SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR OUTGOING (EAMCET) | **EAMCET (ENGG) TOT G.T-8** | **Date: 13-07-2020**

Time: 3 Hour | **Max. Marks: 160 M**

KEY SHEET

MATHS – A

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

MATHS - B

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

PHYSICS

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

CHEMISTRY

121) 2	41) 1	42) 4	43) 3	44) 1	45) 3	46) 3	47) 1	48) 2	49) 4
50) 3	51) 2	52) 1	53) 3	54) 3	55) 1	56) 1	57) 4	58) 2	59) 3
60) 3	61) 1	62) 1	63) 3	64) 3	65) 1	66) 3	67) 4	68) 1	69) 1
70) 3	71) 4	72) 2	73) 4	74) 3	75) 2	76) 2	77) 3	78) 2	79) 1

HINTS & SOLUTOINS

MATHS-A

1. If $A+B=45^0$ then

$\tan A+\tan B+\tan(A+B).\tan A\tan B=\tan(A+B)$

$A+B=18+27=45^0$

2. $\alpha=\cot 67\frac{1}{2}^0=\sqrt{2}-1$

$\beta=\tan 67\frac{1}{2}^0=\sqrt{2}+1$

Then $\alpha+\beta=2\sqrt{2},\ \alpha\beta=1$

3. $\cos^2(120-x)+1-\sin^2(120+x)$

$1+\cos 240\cos 2x=1-\frac{1}{2}\cos 2x$

4. $1-2\sin^2\theta=\sin\theta$

$\Rightarrow 2\sin^2\theta+\sin\theta-1=0$

$\Rightarrow(2\sin\theta-1)(\sin\theta+1)=0$

$\sin\theta=\frac{1}{2}$ *or* $\sin\theta=-1$

$\theta=\frac{\pi}{6},\frac{5\pi}{6},\frac{3\pi}{2}$

5. Take $x=\tan\theta$

6. Length of median through B is

$\frac{1}{2}\sqrt{2c^2+2a^2-b^2}=\frac{1}{2}(14)=7$

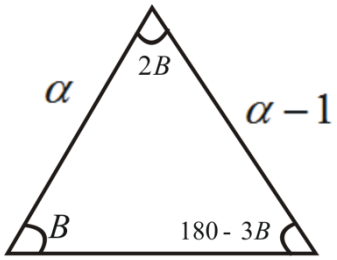
7. $\cosh^2 x-\sinh^2 x=1$

$\frac{\cosh^2 x+\sinh^2 x=199}{2\cosh^2 x=200}$

$\Rightarrow\cosh x=10$ *and* $\sinh x=3\sqrt{11}$

$\coth x=\frac{10}{3\sqrt{11}}$

8.



$$\frac{\alpha+1}{\sin 2B}=\frac{\alpha-1}{\sin B}=\frac{\alpha}{\sin(180-3B)}$$

$$2\cos B=\frac{\alpha+1}{\alpha-1}\ and\ \frac{\sin 3B}{\sin B}=\frac{\alpha}{\alpha-1}$$

$$3-4\sin^2 B=\frac{\alpha}{\alpha-1}$$

$$3-4+4\cos^2 B=\frac{\alpha}{\alpha-1}$$

$$-1+\left(\frac{\alpha+1}{\alpha-1}\right)^2=\frac{\alpha}{\alpha-1}$$

By verification $\alpha=5$

9. $\cos\left[180-(B+C)\right]=\cos B\cos C$

$\sin B\sin C-\cos B\cos C=\cos B\cos C$

$\sin B\sin C=2\cos B\cos C$

$$\cot B\cot C=\frac{1}{2}$$

10. $A^T=A\Rightarrow x=3$

11. $R_1\to R_1+R_2+R_3$

$$\begin{vmatrix}4x-3 & 4x-3 & 4x-3\\ 4 & 4x-11 & 4\\ 4 & 4 & 4x-11\end{vmatrix}=0$$

$$(4x-3)\begin{vmatrix}1 & 1 & 1\\ 4 & 4x-11 & 4\\ 4 & 4 & 4x-11\end{vmatrix}=0$$

