SRIGAYATRI EDUCATIONAL INSTITUTIONS
INDIA
DPP-11

Date:20-04-2020

MATHS-A

1. **If** $A=\begin{pmatrix}2 & 2\\ -3 & 2\end{pmatrix}$**, B=** $\begin{pmatrix}0 & -1\\ 1 & 0\end{pmatrix}$ **then** $\left(B^{-1}A^{-1}\right)^{-1}$ **=**

1) $\begin{pmatrix}2 & -2\\ 2 & 3\end{pmatrix}$ 2) $\begin{pmatrix}3 & -2\\ 2 & 2\end{pmatrix}$ 3) $\begin{pmatrix}\frac{1}{5} & \frac{1}{5}\\ \frac{-1}{5} & \frac{3}{10}\end{pmatrix}$ 4) $\frac{1}{10}\begin{pmatrix}3 & 2\\ -2 & 2\end{pmatrix}$

2. **If** $A=\begin{bmatrix}1 & 0 & 1\\ 0 & 1 & 1\\ 0 & 1 & 0\end{bmatrix}$ **then** A^2-2A **=**

1) A^{-1} 2) $-A^{-1}$ 3) I 4) $-I$

3. **If A is the Square matrix of order 3 then |Adj (Adj** A^2 **)|=**

1) $|A|^2$ 2) $|A|^4$ 3) $|A|^8$ 4) $|A|^{16}$

4. **If A is a singular Matrix, then A (Adj A) is**

1) Scalar matrix 2) Zero Matrix
3) Identity Matrix 4) Orthogonal Matrix

5. **A Square matrix A satisfies** $A^2-A+2I=0$ **then** A^{-1} **=**

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

6. **If A is non Singular and** $(A-2I)(A-4I)$**=0 then** $\frac{1}{6}A+\frac{4}{3}A^{-1}=$

1) I 2) o 3) $2I$ 4) $6I$

7. **If A=**$\begin{bmatrix}0 & 1 & -1\\ 2 & 1 & 3\\ 3 & 2 & 1\end{bmatrix}$ **then [A (adj) A)** A^{-1}**] A=**

1) $\begin{bmatrix}6 & 0 & 0\\ 0 & 6 & 0\\ 0 & 0 & 6\end{bmatrix}$ 2) $\begin{bmatrix}4 & 0 & 0\\ 0 & 4 & 0\\ 0 & 0 & 4\end{bmatrix}$ 3) $\begin{bmatrix}2 & 0 & 0\\ 0 & 2 & 0\\ 0 & 0 & 2\end{bmatrix}$ 4) I

8. **If** $A=\begin{bmatrix}3 & 2\\ 0 & 1\end{bmatrix}$ **then** $(A^{-1})^3$ **is equal to**

1) $\frac{1}{27}\begin{bmatrix}1 & -8\\ 0 & 27\end{bmatrix}$ 2) $\frac{1}{27}\begin{bmatrix}-1 & 26\\ 0 & 27\end{bmatrix}$ 3) $\frac{1}{27}\begin{bmatrix}1 & -26\\ 0 & -27\end{bmatrix}$ 4) $\frac{1}{27}\begin{bmatrix}1 & -26\\ 0 & 27\end{bmatrix}$

9. **The Values of 't' such that matrix** $\begin{bmatrix}1 & 3 & 2\\ 2 & 5 & t\\ 4 & 7-t & -6\end{bmatrix}$ **has no inverse are**

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

10. **If A is non-singular matrix such that** $A^2=A^{-1}$ **then adj A is**

1) A 2) A^{-1} 3) A^3 4) A^4

11. **For the Matrix** $A=\begin{bmatrix}3 & -3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix}$, $A^{-1}=$

1) A 2) A^2 3) A^3 4) A^4

12. **The Equations** $x-y+2z=4, 3x+y+4z=6, x+y+z=1$ **has**

1) Unique solution 2) Infinite number of Solution
3) No Solutions 4) Two solutions

13. **If the system of equations** $ax+y+z=0$, $x+by+z=0$, $x+y+cz=0$ **has a non Trivial solution then** $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}=$

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

14. **The system of Equations** $\sin 3\theta x-y+z=0, \cos 2\theta . x+4y+3z=0$ $2x+7y+7z=0$ **has non trivial solution then** $\sin 3\theta+2\cos 2\theta=$

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

15. **The system of equations** $x-2y+3z=5, 2x-2y+z=0, -x+2y-3z=6$ **has**

1) Infinite solution 2) Two solution
3) Unique solution 4) No solution

16. **The system of equations** $x+y+z=5, x+2y+3z=9, x+3y+\lambda z=\mu$ **has unique Solution if**

1) $\lambda=5, \mu=10$ 2) $\lambda=5, u\neq 10$ 3) $\lambda\in R, \mu\neq 5$ 4) $\lambda\neq 5, \mu\in R$

