}$ is heated to 200^0C in a one litre closed flask till the following equilibrium is reached $A_{(g)}\rightleftharpoons B_{(g)}$ the rate of forward reaction at equilibrium is 0.02 mol/lit $\min^{-1}$ is the rate $\left(lit.mole^{-1}.\sec^{-1}\right)$ for the backward reaction

1) 0.04 2) 0.01 3) 0.02 4) 1

77. Equilibrium constant for the reaction $H_2O_{(g)}\rightleftharpoons H_2+CO_2$ is 81. If the velocity constant of the forward reaction is 162 $lit.mole^{-1}.\sec^{-1}$. What is the velocity constant $(lit.mole^{-1}.\sec^{-1})$ for the backward reaction

1) 13122 2) 2 3) 261 4) 243

78. 9.2 grams of N_2O_4 is taken in a closed one litre vessel and heated in the following equilibrium is reached $\underset{(g)}{N_2O_4}\rightleftharpoons2\underset{(g)}{NO_2}$ is dissociated. What is the equilibrium constant in $(mole.lit^{-1})$

(mol. wt of N_2O_4 is 92)

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

79. The equilibrium constant for the reaction $\underset{(g)}{H_2}+\underset{(g)}{I_2} \rightleftharpoons 2\underset{(g)}{HI}$ is 64 at certain temperature. The equilibrium concentration of H_2 and HI are 2 and 6 $mol.lit^{-1}$ respectively. What is the equilibrium concentration of I_2

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

80. 4 moles of HI is taken in a one litre closed vessel and heated till equilibrium is reached . At equilibrium concentration of H_2 is one mole lit. What is equilibrium constant for dissociation of HI

1) 4 2) 0.5 3) 2 4) 0.25

SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR EAMCET | **DPP** | **Date:14-04-2020**

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

KEY

MATHS A

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

MATHS B

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

PHYSICS

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

CHEMISTRY

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

HINTS AND SOLUTIONS

MATHS A

1. $f(1)=1\Rightarrow\alpha+\beta=1;\ f(2)=3\Rightarrow 2\alpha+\beta=3$

$\Rightarrow\alpha=2,\beta=-1$

2. $fof(x)=\dfrac{\dfrac{x}{\sqrt{1+x^2}}}{\sqrt{1+\dfrac{x^2}{1+x^2}}}=\dfrac{x}{\sqrt{1+2x^2}}$ and

$fofof(x)=f\left(\dfrac{x}{\sqrt{1+2x^2}}\right)=\dfrac{\dfrac{x}{\sqrt{1+2x^2}}}{\sqrt{1+\dfrac{x^2}{1+2x^2}}}=\dfrac{x}{\sqrt{1+3x^2}}$

3. $f\left(x+\dfrac{1}{x}\right)=\left(x+\dfrac{1}{x}\right)^2-2\Rightarrow f(x)=x^2-2$

4. $f(3)=f(2)=-6\Rightarrow f(-6)=\{3,2\}$

5. $2^x-2^{-x}\neq 0\Rightarrow x\neq 0$

6. $[x]-x\neq 0\Rightarrow[x]\neq x\Rightarrow x\notin Z$

7. Range $\left[c-\sqrt{a^2+b^2},c+\sqrt{a^2+b^2}\right]$

8. $x^2+4x+29=(x+2)^2+25\geq 25$

9. $f(y)=fof(x)=x$

10. $1-|x|\geq 0\Rightarrow|x|\leq 1$

11. Range of $f(x)=ax^2+bx+c$ is $\left[\dfrac{-D}{4a},\infty\right)$ if $a>0$

Where $D=b^2-4ac$

12. $fog(x)=2^{2x};gof(x)=2^{x^2}\Rightarrow 2^{2x}=2^{x^2}$

$\Rightarrow x^2=2x$ then $x=0,2$

13. $\log_{10}5x-x^2\geq 0\Rightarrow\log_{10}5x-x^2\geq\log_{10}1\Rightarrow 5x-x^2\geq 1$