$c_2\to c_2-c_1\ \&\ c_3\to c_3-c_1$

$$\therefore x=\frac{3}{4}\ \&\ x=\frac{15}{4}$$

12. By M.I

$A^n=nA-(n-1)I$

13. Domain of $|x|$ is R

14. $f\left[f(x)\right]=x$

15. Put n = 2, $t_2=2+3+4=9$

Verify by the options

16. $\bar{r}=s\bar{b}+t\bar{c}$

17. $\bar{n}_1=3\bar{i}+2\bar{j}-4\bar{k}$

$\bar{n}_2=2\bar{i}+3\bar{j}+3\bar{k}$

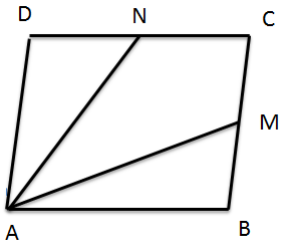
$$\cos\theta=\frac{\bar{n}_1.\bar{n}_2}{|\bar{n}_1||\bar{n}_2|}=0$$

18. $\left[4\bar{a}\ \ \bar{c}\ \ \bar{d}\right]+\left[2\bar{b}\ \ \bar{c}\ \ \bar{d}\right]=$

$\lambda\left[\bar{a}\ \ \bar{c}\ \ \bar{d}\right]+\mu\left[\bar{b}\ \ \bar{c}\ \ \bar{d}\right]$

$\Rightarrow\lambda+\mu=4+2=6$

19.



$$\overline{AM}=\overline{AB}+\frac{1}{2}\overline{BC}$$

$$\overline{AN}=\overline{AD}+\frac{1}{2}\overline{DC}$$

$$\overline{AM}+\overline{AN}=\overline{AB}+\frac{1}{2}\overline{BC}+\overline{BC}+\frac{1}{2}\overline{AB}$$

$$=\frac{3}{2}\left(\overline{AB}+\overline{BC}\right)=\frac{3}{2}\overline{AC}$$

20. By verification

21. By verification

$\bar{r}.\bar{a}=0\ \ and\ \ \bar{r}\times\bar{b}=\bar{c}\times\bar{b}$

22. $\left|e^{p+iq}\right|=\left|e^p e^{iq}\right|=\left|e^p\right|\left|e^{iq}\right|$

$$=e^p\sqrt{\cos^2 q+\sin^2 q}=e^p$$

23. Roots of $x^2-x+1=0$ *are* $-\omega,-\omega^2$

$\alpha^{2015}=(-\omega)^{2015}=-\left(\omega^{2015}\right)=-\omega^2$

$\beta^{2015}=\left(-\omega^2\right)^{2015}=-\left(\omega^{4030}\right)=-\omega$

24. $(1+\omega)^7=(1+\omega)^6.(1+\omega)=1+\omega$

$\therefore A+B\omega=1+\omega$

25. $f(x-5)=0$

26. $\dfrac{2\alpha\beta}{\alpha+\beta}=4$

$$2\frac{\frac{8-2\sqrt{5}}{\sqrt{2}}}{\frac{b}{\sqrt{2}}}=4,\ b=4-\sqrt{5}$$

27. $f'(h)=0$

$6h^2+8h+2=0\Rightarrow 2\left(3h^2+4h+1\right)=0$

$(3h+1)(h+1)=0$

$h=\frac{-1}{3}, h=-1$

28. $\frac{a}{r}, a, ar$

$a^3=512=8^3$

$a=8$

$\frac{a}{r}+a+ar=42$

$\frac{1}{r}+1+r=\frac{21}{4}$

$4r^2+4r+4=4r$

$4r^2-17r+4=0$

$(4r-1)(r-4)=0$

$r=4 or \frac{1}{4}$

29. $10!-7!4!$

$90\times 8!-3\times 8!$

$8!(87)$

30. $(3+1)(4+1)(5+1)-1$

$4\times 5\times 6-1=119$

31. Coefficient of x^3 in

$\frac{1}{2}\left(1-\frac{3x}{2}\right)^{-1}=\frac{1}{2}\left[1+\frac{3x}{2}+\left(\frac{3x}{2}\right)^2+\left(\frac{3x}{2}\right)^3\right]=\frac{27x^3}{16}$