17. **The number of values of k for which the system of equations (k+1)** $x+8y=4k, kx+(k+3)y=3k-1$ **has infinitely many solutions is**

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

18. **If the system of equations** $x+y+z=6$, $x+2y+kz=0, x+2y+3z=10$ **has no Solutions then k=**

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

19. **If the system of equations given by** $x+y+z=3, 2x+2y-z=3, x+y-z=1$ **is Consistent and if** (x_0, y_0, z_0) **is a solution then** $2x_0+2y_0+z_0=$

1)0 2) 5 3) 7 4) 6

20. **If x=a, y=b, z=c is the solution of the system of equations** $x+y+z=4, x-y+z=2, x+2y+2z=1$ **then ab+bc+ca=**

1)0 2) -25 3) 1 4) -4

MATHS-B

21 $x=\frac{1-\sqrt{y}}{1+\sqrt{y}} \Rightarrow \frac{dy}{dx}=$

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

22. $\frac{d}{dx}(\cos x^0)=$

1) $-\sin x^0$ 2) $\frac{-\pi}{180}\sin x^0$ 3) $\frac{\pi}{180}\sin x^0$ 4) $\frac{2\pi}{180}\sin x^0$

23. **If** $f(x)=x-x^2+x^3-x^4+.......\infty$ **for** $|x|<1$ **then** $f^1(x)=$

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

24. $\frac{d}{dx}\left[(x+a)(x^2+a^2)(x^4+a^4)\right]$

1) $\frac{7x^8+a(8x^7-a^7)}{(x-a)^2}$ 2) $\frac{7x^8-a(8x^7-a^7)}{(x-a)^2}$

3) $\frac{7x^8-a(8x^7+a^7)}{(x-a)^2}$ 4) $\frac{7x^8+a(8x^7+a^7)}{(x-a)^4}$

25. If $y=2^{2^x}$ then $\frac{dy}{dx}=$

1) $y(\log 2)^2.2^x$ 2) $y(\log 2).2^x$ 3) $y^2(\log 2)^2.2^x$ 4) $-y(\log 2).2^x$

26. If $y=\log_{\sqrt{x}}^{x}(x>0, x\neq 1) then \frac{dy}{dx}=$

1) $\frac{1}{x^2\log\sqrt{x}}$ 2) $\frac{\log x-1}{x\log\sqrt{x}}$ 3) 1 4) 0

27. If $2x^2-3xy+y^2+x+2y-8=0 then \frac{dy}{dx}=$

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

28. $\frac{d}{dx}\left[\sin^{-1}\left(\frac{3x}{2}-\frac{x^3}{2}\right)\right]=$

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

29. $y=\cos^{-1}\left(\frac{x-x^{-1}}{x+x^{-1}}\right) then \frac{dy}{dx}=$

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

30. $\frac{d}{dx}[\log_x 10]=$

1) $\frac{1}{x}$ 2) $\log_x 10$ 3) $\frac{\log 10}{\text{logx}}$ 4) $\frac{-\log 10}{\text{x(logx)}^2}$

31. If $\frac{d}{dx}\left(\frac{1+x^2+x^4}{1+x+x^2}\right)=ax+b$ then a^2+b^2

1) 3 2) 4 3) 5 4) 6

32. $\frac{d}{dx}\left(\frac{3^x-3^{-x}}{3^x+3^{-x}}\right)=$

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

33. If $y=Tan^{-1}\left(\frac{\log\frac{e}{x^2}}{\log ex^2}\right)+Tan^{-1}\left(\frac{2+2\text{logx}}{1-4\log x}\right) then \frac{dy}{dx}=$

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

34. If $\sqrt{\frac{v}{u}}+\sqrt{\frac{u}{v}}=6 then \frac{dv}{du}=$

1) $\frac{17u-v}{u-17v}$ 2) $\frac{u-17v}{17u-v}$ 3) $\frac{17u+v}{u-17v}$ 4) $\frac{u+17v}{17u-v}$

35. If $y=\sqrt{a^{3x+1}+\sqrt{a^{3x+1}+....\infty}}$ then $\frac{dy}{dx}=$

1) $\frac{a^{3x+1}\log a}{2y-1}$ 2) $\frac{3.a^{3x+1}.\log a}{2y-1}$ 3) $\frac{3a^{3x+1}\log a}{2y+1}$ 4) $\frac{a^{3x+1}\log a}{2y+1}$

36. If $y=x+\cfrac{1}{x+\cfrac{1}{x+.....\infty}}$ then $\frac{dy}{dx}=$

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

37. $\frac{d}{dx}\left[\cos^{-1}\frac{\sqrt{1+x}-\sqrt{1-x}}{2}\right]=$

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

38. If $\sqrt{1-x^6}+\sqrt{1-y^6}=a(x^3-y^3)$ and $\frac{dy}{dx}=f(x,y)\sqrt{\frac{1-y^6}{1-x^6}}$ then $f(x,y)=$

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

39. If $f(x)=\begin{vmatrix}2\cos x & 1 & 0\\ x-\frac{\pi}{2} & 2\cos x & 1\\ 0 & 1 & 2\cos x\end{vmatrix}$ then $\frac{df}{dx}$ at $x=\frac{\pi}{2}$