$\Rightarrow x\in\left[\dfrac{5-\sqrt{21}}{2},\dfrac{5+\sqrt{21}}{2}\right]$

14. $\left(3^x-1\right)^2+6\geq 6$

15. $\dfrac{x}{1+x^2}=y\quad\Rightarrow x^2y-x+y=0$ and $x\in R\ \ 1-4y^2\geq 0$

16. $f(x+y,x-y)=x^2-y^2=(x+y)(x-y)$

$\therefore f\left(x^2,y^2\right)=x^2y^2$

17. Put $x=1;y=1\quad\Rightarrow f(2)=f(1)f(1)=4=2^2$

$f(2+1)=f(2)f(1)=4.2=2^3$

$f(n)=2^n;\quad\sum_{k=1}^{n}f(4+k)=480$

$\sum_{k=1}^{n}2^{4+k}=480\Rightarrow 2^4\sum_{k=1}^{n}2^k=480\Rightarrow 2^4.2\left(2^n-1\right)=480$

$2^n-1=15\Rightarrow 2^n=16\quad\Rightarrow 2^n=2^4$

$\Rightarrow n = 4$

18. If $a^2 + b^2 + c^2 = k$ then the range is $\left[\frac{-k}{2}, k\right]$

19. $f(x) = \frac{\cos^2 x + \left(1 - \cos^2 x\right)^2}{1 - \cos^2 x + \cos^4 x} = 1 \quad (f \text{ is constant function})$

$f(2002) = 1$

20. $d\left(p^7\right) = 8 = 2^3 \Rightarrow d\left[d\left(p^7\right)\right] = 4 = 2^2$

$d\left(d\left(d\left(p^7\right)\right)\right) = 3$

MATHS-B

21. $P = \sqrt{3} \qquad (l, m, n) = \left(\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$

$lx + my + nz = p$

$= \frac{1}{\sqrt{3}}x - \frac{1}{\sqrt{3}}y + \frac{1}{\sqrt{3}}z = 2\sqrt{3}$

$x - y + z = 6$

22. Dr's of zx plane are $= (0,1,0) = (a,b,c)$

$= (2,-3,5) = (x, y, z)$

Equation of plane is $a(x - x_1) + b(y - y_1) + c(z - z_1) = 0$

$\Rightarrow 0(x-2) + 1(y+3) + 0(z-5) = 0$

$y + 3 = 0$

23. $A = (-3,3,2) \quad B = (9,5,4)$

Midpoint $= \left(\frac{-3+9}{2}, \frac{3+5}{2}, \frac{2+4}{2}\right)$

$= (3,4,3)$

Dr's of normal the plane

$= (9+3,\ 5-3,\ 4-2)$

$(a,b,c) = (12,2,2)$

$\Rightarrow 12(x-3) + 2(y-4) + 2(z-3) = 0$

$12x + 2y + 2z - 50 = 0$

$6x + y + z - 25 = 0$

24. $2001 = 23 \times 29 \times 3$

$3 < 23 < 29$

$a = 3,\ b = 23,\ c = 29$

$(x_1, y_1, z_1) = (1,1,1)$

$b(x-1) + c(y-1) + a(z-1) = 0$

$\Rightarrow 23(x-1) + 29(y-1) + 3(z-1) = 0$

$\Rightarrow 23x + 29y + 3z = 55$

25. $2(x+2) + 1(y+2) + 1(z+3) = 0$

$\Rightarrow 2x + y + z + 8 = 0$

26. $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$

$\Rightarrow \frac{x}{-4}+\frac{y}{5}+\frac{z}{6}=1$

$\Rightarrow \frac{-15x+12y+10z}{60}=1$

$\Rightarrow 15x-12y-10z+60=0$

27. $\frac{|d|}{\sqrt{a^2+b^2+c^2}}=\frac{|26|}{\sqrt{3^2+4^2+12^2}}=\frac{26}{\sqrt{9+16+144}}=\frac{26}{\sqrt{169}}=\frac{26}{13}=2$

28. $\frac{|d_1-d_2|}{\sqrt{a^2+b^2+c^2}}=\frac{|5-6|}{\sqrt{4^2+(-4)^2+2^2}}=\frac{|-1|}{\sqrt{36}}=\frac{1}{6}$

29. $\begin{vmatrix} x-x_1 & y-y_1 & z-z_1 \\ x_2-x_1 & y_2-y_1 & z_2-z_1 \\ x_3-x_1 & y_3-y_1 & z_3-z_1 \end{vmatrix}=0$