32. $(1-x)^{-p/q}=1\frac{p}{1!}\left(\frac{x}{q}\right)+\frac{p(p+q)}{2!}\left(\frac{x}{q}\right)^2+.....$

$P=3, \frac{x}{q}=\frac{1}{6}, q=4$

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

$\Rightarrow x^4=3^3=27$

33. $3x+4=A(x+1)^2+B(x+1)(x-1)+c(x-1)$

If $x=-1$ then

$c=\frac{-1}{2}$

MATHS-B

41. Conceptual

42. $x=1+\cos\alpha,\ y=1+\cos\beta$

43. Use $\cos\theta=\frac{a_1a_2+b_1b_2}{\sqrt{a_1^2+b_1^2}\sqrt{a_2^2+b_2^2}}$

44. Use $\frac{|ax_1+by_1+c|}{\sqrt{a^2+b^2}}=5$

45. $\begin{vmatrix}2 & 3 & -1\\ 3 & 4 & -6\\ a & b & 1\end{vmatrix}=0$

34. Favorable cases are $(4,4,5,5)\rightarrow\frac{4!}{2!2!}$ ways

$n(E)=6,\ n(S)=6^4$

35. $P(B)=\frac{35}{100},\ P(C)=\frac{25}{100}$

$P(B\cap C)=\frac{10}{100}$

$P\left(\frac{B}{C}\right)=\frac{P(B\cap C)}{P(C)}=\frac{\frac{10}{100}}{\frac{25}{100}}$

36.

X	**5**	**1**
$P(X)$	$\frac{3}{8}$	$\frac{5}{8}$

$\mu=5\left(\frac{3}{8}\right)+1\left(\frac{5}{8}\right)$

$=\frac{15+5}{8}=\frac{20}{8}=\frac{5}{2}$

37. $\frac{{}^4C_2+{}^4C_3+{}^4C_4}{2^4}=\frac{11}{16}$

38. $P(A)=\frac{14}{50}(00,01,02,....09,10,20,30,40)$

$P(B)=\frac{5}{50}(08,17,26,35,44)$

$P(A\cap B)=\frac{1}{50}(08)$

$P\left(\frac{B}{A}\right)=\frac{P(A\cap B)}{P(A)}=\frac{1}{14}$

39. $\frac{300-(2+7)+(9+3)}{20}=15.15$

40. $x=17$ *and* $\bar{x}=14$

$(a^2)=\frac{1}{6}\sum x_i^2-(14)^2=\frac{1364}{6}-196$

$=\frac{1364-1176}{6}=\frac{188}{6}=\frac{94}{3}=31\frac{1}{3}$

$\Rightarrow 2(4+6b)-3(3+6a)-1(3b-4a)=0$

$\Rightarrow -14a+9b-1=0 \Rightarrow 14a-9b+1=0$

46. $5(x-1)^2+8(x-1)\ (y-1)+3(y-1)^2=0$

47. Verify $\frac{3}{2}(2,2)=(3,3)$ lies on

$x-2y+3=0$

48. Use $\frac{1}{2}\left|\overline{AB}\times\overline{AC}\right|$

49. $D.r's=(0-2,0-3,0+1)\ \ =(-2,-3,1)$

$D.C'S = \left(\frac{-2}{\sqrt{14}}, \frac{-3}{\sqrt{14}}, \frac{1}{\sqrt{14}}\right)$