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

40. If $y=\left(\frac{x^a}{x^b}\right)^{a+b}\left(\frac{x^b}{x^c}\right)^{b+c}\left(\frac{x^c}{x^a}\right)^{c+a}$ then $\frac{dy}{dx}=$

1) 0 2) 1 3) a+b+c 4) 2

PHYSICS

41. A geo stationary satellite is orbiting the earth at height of 6R above the surface of earth, R being radius of earth. The time period of another satellite at a height of 2.5 R from the surface of earth is

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

42. Two satellite A and B go around a planet in circular orbits having radii 4R and R respectively. If the speed of satellite A is $3Kms^{-1}$, then the speed of satellite B is

1) $12Kms^{-1}$ 2) $6Kms^{-1}$ 3) $4Kms^{-1}$ 4) $2Kms^{-1}$

43. A satellite is moving round the earth.In order to escape it, its velocity must be increased by

1) 20% 2) 41.4% 3) 4.14% 4)10%

44. If the radius of earth is R, then the height 'h' at which value of 'g' become one-fourth is

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

45. Two particles of equal mass 'm' go around a circle of radius R under the action of their mutual gravitational attraction. The speed of each particle is

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

46. The distance of the centres of moon and earth is D. The mass of earth is 81 times the mass of moon. At what distance from the centre of earth, the gravitational force will be zero?

1) $\frac{D}{2}$ 2) $\frac{2D}{3}$ 3) $\frac{D}{10}$ 4) $\frac{9D}{10}$

47. If the change in value of 'g' at a height 'h' above the surface of the earth is same as at a depth 'd' below it. Both 'd' and 'h' are much smaller than the radius of the earth, then

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

48. Potential energy of a satellite having mass 'm' and rotating at a height of $6.4\times10^6 m$ from the earth surface is [Radius of earth, R=6400 Km]

1)-0.5mgR 2) –mgR 3) -2mgR 4)-4mgR

49. A satellite of mass 'm' is orbiting the earth in a circular path of radius r. The energy required to take the satellite from an orbit of radius r to another orbit of radius 3r is

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

50. If the earth is supposed to be a sphere of radius R, if g_{30^0} is the value of acceleration Due to gravity at latitude of 30^0 and 'g' at poles, then the value of $g-g_{30^0}$

1) $\frac{1}{4}\omega^2R$ 2) $\frac{3}{4}\omega^2R$ 3) ω^2R 4) $\frac{1}{2}\omega^2R$

51. The angular velocity of the earth with which it has to rotate so that the acceleration due to gravity on 60^0 latitude becomes zero is [radius of earth= 6400Km, $g=10m/s^2$]

1) $2.5\times10^{-3} rad/s$ 2) 250 rad/s 3) $2.5\times10^{-2} rad/s$ 4) 2.5 rad/s

52. The gravitational field due to a mass distribution $E=k/x^3$ in the x-direction, where k is a constant. Taking gravitational potential to be zero at infinity, its value at a distance x is

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

53. A particle of mass 10 g is kept on the surface of a uniform sphere of mass 100 kg and radius 10 cm. Find the work to be done against the gravitational force between them to take the particle to infinity

1) $6.67\times10^{-9} J$ 2) $6.67\times10^{-10} J$ 3) $13.34\times10^{-10} J$ 4) $3.33\times10^{-10} J$

54. An artificial satellite is moving in circular orbit around the earth with a speed equal to half the magnitude of escape velocity from the earth. The height of the satellite above the earth's surface is [R is the radius of earth]

1)R 2) R/2 3) 2R 4) 3R

55. The gravitational field in a region is given by $\overline{E}=5\hat{i}+10\hat{J}$ N/Kg. The work done by on external agent in carrying a mass 0.4 Kg from (0,0) to a point (3,4) m is

1)-20 J 2) -22 J 3) -24 J 4) 0 J

56. The escape velocity corresponding to a planet of mass M and radius R is 50 Kms^{-1}.If the planet's mass and radius were 4 M and R, respectively, then the corresponding escape velocity would be (in Kms^{-1})

1)100 2) 50 3) 150 4) 25

57. A tunnel is dug along the diameter of the earth [radius-R and mass –M]. Thereis a particle of mass 'm' at the centre of the tunnel. The minimum velocity given to the particle so that it just reaches the surface of earth is

1) $\sqrt{\frac{GM}{R}}$ 2) $\sqrt{\frac{2GM}{R}}$ 3) $\sqrt{\frac{2GM}{R^2}}$ 4) $\sqrt{\frac{GM}{2R}}$