$\Rightarrow \begin{vmatrix} x-1 & y-1 & z-1 \\ 0 & -2 & 0 \\ -8 & -4 & -6 \end{vmatrix}=0$

$\Rightarrow (x-1)(12-0)-(y-1)(0-0)+(z-1)(0-16)=0$

$12x-12-16z+16=0$

$12x-16z+4=0$

$3x-4z+1=0$

Plane parallel to y-axis

30. $\begin{vmatrix} x+1 & y-6 & z-2 \\ 1 & 2 & 2 \\ 3 & 3 & 2 \end{vmatrix}=0$

$\Rightarrow (x+1)(4-6)-(y-6)(2-6)+(z-2)(3-6)=0$

$\Rightarrow -2x-2+4y-24-3z+6=0$

$\Rightarrow 2x-4y+3z+20=0$

31. $\frac{h-x_1}{a}=\frac{k-y_1}{b}=\frac{l-z_1}{c}=\frac{-2(ax_1+by_1+cz_1+d)}{a^2+b^2+c^2}$

32. $56x+4y+9z=2016$

$\frac{56x}{2016}+\frac{4y}{2016}+\frac{9z}{2016}=1$

$\frac{x}{36}+\frac{y}{504}+\frac{z}{224}=1$

$A=(36,0,0)$, $B=(0,54,0)$, $C=(0,0,224)$

Centroid $=\left(\frac{36}{3},\frac{504}{3},\frac{224}{3}\right)$

$=\left(12,168,\frac{224}{3}\right)$

33. Equation of the plane is $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$

$G=\left(\frac{a}{3},\frac{b}{3},\frac{c}{3}\right)=(1,2,4)$

$a=3, b=6, c=12$

$\frac{x}{3}+\frac{y}{6}+\frac{z}{12}=1$

34. $-\pi_{111}:\pi_{222}$

$\Rightarrow -\left[1+2(2)+3(3)-5\right]:\left[-2+2(3)+3(4)-5\right]$

$-9:11$

$9:11$ externally

35. $\pi_1+\lambda\pi_2=0$

$(x-2y+3z-1)+\lambda(2x+y+z-2)=0$

Sub $(1,2,3)$

$\left[1-2(2)+3(3)-1\right]+\lambda\left[2(1)+2+3-2\right]=0$

$5+\lambda(5)=0$

$\lambda=-1$

$(x-2y+3z-1)-1(2x+y+z-2)=0$

$-x-3y+2z+1=0$

$x+3y-2z-1=0$

36. $\text{Cos}\,\theta=\frac{a_1a_2+b_1b_2+c_1c_2}{\sqrt{\left(a_1^{\,2}+b_1^{\,2}+c_1^{\,2}\right)\left(a_2^{\,2}+b_2^{\,2}+c_2^{\,2}\right)}}$

37. $\frac{1}{\sqrt{\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}}}=3p$

$\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}=\frac{1}{9p^2}$ ----------(1)

$A=(a,0,0)\quad B=(0,b,0)\quad C=(0,0,c)$ centroid of ΔABC

$\left(\frac{a}{3},\frac{b}{3},\frac{c}{3}\right)=(x,y,z)$

$a=3x,\ b=3y,\ c=3z$

Sub in 1

$x^{-2}+y^{-2}+z^{-2}=p^{-2}$

38. $A=(1,2,4)\quad B=(3,3,0)$

$\frac{x-1}{2}=\frac{y-2}{1}=\frac{z-4}{-4}$

Verification

39. $ax+by+cz+\frac{d_1+d_2}{2}=0$

40. Given that

$\text{Cos}\,\theta=\frac{\sqrt{5}}{\sqrt{14}}$

$\text{Sin}\,\theta=\frac{3}{\sqrt{14}}$

$\text{Sin}\,\theta=\frac{1+4+3\lambda}{\sqrt{1+4+\lambda^2}\sqrt{1+4+9}}$

$\frac{3}{\sqrt{14}}=\frac{5+3\lambda}{\sqrt{1+4+\lambda^2}\sqrt{14}}$

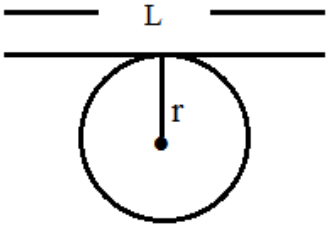
$\lambda = 2/3$

PHYSICS

41. C.U.Q

42. $m_1 x_1 = m_2 x_2$

43.