50. $\frac{1}{2}|a\,b|$

51. $\underset{x\to 0}{Lt}\ \frac{\frac{1}{4}\sin 3x}{x} = \frac{3}{4}$

52. Use L hospitals rule

53. $f(0) = \underset{x\to 0}{Lt}\ f(x)$

54. Let $P(x, y)$ be any point on $x = y^2$

Distance $= \frac{|y - x - 1|}{\sqrt{2}}$

$f(y) = \frac{|y - y^2 - 1|}{\sqrt{2}}$

$f'(y) = \frac{1}{\sqrt{2}}(1 - 2y) = 0$

$y = \frac{1}{2}, x = \frac{1}{4}$

Shortest distance $= \frac{\left|\frac{1}{2} - \frac{1}{4} - 1\right|}{\sqrt{2}}$

$= \left|\frac{2 - 1 - 4}{4\sqrt{2}}\right| = \frac{3}{4\sqrt{2}} = \frac{3\sqrt{2}}{8}$

55. $f'(c) = \frac{f(6) - f(2)}{6 - 2}$

$\frac{1}{2\sqrt{c-2}} = \frac{2-0}{4}$

$c - 2 = 1, c = 3$

56. $f(x) = (x)^{\frac{1}{3}}$

$x = 125,\ \Delta x = 2$

$f(x + \Delta x) \simeq f(x) + f'(x)\Delta x$

57. $x^3 y = 1$

$y = x^{-3}$

$\frac{dy}{dx} = -3x^{-4}$

$m_1 = -3,\ y = e^{3(1-x)}$

$\frac{dy}{dx} = -3e^{3(1-x)}$

$m_2 = -3$

58. Apply log on both sides and differentiate two times

59. $y_1 = \frac{dy}{dx} = \frac{b\cos\theta}{-a\sin\theta} = \frac{-b}{a}\cot\theta$

$y_2 = \frac{-b}{a}\left(-\cos ec^2\theta\right)\frac{d\theta}{dx}$

$= \frac{b}{a}\cos ec^2\theta\left(\frac{-1}{a\sin\theta}\right)$

$(y_2)_{\theta=\frac{\pi}{2}} = \frac{-b}{a^2}$

60. $\frac{dy}{dx} = -\frac{f_x}{f_y}$

61. $\frac{dy}{dx} = c(2x)$

$\frac{dy}{dx} = \frac{y}{x^2}(2x)$

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

62. $\frac{1}{x}\,dx = \frac{y}{1+y^2}\,dy$

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

$\log cx^2 = \log\left(1 + y^2\right)$

$cx^2 = 1 + y^2$

63. $Order = 2$

$\deg ree = 1$

64. $\int_0^3 \left(3x - x^2\right)dx = \left(3\frac{x^2}{2} - \frac{x^3}{3}\right)_0^3$

$= \frac{27}{2} - \frac{27}{3} = 27\left(\frac{1}{6}\right) = \frac{9}{2}$

65. $\int_{-2}^{-1} 2dx + \int_{-1}^{0} 1dx + \int_{0}^{1} 0dx + \int_{1}^{2} 1dx$

66. $I_n + I_{n-2} = \frac{1}{n-1}$

Put $n = n + 1$

67. $\int\left(\frac{1}{x} + \frac{2}{1+x^2}\right)dx$

68. Put $\tan^{-1}\sqrt{x} = t$

69. $\int 3\cos^{-1} x\ dx$

70. $\int\left[f(x) + xf^1(x)\right]dx = xf(x) + c$

71. $g^2 - c = f^2 + c$

$g^2 - f^2 = 2c$

72. $(2)(3)(4)(k) = 1$

73. Given points form a right angle triangle at (2, 1)

74. Intersect each other

75. Centre of the first circle lies on the common chord

76. Verify distance from focus to directrix=2 distance from vertex to directrix

77. $h^2 = ab$

78. $2a = n.2b$

$a^2 = n^2 b^2$

$a^2 = n^2 a^2 \left(1 - e^2\right)$

$1 - e^2 = \frac{1}{n^2}$

$e^2 = \frac{n^2 - 1}{n^2}$

79. $\tan\theta = \frac{b}{ae}$

$\tan^2\theta = \frac{b^2}{a^2 e^2}$

$\tan^2\theta = \frac{1 - e^2}{e^2} = \frac{1}{e^2} - 1$

$\frac{1}{e^2} = 1 + \tan^2\theta$

$e^2 = \cos^2\theta$

$e = \cos\theta$

80. $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{\left(a^2 + b^2\right)^2}{n^2}$