58. Masses of 1Kg each are placed 1m,2m,4m,8m….., from a point P. The gravitational intensity at P due to these masses is

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

59. The distance of two planets from the sun are 10^{13} m and 10^{12} respectively. The ratio of time periods of these two planets is

1) $\frac{1}{\sqrt{10}}$ 2) 100 3) $10\sqrt{10}$ 4) $\sqrt{10}$

60. The radius of a planet is R. A satellite revolves around it in a circle of radius 'r' with angular velocity ω. The acceleration due to gravity on planet's surface is

1) $\frac{r^3\omega}{R}$ 2) $\frac{r^3\omega^3}{R^2}$ 3) $\frac{r^3\omega^2}{R}$ 4) $\frac{r^3\omega^2}{R^2}$

CHEMISTRY

61. For the alkali metals, which of the of the following increases with Increasing atomic number?

1)First ionisation energy 2) EN
3) Hydration energy of the univalent ion 4) Atomic radius

62. Which of the following metal is used in flash bulbs?

1)Be 2) Mg 3) Ca 4) Ba

63. The correct order of increasing solubility in water is:

1) $KF < NaF < LiF$ 2) $LiNO_3 < NaNO_3 < KNO_3$
3) $NaHCO_3 < KHCO_3 < RbHCO_3$ 4) $K_2CO_3 < Na_2CO_3 < Li_2CO_3$

64. The metallic lustre exhibited by sodium is explained by:

1) Diffusion of Na^+ ions 2) Oscillation of loose electrons
3) Excitation of free protons
4) existence of body- Cantered cubic Lattice.

65. X and Y are two metals, when burnt in air, x forms only oxide while Y Forms oxide and nitride. The metals X and Y may be:

1)Ca and Mg 2) Na and Mg 3) Li and Na 4) Na and K

66. Which of the following is the most important factor in making lithium metal The strongest reducing agent?

1)Ionisation energy 2) Hydration energy
3) Heat of sublimation 4) None of these

67. Solid bicarbonates are not found for

1) Li 2) K 3) Na 4) Both 1,2

68. KO_2 Exhibits paramagnetic behaviour. This is due to the paramagnetic Nature of

1) K^+ 2) o_2 3) o_2^- 4) Ko^-

69. A compound X on heating gives a colourless gas. The residue is dissolved in water to obtain Y. Excess CO_2 is bubbled through aqueous Solutions of Y and Z is formed. Z on gentle heating gives back X. the X is.

1) $CaCO_3$ 2) $Ca(HCO_3)_2$ 3) Na_2CO_3 4) $NaHCO_3$

70. The ionic mobility of alkali metal ions in aqueous solution is maximum for

1) K^+ 2) Rb^+ 3) Li^+ 4) Na^+

71. Which of the following pair cannot exist together in solution

1) $NaHCO_3 + NaOH$ 2) $Na_2CO_3 + NaOH$

3) $Na_2CO_3 + NaCl$ 4) $NaHCO_3 + NaCl$

72. Thermal decomposition of which compound gives a basic and acidic Oxide simultaneously

1) $KClO_3$ 2) NH_4NO_3 3) $CaCO_3$ 4) $NaHCO_3$

73. BeH_2 Can be prepared by the reaction of

1) $BeCl_2$ with $LiAlH_4$ 2) B_2 with H_2 3) Be with water 4) Be with $LiqNH_3$

74. Which of the following fumes in moist air

1) $BeCl_2$ 2) $CaCl_2$ 3) $SrCl_2$ 4) $BaCl_2$

75. The alkaline earth metal nitrate that does not crystallise with water Molecules is

1) $Sr(NO_3)_2$ 2) $Mg(NO_3)_2$ 3) $Ba(NO_3)_2$ 4) $Ca(NO_3)_2$

76. A hydrated solid 'X' on heating initially gives a monohydrated compound Y. Y upon heating above 373 K leads to an anhydrous white powder Z. X & Z respectively are

1)Baking soda and soda ash
2)Washing soda and dead burnt plaster
3)Washing soda and soda ash
4)Baking soda and dead burnt plaster

77. Highly pure solution of sodium in liq. NH_3

1) Shows green colour
2) Produces sodium amide
3) Exhibit electrical conductivity
4) Produces H_2 gas

78. Thermal stability of MCO_3 is in order

1) $BeCO_3 < MgCO_3 < CaCO_3 < SrCO_3 < BaCO_3$

2) $MgCO_3 < BeCO_3 < CaCO_3 < SrCO_3 < BaCO_3$

3) $CaCO_3 < SrCO_3 < BaCO_3 < BeCO_3 < MgCO_3$

4) $BaCO_3 < SrCO_3 < CaCO_3 < MgCO_3 < BeCO_3$

79. A metal 'M' readily forms its sulphate MSO_4 which is water soluble. It Forms its oxide MO which becomes inert on heating. It forms an Insoluble hydroxide $M(OH)_2$ which is soluble in $NaOH$ solution then 'M' is

1)Mg 2) Ba 3) Ca 4) Be

80. Both Li and Mg display several similar properties due to the diagonal Relationship, however the one which is incorrect

1)Both form basic carbonates
2)Both form soluble bicarbonates
3)Both form nitrides
4)Nitrates of both Li and Mg yield NO_2 and O_2 on heating.