$L = 2\pi r \rightarrow r = \dfrac{L}{2\pi}$

44. C.U.Q

45. C.U.Q

46. $w = \dfrac{2\pi}{T} = \dfrac{2\pi}{60} = \dfrac{\pi}{3^0} rad/\sec$

47. $a = \sqrt{a_r^2 + a_t^2}$

$a_l = 2m/s^2$

$a_r = \dfrac{v^2}{r} = \dfrac{900}{500} = 1.8m/s^2$

$a = \sqrt{3.26+4} = \sqrt{7.26} = 2.7m/s^2$

48. $\dfrac{mv^2}{r} = \dfrac{k}{r^2} \Rightarrow mv^2 = \dfrac{k}{r}$

$KE = \dfrac{k}{2r}$

$TE = -KE = \dfrac{-K}{2r}$

49. $w_s = \dfrac{\pi}{30}$

$\Delta V = 2v\sin\dfrac{\theta}{2} = 2rw_s \sin\dfrac{90}{2} = \dfrac{\pi}{\sqrt{2}} cm/\sec$

50. $\theta = 2\pi N = \left(\dfrac{60\pi + 40\pi}{2}\right)20$

$N = 500$

51. $T\cos\theta = mg$

$T - mg\cos\theta = \dfrac{mv^2}{r}$

$\dfrac{mg}{\cos\theta} - mg\cos\theta = \dfrac{M}{L}(2gl\cos\alpha) \Rightarrow \theta = \cos^{-1}\dfrac{1}{\sqrt{3}}$

52. Difference in K.E = Difference in P.E= $2mgr$

53. $\dfrac{T_1}{T_2} = \dfrac{MV_1^2}{r} + Mg = \dfrac{\frac{M}{r}(7gr) + mg}{\frac{M}{r}(3gr) - mg} = \dfrac{8mg}{2mg} = 4:1$

54. $h = \dfrac{5}{2}r = \dfrac{5}{2}\left(\dfrac{D}{2}\right) = \dfrac{50}{4}$

55. $\frac{v_1}{v_2}=\frac{\sqrt{3}}{1};v_1=\sqrt{3}v_2$

$$\frac{T_1}{T_2}=\left(\frac{\frac{MV_1^2}{r}+mg}{\frac{MV_2^2}{r}-mg}\right)\Rightarrow\frac{T_1}{T_2}=\frac{7}{1}$$

56. $\tau=\frac{L_2-L_2}{t}$

57. C.U.Q

58. $P=100\times10^3\,watt$

1800 rpm = 30 rps

$w=2\pi(30)=60\pi\ rad/\sec$

$$\tau=\frac{P}{W}=\frac{100\times10^3}{60\pi}=530.3\ N$$

$=531\ N$ m

59. $\tau=F\times(\perp)er$ distance

60. $\tau=rF\sin\theta$

CHEMISTRY

61. $C+O_2\rightarrow CO_2$

Amount of 'C' reacts $=40-4=36 grams$

According to equation

12 gram of 'C' requires 22.4 lit of O_2

$\therefore 36$ grams requires $3\times22.4=67.2$ lit

62. $Cr_2O_7^{-2}\rightarrow 2Cr^{+3}$

Change in oxidation number of $C_r=6$ units

$\therefore$ Equivalent weight $=\frac{\text{molecular weight}}{6}$

63. $\frac{M_1V_1}{n_1}(KMnO_4)=\frac{M_2V_2}{n_2}\left(H_2C_2O_4\right)$

$$=\frac{0.1\times V_1}{2}=\frac{0.25\times25}{5}$$

$$=\frac{0.5\times25}{0.5}=25ml$$

64.