$\frac{9}{1} - \frac{4}{1} = \frac{(9+4)^2}{K^2}$

$K^2 = \frac{(13)^2}{5}$

$K = \pm\frac{13}{\sqrt{5}}$

PHYSICS

81. $n_o = \frac{(n+1)\text{v}}{2l_0}$ $n_c = \frac{(2n+1)\text{v}}{4l_c}$

$\frac{n_o}{n_c} = \frac{\frac{(n+1)\text{v}}{2l_o}}{\frac{(2n+1)\text{v}}{4l_c}}$

$l_0 = l_c$

$\frac{n_0}{n_c} = \frac{2(n+1)}{2n+1}$

82. $f = fo\left(\frac{\text{v}}{\text{v} - \text{v}_0}\right)$ $\text{v}_0 = gt = 2g$

83. Deviation by a sphere is 2(i-r)

Here deviation $\delta = 60^0 = 2(i - r)$

$(i - r) = 30^0$

$r = i - 30 = 60 - 30 = 30^0$

$\mu = \frac{\sin i}{\sin r} = \sqrt{3}$

84. $\frac{1}{f} = \frac{1}{V} - \frac{1}{u}$ $u = a$ $V = a/3$

$\frac{1}{f} = \frac{3}{a} - \frac{1}{a} = \frac{2}{a} \Rightarrow a = 2f$

85. $\frac{i_1}{i_2} = b \Rightarrow \frac{a_1}{a_2} = \sqrt{b}$

$\therefore \frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}} = \frac{\left(a_1 + a_2\right)^2 - \left(a_1 - a_2\right)^2}{\left(a_1 + a_2\right)^2 + \left(a_1 - a_2\right)^2}$

On solving $= \frac{i_1}{i_2} = \frac{2\sqrt{b}}{b+1}$

86. The charge given out in one second is

$1.6\times10^{-19}\times10^9 = 1.6\times10^{-10}c$

The time required to accumulate a charge of 1c can be estimated to be

$t = \frac{1}{1.6\times10^{-10}} = 6.25\times10^9 \text{ sec}$

$= \frac{6.25\times10^9}{365\times24\times3600} = 198\ years$

87. At one side distance b/w plates d,

At another side distance =

$d + l\sin\alpha \approx d + l\alpha$

Mean distance b/w the plates =

$\frac{d + (d + l\alpha)}{2} = d + \frac{l\alpha}{2}$

$C = \frac{\varepsilon_0 A}{d} = \frac{\varepsilon_0 l^2}{d}\left(1 + \frac{l\alpha}{2d}\right)^{-1} = \frac{\varepsilon_0 l^2}{d}\left(1 - \frac{l\alpha}{2d}\right)$

88. $i = i_0 + \alpha t$

$i = \frac{dq}{dt} \Rightarrow dq = idt$

$\int dq = \int_0^{10} idt = \int_0^{10} (i_0 + \alpha t)\,dt = \left[i_0 t + \frac{\alpha t^2}{2}\right]_0^{10} = 300c$

89. $V_{AB} = i_2(4 + 6)$

$V_{AB} = 10i_2$

Also $V_{AB} = i_1 5$

$5i_1 = 10i_2 \quad i_1 = 2i_2$

Let $H = i^2 R$

$\frac{H_4}{H_5} = \frac{i_2^2 \times 4}{i_1^2 \times 5} \Rightarrow \frac{H_4}{10} = \frac{i_2^2 \times 4}{4i_2^2 \times 5}$