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MATHS-A

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

MATHS-B

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

PHYSICS

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

CHEMISTRY

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

SOLUTIONS
MATHS-A

1) $\left(B^{-1}A^{-1}\right)^{-1} = AB$

2) $|A-\lambda I| = 0 \Rightarrow \lambda^3 - 2\lambda^2 = -I \Rightarrow A^2 - 2A = -A^{-1}$

3) $|A^2|^4 = |A|^8$

4) $A(adjA) = |A|\,\mathrm{I} = 0$

5) $A^2 - A = -2I \Rightarrow A - I = -2A^{-1} \Rightarrow A^{-1} = \dfrac{I-A}{2}$

6) $A^2 - 6A + 8I = 0 \Rightarrow A - 6I + 8A^{-1} = 0 \Rightarrow A + 8A^{-1} = 6I \Rightarrow \dfrac{1}{6}A + \dfrac{4}{3}A^{-1} = I$

7) $|A|.I = 6\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 6 & 0 & 0 \\ 0 & 6 & 0 \\ 0 & 0 & 6 \end{bmatrix}$

8) $(A^{-1})^3 = (A^3)^{-1}$

9) Det=0

10) $A^2 = A^{-1} \Rightarrow |A| = 1 \Rightarrow A^{-1} = adjA$

11) |A|=1 and $A^4 = I \Rightarrow A^3 = A^{-1}$

12) $\Delta = \Delta_1 = \Delta_2 = \Delta_3 = 0$

13) $\begin{vmatrix} a & 1 & 1 \\ 1 & b & 1 \\ 1 & 1 & c \end{vmatrix} = 0$

14) $\begin{vmatrix} \sin 3\theta & -1 & 1 \\ \cos 2\theta & 4 & 3 \\ 2 & 7 & 7 \end{vmatrix} = 0$

15) $\begin{vmatrix} 1 & -2 & 3 \\ 2 & -2 & 1 \\ -1 & 2 & -3 \end{vmatrix} = 0$

16) $[AD] = \begin{bmatrix} 1 & 1 & 1 & 5 \\ 1 & 2 & 3 & 9 \\ 1 & 3 & \lambda & \mu \end{bmatrix}$

$$\begin{matrix} R_2 \to R_2 - R_1 \\ R_3 \to R_3 - R_1 \end{matrix} \begin{bmatrix} 1 & 1 & 1 & 5 \\ 0 & 1 & 2 & 4 \\ 0 & 2 & \lambda - 1 & \mu - 5 \end{bmatrix} R_3 \to R_3 - 2R_2 \begin{bmatrix} 1 & 1 & 1 & 5 \\ 0 & 1 & 2 & 4 \\ 0 & 0 & \lambda - 5 & \mu - 13 \end{bmatrix}$$

$\Rightarrow \lambda \neq 5, \mu \in R$

17) $\dfrac{K+1}{K} = \dfrac{8}{K+3} = \dfrac{4K}{3K-1}$

$K^2 + 4K + 3 = 8K \Rightarrow K^2 - 4K + 3 = 0 \Rightarrow K = 1, 3$ but K=3 does not satisfy

18) $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 2 & K \\ 1 & 2 & 3 \end{vmatrix} = 0 \Rightarrow K = 3$

19) $$\begin{vmatrix} 1 & 1 & 1 & 3 \\ 2 & 2 & -1 & 3 \\ 1 & 1 & -1 & 1 \end{vmatrix} \begin{matrix} R_2 - 2R_1 \\ R_3 - R_1 \end{matrix} \begin{bmatrix} 1 & 1 & 1 & 3 \\ 0 & 0 & -3 & -3 \\ 0 & 0 & -2 & -2 \end{bmatrix} \Rightarrow \begin{bmatrix} 1 & 1 & 1 & 3 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \Rightarrow z = 1, x + y = 2$$

20) On solving the equations, a=7,b=1, c= -4

MATHS-B

21.