Element	Atomic ratio	Simplest ratio
C	$\frac{92.3}{12}=7.7$	$\frac{7.7}{7.7}=1$
H	$\frac{7.7}{1}=7.7$	$\frac{7.7}{7.7}=1$

$\therefore E.F=C.H$

65. $2K_4\left[Fe(CN)_6\right]+H_2O_2+H_2SO_4\rightarrow2K_3\left[Fe(CN)_6\right]+K_2SO_4+2H_2O$

Oxidation state of Fe in $K_3\left[Fe(CN)_6\right]$

$x+3-6=0$

$x=+3$

66. $P_{N_2} = X_{N_2} \times P$

$$X_{N_2} = \left(\frac{n_{N_2}}{n_{N_2} + n_{O_2} + n_{NH_3} + n_{He}} \right)$$

$$= \left(\frac{0.4}{0.4 + 0.2 + 0.1 + 0.3} \right) P$$

$$\Rightarrow \frac{0.4}{1} \times 1 = 0.4 \text{ atm}$$

67. $K.E_{He} = K.E_{Ar}$

$$\frac{3}{2} nRT = \frac{3}{2} nRT$$

$$\frac{3}{2} \times 63 \times RT = \frac{3}{2} \times 0.4 \times R \times 400$$

$$0.3T = 0.4 \times 400$$

$$T = \frac{0.4 \times 400}{0.3} = 533K$$

68. $C_p = 0.8166 \times C$

$$C = \frac{C_p}{0.8166} = \frac{300}{0.8166} = 367K$$

69. $$\frac{X_{C_2H_5OH}}{X_{H_2O}} = \frac{\frac{138}{46}}{\frac{72}{18}} = \frac{3}{4}$$

70. $$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}, \quad \frac{V_1}{T_1} = \frac{V_2}{T_2} = \frac{2}{23} = \frac{4}{12}$$

$$T_2 = 546K = 273^0 C$$

71. $$SO_{2(g)} + \frac{1}{2} O_{2(g)} \rightleftharpoons SO_{3(g)}$$

$$[H_2][I_2] = \frac{1 \times 1}{2^2} = \frac{1}{4} = 0.25$$

Squaring

$$K_C = \frac{[NO_2]^2}{[N_2O_4]} = \frac{[0.1]^2}{0.05}$$

$$= \frac{P^2_{SO_3} . P_{O_2}}{P^2_{SO_3}} = \frac{1}{25 \times 10^{-6}}$$

$$= 4 \times 10^4 \, atm$$

$$2SO_{3(g)} \rightleftharpoons 2SO_{2(g)} + O_{2(g)}$$

$$K_p = 4 \times 10^4 \text{ atm}$$

72. $$K_C = \frac{[C]^{\frac{2}{3}}}{[A]^{\frac{1}{2}} [B]^{\frac{1}{3}}}$$

73. Addition of catalyst does not alter the equilibrium constant

74. Highest the 'K' value mean concentration of product is high

75. $K_c = \frac{[PCl_3][Cl_2]}{[PCl_5]}$

$0.5 = \frac{0.2[Cl_2]}{0.4}$

$\therefore [Cl_2] = \frac{0.5 \times 0.4}{0.2} = 1$

76. At equilibrium rate of forward reaction is equal to rate of backward reaction

77. $K_c = \frac{K_f}{K_b}$

$81 = \frac{162}{K_b}$

$\therefore K_b = \frac{162}{81} = 2$

78. No of moles of N_2O_4 initially taken

$= \frac{9.2}{92} = 0.1$

Volume of vessel = 1 lit

At equilibrium 50 % N_2O_4 is dissociated

$\frac{0.1 \times 50}{100} = 0.05$

$\underset{(g)}{N_2O_4} \rightleftharpoons \underset{(g)}{2NO_2}$

Initial $\frac{0.1}{1}$

At equilibrium $\frac{0.05}{1}$, $\frac{2 \times 0.05}{1} = 0.1$

$K_C = \frac{[NO_2]^2}{[N_2O_4]} = \frac{[0.1]^2}{0.05}$

$= \frac{0.1 \times 0.1}{0.05} = 0.2$

79. $H_2 + I_2 \rightleftharpoons 2HI$

$K_C = \frac{[HI]^2}{[H_2][I_2]} = 64 = \frac{(16)^2}{2[I_2]}$

$[I_2] = \frac{256}{64\pi 2} = 2$

80. $2HI \rightleftharpoons H_2 + I_2$

4 0 0

2 1 1

$[H_2][I_2] = \frac{1 \times 1}{2^2} = \frac{1}{4} = 0.25$