$H_4 = 2cal/\sec$

90. Charged particle moves in a magnetic field undeviated when $\bar{v}$ is parallel (or) anti parallel to $\bar{B}$

$\frac{V_x}{B_x} = \frac{V_y}{B_y} = \frac{V_z}{B_z} = K \quad \frac{4}{2} = \frac{2}{y} = \frac{-b}{-z}$

$y = 1 \quad z = 3$

$\bar{F} = q\left(\bar{V} \times \bar{B}\right)$

$$F = 10^{-6}\begin{vmatrix} i & j & k \\ 1 & 1 & o \\ 2 & 1 & -3 \end{vmatrix}$$

$F = \sqrt{19}\mu N$

91. $F_{AB} = Bil(i)$ the forgive of forces F_{AB} and F_{HG} is zero

$F_{CD} = Bil(-i)$

$F_{HG} = Bil(-i)$ and that of F_{CD} and F_{EF} is zero

$F_{EF} = Bil\ i$ the forces on edges AH and DE are equal and opposite and so constitutes a net torque. Thus

$F_{AH} = Bil(-k)\ and\ F_{DE} = Bil\ k$

Torque $= Bil^2 i = 2.1.1\ \hat{i} = 2i\ N - M$

92. $V = \frac{\mu_0}{4\pi}\ \frac{\pi\cos\theta}{r^2}\ then\ M = 4.8Am^2$

93. Magnetic field by the straight wire of current I at distance

r is $B = \frac{\mu_0 i}{2\pi r}$, flux associated with the loop

is $\phi = BA = \frac{\mu_0 i}{2\pi r}a^2$

$$e = \frac{-d\phi}{dt} = \frac{-\mu_0}{2\pi} ia^2\, d/dt\left(\frac{1}{r}\right) = \frac{\mu_0}{2\pi}\frac{ia^2}{r^2}\frac{dr}{dt} = \frac{\mu_0}{2\pi r^2} ia^2 \text{v}$$

94. $I^2{}_{rms} = \frac{\int_0^t i^2 dt}{\int_0^t dt} = \frac{\int_0^1 9t^2 dt}{\int_0^1 dt} = 3$

$I_{rms} = \sqrt{3}A$

95. $\in = \frac{hc}{\lambda} = \frac{1.2400}{1400} e\text{v} = 8.86\text{ev}$

$\in = w_0 + e\text{v}_0$

$\text{v}_0 = 4.86\text{v}$

96. $N = \frac{Qntz^2e^4}{\left(8\pi\varepsilon_0\right)^2 r^2 E^2 \left(\sin\theta/2\right)^4}$

$N\alpha \frac{1}{\left(\sin\theta/2\right)^4} \Rightarrow \frac{N_1}{N_2} = \left(\frac{Sin\frac{\theta_2}{2}}{Sin\frac{\theta_1}{2}}\right)^4$

$\frac{N_1}{N_2} = \left(\frac{Sin30}{\sin 45}\right)^4$

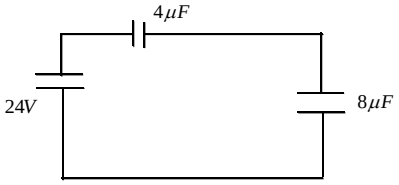
$\frac{28}{N_2} = \left(\frac{\frac{1}{2}}{\frac{1}{\sqrt{2}}}\right)^4 = \left(\frac{1}{\sqrt{2}}\right)^4$

$N_2 = 112$

97. $p(t) = 1 - e^{-\lambda t} = 1 - e^{-\lambda} \times \frac{1}{\lambda} \quad t = 1/\lambda$