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

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

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

$$\frac{dy}{dx}=2\left(\frac{1-x}{1+x}\right)\frac{2}{(1+x)^2}$$

22. $\frac{d}{dx}\left[\cos\frac{\pi}{180}x\right]$

23. $f(x)=\frac{x}{1-(-x)}$

$$=\frac{x}{1+x)}$$

$$f^{'}(x)=\frac{1}{(1+x)^2}$$

24. $\frac{d}{dx}\left[\frac{x^8-a^8}{x-a}\right]$

25. $y=2^{2^x}$

$$\frac{dy}{dx}=2^{2^x}.\log 2.\frac{d}{dx}(2^x)$$

$$=2^{2^x}.\log 2.2^x\log 2$$

26. $y=\log^{x}_{x^{\frac{1}{2}}}$

$$=\frac{1}{\frac{1}{2}}\log^x_x$$

$$=2$$

$$\frac{dy}{dx}=0$$

27. $\frac{dy}{dx}=\frac{-\frac{\partial f}{\partial x}}{\frac{\partial f}{\partial y}}$

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

28. $\frac{d}{dx}\left[\sin^{-1}\left(3.\frac{x}{2}-4\left(\frac{x}{2}\right)^3\right)\right]$

$\frac{d}{dx}\left(3\sin^{-1}\frac{x}{2}\right)$

$3.\frac{1}{\sqrt{1-\frac{x^2}{4}}}\times\frac{1}{2}$

$=\frac{3}{\sqrt{4-x^2}}$

29. put $x=Tan\theta$

$y=\cos^{-1}\left[\frac{Tan\theta-\frac{1}{Tan\theta}}{Tan\theta+\frac{1}{Tan\theta}}\right]$

$y=\cos^{-1}\left[-\left(\frac{1-Tan^2\theta}{1+Tan^2\theta}\right)\right]$

$y=\cos^{-1}[-\cos 2\theta]$

$y=\pi-\cos^{-1}(\cos 2\theta)$

$y=\pi-2Tan^{-1}x$

$\frac{dy}{dx}=\frac{-2}{1+x^2}$

30. $\frac{d}{dx}\left[\frac{\log 10}{\log x}\right]=\log 10\times\frac{-1}{(\log x)^2}\times\frac{1}{x}$

31. $\frac{d}{dx}\left[\frac{(1-x+x^2)(1+x+x^2)}{1+x+x^2}\right]=-1+2x$

$a=2,b=-1$

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

32. Differentiate w.r.to.x.

33. $y=Tan^{-1}\left(\frac{1-\log x^2}{1+\log x^2}\right)+Tan^{-1}\left(\frac{2+\log x^2}{1-2\log x^2}\right)$

$=Tan^{-1}(1)-Tan^{-1}(\log x^2)+Tan^{-1}(2)+Tan^{-1}(\log x^2)$

$\frac{dy}{dx}=0$

34. $u+v=6\sqrt{uv}$

$u^2+v^2-34uv=0$

$\frac{dv}{du}=\frac{-\left(\frac{\partial f}{\partial u}\right)}{\frac{\partial f}{\partial v}}$

$$=\frac{-(2u-34v)}{2v-34u}$$

$$=\frac{17v-u}{v-17u}$$

35. $y=\sqrt{a^{3x+1}+y}$

$$y^2=a^{3x+1}+y$$

$$y^2-y=a^{3x+1}$$

$$2y\frac{dy}{dx}-\frac{dy}{dx}=a^{3x+1}\log a.3$$

$$\frac{dy}{dx}=\frac{3a^{3x+1}\log a}{2y-1}$$

36. $y=x+\frac{1}{y}$

$$y^2=xy+1$$

$$2y\frac{dy}{dx}=x\frac{dy}{dx}+y$$

$$\frac{dy}{dx}=\frac{y}{2y-x}$$

37. put $x=\cos\theta$

$$\frac{d}{dx}\left[\cos^{-1}\frac{\sqrt{1+\cos\theta}-\sqrt{1-\cos\theta}}{2}\right]$$

$$\frac{d}{dx}\left[\cos^{-1}\frac{\sqrt{2\cos^2\frac{\theta}{2}}-\sqrt{2\sin^2\frac{\theta}{2}}}{2}\right]$$

$$\frac{d}{dx}\left[\cos^{-1}\left(\frac{1}{\sqrt{2}}\cos\frac{\theta}{2}-\frac{1}{\sqrt{2}}\sin\frac{\theta}{2}\right)\right]$$

$$\frac{d}{dx}\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x\right)$$

$$\frac{1}{2}\times\frac{-1}{\sqrt{1-x^2}}$$

38. Take $x^3=\sin A, y^3=\sin B$

39. $f(x)=\begin{vmatrix}2\cos x & 1 & 0\\ x-\frac{\pi}{2} & 2\cos x & 1\\ 0 & 1 & 2\cos x\end{vmatrix}$

$$= 2\cos x(4\cos^2 x - 1) - 1\left[\left(x - \frac{\pi}{2}\right)2\cos x - 0\right]$$

$$= 8\cos^3 x - 2\cos x - 2x\cos x + \pi\cos x$$

$$f^{'}(x) = 24\cos^2 x(-\sin x) + 2\sin x - 2[-x\sin x + \cos x] - \pi\sin x$$

$$x = \frac{\pi}{2} \Rightarrow f^{'}(x) = 0 + 2(1) - 2\left(-\frac{\pi}{2} + 0\right) - \pi$$

=2

40. $y = x^{a^2-b^2}.x^{b^2-c^2}.x^{c^2-a^2}$

$$= x^{a^2-b^2+b^2-c^2+c^2-a^2}$$

$$= 1$$

$$\frac{dy}{dx} = 0$$

PHYSICS

41. $T \alpha r^{\frac{3}{2}}$

$$\frac{T_1}{T_2} = \left[\frac{r_1}{r_2}\right]^{\frac{3}{2}}$$

$$r_1 = 6R + R = 7R$$

$$r_2 = 2.5R + R = 3.5R$$

$$\frac{24h}{T_2} = \left[\frac{7R}{3.5R}\right]^{\frac{3}{2}} = [2]^{\frac{3}{2}}$$

$$\Rightarrow T_2 = 6\sqrt{2}h$$

42. Orbit speed

$$V = \sqrt{\frac{GM}{R}}$$

$$\Rightarrow \frac{V_1}{V_2} = \sqrt{\frac{R_1}{R_2}} = \sqrt{\frac{R}{4R}} = \frac{1}{2}$$

$$\Rightarrow V_2 = 2V_1 = 2 \times 3Kms^{-1}$$

$$= 6Kms^{-1}$$

43. Orbit speed

$$V_0 \simeq \sqrt{\frac{GM}{R}}$$

Escape speed, $V_e = \sqrt{\frac{2GM}{R}}$

Additional speed

$$= V_e - V_0$$
$$= \left[\sqrt{2} - 1\right] V_0$$
$$= 0.414 V_0$$
$$= 41.4\% of V_0$$

44. At a height ' h'

$$g^1 = \frac{g}{\left[1 + \frac{h}{R}\right]^2}$$
$$\frac{1}{4} g = \frac{g}{\left[1 + \frac{h}{R}\right]^2}$$
$$1 + \frac{h}{R} = 2$$
$$\frac{h}{R} = 1$$
$$h = R$$

45. Two particles are separated by a distance $2R_1$

$$\therefore \frac{mv^2}{R} = \frac{GM^2}{(2R)^2}$$
$$= \frac{v^2}{R} = \frac{GM}{4R^2}$$
$$\Rightarrow v^2 = \frac{GM}{4R}$$
$$\Rightarrow v = \frac{1}{2}\sqrt{\frac{GM}{R}}$$

46.

$$F_1 = F_2 at, null point$$
$$\frac{GM_e M}{x^2} = \frac{GM_e M}{(D - x)^2}$$
$$\frac{81 M_m}{x^2} = \frac{M_m}{(D - x)^2}$$
$$\frac{9}{x} = \frac{1}{D - x}$$

$x = \frac{9D}{10}$ From centre of earth

47. For smaller heights

$$g^1 = g\left[1 - \frac{2h}{R}\right]$$

Change in 'g'

$$\Delta g_n = g - g^1 = \frac{2h}{R}$$

At a depth 'd' $g^1 = g\left[1 - \frac{d}{R}\right]$

Change in g $\Delta g_d = g - g^1 = \frac{d}{R}$

Given

$$\Delta g_n = \Delta g d$$

$$\frac{2h}{R} = \frac{d}{R}$$

$$\Rightarrow d = 2h$$

48.

$$U = -\frac{GM_m}{R+h}$$

$$h = 6.4 \times 10^6 m = R$$

$$\Rightarrow U = \frac{GM_m}{2R}$$

$$\Rightarrow U = \frac{2R^2 m}{2R}$$

$$\Rightarrow U = \frac{1}{2} mgR$$

$$\Rightarrow U = 0.5mgR$$

49. Total energy of satellite is $E = -\frac{GMm}{2r}$

Work done

$$\Delta E - E_2 - E_1$$

$$= \frac{GMm}{3r}$$

50.

$$g_{30^0} = gR\omega^2 \cos^2 30^0$$

$$g_{30^0} = g - \frac{3}{4} R\omega^2$$

$$g - g_{30^0} = \frac{3}{4} R\omega^2$$

51. At latitude 60^0

$$g_{60^0} = gR\omega^2 \cos^2 60^0$$

$$o = g - \frac{1}{4}R\omega^2$$

$$g = \frac{1}{4}R\omega^2$$

$$\omega^2 = \frac{4g}{R}$$

$$\omega = \sqrt{\frac{4g}{R}}$$

$$\omega = \sqrt{\frac{4\times10}{6.4\times10^6}}$$

$$\omega = 2.5\times10^{-3} rad / s.$$

52.

$$E = -\frac{\partial v}{ox}$$

$$\Rightarrow \partial v = -Edx$$

$$\Rightarrow v = -\int Edx$$

$$\Rightarrow v = \frac{K}{2x^2}$$

53.