$= 1 - e^{-1} = 1 - \frac{1}{e} = 1 - 0.37 = 0.63$

98. The diode D_1 is reverse biased but the D_2 is forward biased (short-cht)



$\frac{V_1}{V_2} = \frac{C_2}{C_1} = B/4 = \frac{2}{1}$

$V_1 = 2/3\ E = 2/3 \times 24 = 16V$

$V_2\ 1/3\ E = 1/3 \times 24 = 8V$

99. $F = (w+x).(w+y)$

$F = w.w + w.y + x.w + x.y$

$F = w + w.y + x.w + x.y$

$F = w(1+y) + xw + x.y$

$F = w + xw + x.y$

$F = w(1+x) + x.y$

$F = w + x.y$

100. $P_T = P_C\left(1 + \frac{m^2}{2}\right)$

$P_T = 1000\left(1 + \frac{1}{2}\right) = 1500w$

101. $I_d = \in_0 \frac{d\varphi}{dt} \Rightarrow I_d = c\left(\frac{d\text{v}}{dt}\right) = 2 \times 10^{-6} \times 10$

$= 20\mu A$

102. X=F linear density

$= MLT^{-2}\frac{M}{L} = M^2T^{-2} = \left[M^2L^0T^{-2}\right]$

103. $S = 2R\frac{\sin\theta}{2}$

104. Conceptual

105. From the graph it is a straight line so uniform motion because of impulse direction of velocity changes as can be seen from the slope of the graph

Initial velocity $= \frac{2}{2} = 1m/\sec$

Final velocity $= \frac{-2}{2} = -1m/\sec$

$P_i = 0.4 \;\; P_t = -0.4$

$I = P_2 - P_1 = -0.8N\sec$

106. Force of friction provided the necessary centripetal force

$f \le \mu_s N = \frac{Mv^2}{R}$

$v^2 \le \frac{\mu_S RN}{m} \quad (N = mg)$

$V \le \sqrt{\mu_s Rg}$

The maximum speed of the car in circular motion is

$V_{\max} = \sqrt{\mu_s Rg}$

107. Let the particles A and B collide at time t, for then collsion

The position vectors of both particles should be same at time t sec

$\bar{r}_1 + \bar{v}_1 t = \bar{r}_2 + \bar{v}_2 t$

$\bar{r}_1 - \bar{r}_2 = \bar{v}_2 t - v_1 t = (\bar{v}_2 - \bar{v}_1)t ----1$

$also \;\; |\bar{r}_1 - \bar{r}_2| = |\bar{v}_2 - \bar{v}_1| t$

$t = \frac{(\bar{r}_1 - \bar{r}_2)}{(\bar{v}_2 - \bar{v}_1)}$

Sub this value of t in equation -----1

$\bar{r}_1 - \bar{r}_2 = (\bar{v}_2 - \bar{v}_1)\frac{|\bar{r}_1 - \bar{r}_2|}{|\bar{v}_2 - \bar{v}_1|}$

$\frac{\bar{r}_1 - \bar{r}_2}{|r_1 - r_2|} = \frac{(\bar{v}_2 - \bar{v}_1)}{|\bar{v}_2 - \bar{v}_1|}$

108. $F = -\frac{d}{dx}V(x)$

$-12ax^{-13} + 6bx^{-7} = 0$

$\frac{-12a}{x^{13}b} = \frac{+6b}{x^7}$

$b \times 6 = 2a$

$x = \sqrt[6]{\frac{2a}{b}}$

109. Conceptual

110. $K.E_{Roll} = \frac{1}{2}mv^2\left(1 + \frac{K^2}{R^2}\right) = K.E_{trans}\left(1 + \frac{2}{5}\right)$

$K.E_{Roll} = \frac{1}{2}IW^2\left(\frac{R^2}{K^2} + 1\right) = R_{Rot}\left(5/2 + 1\right)$

111. $\frac{\frac{1}{2}K\left(A^2 - x^2\right)}{\frac{1}{2}Kx^2} = \frac{A^2 - \frac{A^2}{N^2}}{\frac{A^2}{N^2}} = N^2 - 1$

112. P.E = - 2 K.E

113. $t = A/a\sqrt{\frac{2}{g}}\left(\sqrt{h_1} - \sqrt{h_2}\right)$

114. $\left(\frac{Q}{t}\right) = \left(\frac{Q}{t}\right)_1 + \left(\frac{Q}{t}\right)_2$