$$W = \frac{GM_m}{R}$$

$$W = \frac{6.67\times10^{-11}\times100\times10\times10^{-3}}{10\times10^{-2}}$$

$$W = 6.67\times10^{-10} J$$

54. Given

$$V_0 = \frac{1}{2}V_e$$

$$\sqrt{\frac{GM}{R+h}} + \frac{1}{2}\sqrt{\frac{2GM}{2R}}$$

$$\frac{GM}{R+h} = \frac{2GM}{4R}$$

$$\frac{1}{R+h} = \frac{1}{2R}$$

$$2R = R + h$$

$$h = R$$

55. $\overline{F} = m\overline{E} = 0.4(5\hat{I} + 10\hat{J})$

$$\overline{F} = 2\hat{I} + 4\hat{J}$$

$$\overline{S} = \overline{r_2} - \overline{r_1}$$

$$= 3\hat{I} + 4\hat{J}$$

Work done

$=\overline{F}.\overline{S}$

$=6+16$

$=22J$

Work done against gravitational force, W= -22 J

56. $V_e=\sqrt{\frac{2GM}{R}}$

$\frac{V_{e1}}{V_{e2}}=\sqrt{\frac{M_1}{M_2}}=\sqrt{\frac{M}{4M}}=\frac{1}{2}$

$V_{e2}=2V_{e1}=2\times 50=100Kms^{-1}$

57. From the law of conservation of energy

Total energy at centre=Total energy at surface

$\frac{1}{2}mv^2-\frac{3GMm}{2R}=0-\frac{GMm}{R}$

$\frac{1}{2}v^2=\frac{3GM}{2R}-\frac{GM}{R}$

$\frac{1}{2}v^2=\frac{1}{2}\frac{GM}{R}$

$\Rightarrow V=\sqrt{\frac{GM}{R}}$

58. $E=E_1+E_2+E_3....,$

$E=GM\left[\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{4^2}+\frac{1}{8^2}....\right]$

$E=\frac{4Gm}{3},m=1Kg$

59. $\frac{T_1}{T_2}=\left(\frac{r_1}{r_2}\right)^{\frac{3}{2}}$

$=\left(\frac{10^{13}}{10^{12}}\right)^{\frac{3}{2}}$

$=10\sqrt{10}$

60. $mr\omega^2=\frac{GMm}{r^2}$

$\omega^2=\frac{GM}{r^3}$

$\Rightarrow GM=r^3\omega^2$

Acceleration due to gravity at the surface of planet

$g=\frac{GM}{R^2}$

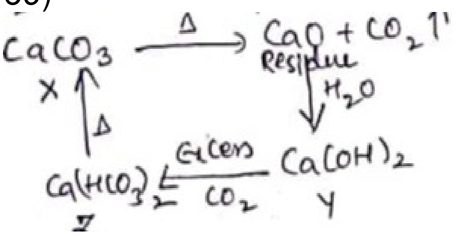
$g=\frac{r^3\omega^2}{R^2}$

CHEMISTRY

61) Down the group Atomic radius increases
62) Mg is used in flash bulbs.
63) Order of solubility in water $\Rightarrow LiF < NaF < KF, LiNO_3 > NaNO_3 > KNO_3$

$Li_2CO_3 < Na_2CO_3 < K_2CO_3, NaHCO_3 < KHCO_3 < RbHCO_3$

64) Alkali metals contain loosely bound electrons which absorb photons and Then re-emit
65) Na forms oxide $\Rightarrow Na_2O, Mg$ forms oxide [MgO] and nitride $[Mg_3N_2]$
66) The standard electrode potential of Li is most negative. This because of High hydration enthalpy of lithium cation.
67) $LiHCO_3$ is not obtained in the solid form
68) O_2^- has an unpaired e^-
69)



70) Hydrated Rb^+ has small size
71) $NaHCO_3$ has acidic hydrogen
72) $CaCO_3 \xrightarrow{\Delta} CaO + CO_2 \downarrow$

Basic Oxide Acidic oxide

73) $2BeCl_2 + LiAlH_4 \rightarrow 2BeH_2 + LiCl + AlCl_3$
74) $BeCl_2$ is covalent , hygroscopic and fumes in air due to hydrolysis by Which HCl is produced

$BeCl_2 + H_2O \rightarrow Be(OH)_2 + HCl$

75) Ba forms anhydrous nitrates
76) $\underset{X}{Na_2CO_3.10H_2O} \xrightarrow{\Delta} \underset{Y}{Na_2CO_3.H_2O} \xrightarrow{>373K} \underset{Z}{Na_2CO_3}$

Washing soda soda ash

77) Na in $liq\ NH_3$ exhibits electrical conductivity by the movement of ions and e^-
78) $BeCO_3 < MgCO_3 < CaCo_3 < SrCo_3 < BaCo_3$
79) Be shows anomalous properties with alkaline earth metals due to its small Size.
80) Li Cannot form basic carbonates.