$(\theta c - o^0 c) = (90 - \theta c) + (90 - \theta c) \Rightarrow \theta c = 180 - 2\theta c \Rightarrow 3\theta c = 180$

$\theta c = 60^0 c$

115. $2Kg\ of\ ice\ at\ -20^0 c \quad 5Kg\ of\ water\ at\ 20^0 c$

$2Kg\ of\ ice\ at\ 0^0 c \quad 5Kg\ of\ water\ at\ 0^0 c$

$2Kg\ of\ water\ at\ 0^0 c \quad Q = MS\Delta t$

$= 5 \times 1 \times 20$

$Q = mS_{ice}\Delta t + MLice \quad Q = 100cal$

$Q = 1 \times 0.5 \times 20 + 1 \times 80$

1 Kg of ice is converted into water

Total water 5Kg+1Kg=6Kg

116. $PV = aT^3 \Rightarrow W = aT^3 \quad W' = a(2T)^3 = 8aT^3$

$W = W' - W = 8at^3 - at^3 = 7at^3$

117. $\eta = \frac{dW}{dQ} \;\; but \;\; \alpha = \frac{dQ_2}{dW} = \frac{Q_2}{Q_1 - Q_2}$

$\frac{1}{\alpha} = \frac{Q_1}{Q_2} - 1 \Rightarrow \frac{1}{\alpha} + 1 = \frac{Q_1}{Q_2}$

$\frac{\alpha + 1}{\alpha} = \frac{Q_1}{Q_2} \Rightarrow \frac{Q_2}{Q_1} = \frac{\alpha}{1 + \alpha}$

$\eta = \frac{Q_1 - Q_2}{Q_1} = 1 - \frac{Q_2}{Q_1}$

$= 1 - \frac{\alpha}{1 + \alpha} = \frac{1 + \alpha - \alpha}{1 + \alpha}$

$\eta = \frac{1}{1 + \alpha}$

118. Conceptual

119. Mean K.E of a gas molecules depends only on its temperature and is independent its nature (constant temperature)

120. $e=\frac{Fl}{Ay}=\frac{Fl}{\pi r^2 y}=\frac{mgl}{\pi r^2 y}$

$\frac{e_1}{e_2}=\frac{m_1 l_1}{r_1^2 y_1}\times\frac{r_2^2 y_2}{m_2 l_2}$

$=\frac{3a}{2b^2 c}$

CHEMISTRY

121. $\frac{r_1}{r_2}=\frac{n_1}{n_2}\times\frac{z_2}{z_1}$

122. $\mu=\sqrt{n(n+2)}$

$n=number\ of\ unparied\ e^-$

123. Conceptual
124. Conceptual
125. Conceptual
126. Percentage of ionic character = $\frac{\mu_{obs}}{\mu_{cal}}\times 100$
127. $\frac{C_1}{C_2}=\sqrt{\frac{T_1}{T_2}}$
128. Conceptual
129. Conceptual
130. Conceptual
131. $CaCO_3 \rightleftarrows CaO+CO_2$
132. Conceptual
133. Conceptual
134. Conceptual
135. Conceptual
136. Conceptual
137. Conceptual
138. Conceptual
139. Conceptual
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150. Conceptual
151. Conceptual
152. Conceptual
153. Conceptual
154. Conceptual
155. Conceptual
156. $\frac{P_0-P_s}{P_0}=m\times\frac{M.wt\ of\ solvent}{1000}$
157. $\frac{M}{V}=\frac{ZM}{a^3 N_0}$

$V=\frac{a^3 N_0}{Z}$

$V=\frac{\left(3.04\times10^{-8}\right)^3\left(6.023\times10^{23}\right)}{2}$

$= 8.45\ cm^3$

158. $E=-0.059\times P^H$
159. Conceptual
160. Conceptual

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