LEADER COURSE (PHASE – ELC, ELD & ELP)

TARGET : JEE (MAIN) 2015

SCORE – I | **DATE : 11 - 03 - 2015**

MAJOR TEST | **Test Pattern : JEE (Main)**

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	1	1	4	4	4	3	3	4	1	4	4	4	4	4	2	4	2	1	1	2
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	4	3	4	2	3	1	2	3	2	4	1	2	4	1	1	4	3	2	3	1
Que.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	2	1	1	3	1	1	1	1	1	3	2	3	1	3	2	2	2	2	2	1
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	2	3	3	3	3	4	3	2	3	1	3	2	2	2	3	1	1	1	2	1
Que.	81	82	83	84	85	86	87	88	89	90										
Ans.	3	2	1	2	2	1	3	1	1	2										

HINT – SHEET

1. According benzyne mechanism.

2. Due to better leaving nature of $-SO_3H$ & Polarmedium.

3. According alillic substitution followed by N.S.R. reaction.

5. α–D–glucose & β D-glucose both are diastereomer.

9. NCERT XI[th] Part-I Page No. 139
The correct order of pressure is
$P_1 > P_3 > P_2$.

11. NCERT XI[th] Part-I Page No. 161
$\Delta H = \Delta E + \Delta nRT$ or $\Delta E = \Delta H - \Delta nRT$

$$\therefore \Delta E = +7.3 - \frac{1}{2} \times 0.002 \times 298 = 7.3 - 0.298 = 7 \text{ kcal}$$

12. NCERT XI[th] Part-I Page No. 160
Workdone in isothermal reversible expansion $W = P\Delta V$

$$W = -2.303 \text{ nRT} \log \frac{V_2}{V_1}$$

$$= -2.303 \times 6 \times 8.314 \times 300 \log \frac{10}{1}$$

$$= 34464.8 \text{ Joule} = 34.465 \text{ kJ}$$

13. $\Delta S^o = 2S^o_{HCl} - (S^o_{H_2} + S^o_{Cl_2})$

$= 2 \times 186.7 - (130.6 + 223.0) = 19.8 \text{ JK}^{-1} \text{ mol}^{-1}$

14. NCERT XI[th] Part-I Page No. 169

Aim : $2C + H_{2(g)} \rightarrow C_2H_{2(g)}$.

Eq. (ii) + Eq. (iii) $\rightarrow$ Eq. (iv) – Eq. (i)

Find the required result.

15. NCERT-XI, Part-I, Page No. 141.

$$V_2 = \frac{P_1V_1T_2}{P_2T_1} \Rightarrow P_1 = P \; ; \; T_1 = 273 \text{ K}$$

$$P_2 = \frac{3}{2}P \; ; \; T_2 = T_1 + \frac{T_1}{3} = \frac{4}{3} \times 273 \text{ K}$$

$$V_2 = \frac{2P}{3P} \times \frac{4}{3} \times \frac{273}{273} \times 100\text{cc} = \frac{800}{9}\text{cc} = 88.888\text{cc}$$

$= 88.9$ cc

17. NCERT-XI, Part-I, Page No. 176.

$$\frac{1}{2}X_2 + \frac{3}{2}Y_2 \rightarrow XY_3$$

$$\Delta S = 50 - \left(\frac{60}{2} + \frac{3}{2} \times 40\right) = 50 - (30 + 60)$$

$= -40$ J / Kmol at equilibrium $\Delta G = 0$

$$\Delta H = T\Delta S \; ; \; T = \frac{\Delta H}{\Delta S} = \frac{-30 \times 10^3}{-40} = 750K$$

18. NCERT : XI, part–1, Page 138

$$P = \frac{dRT}{M.wt.}$$

for same gas $\frac{P_1}{P_2} = \frac{d_1T_1}{d_2T_2} = \frac{1}{2} \times \frac{2}{1} = 1 : 1$.

21. Slop $= \frac{1}{n}$ = tan 45° = 1

$n = 1$

$$\frac{x}{m} = K(P)^{1/n} = 10 \times (0.5)^1 = 5$$

$$\therefore \frac{x}{m} = 5$$

$\because$ m = 1gm $\therefore$ x = 5gm

31. Let $2\alpha + 1 = x \Rightarrow \alpha = \frac{x-1}{2}$

$\therefore$ required equation is $\left(\frac{x-1}{2}\right)^3 + x - 1 - 5 = 0$

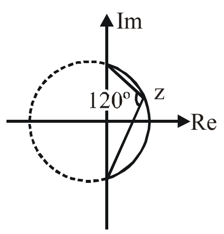
$\Rightarrow x^3 - 3x^2 + 3x - 1 + 8x - 98 = 0$

$\Rightarrow x^3 - 3x^2 + 11x - 49 = 0$

$\therefore$ b = –3, c = 11, d = –49

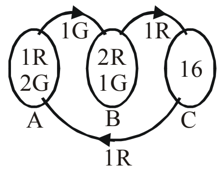
$\Rightarrow |b + c + d| = 41$.

32. Locus is are of circle with center $\left(-\frac{1}{\sqrt{3}}, 0\right)$ and radius $\frac{2}{\sqrt{3}}$



Area $= \frac{1}{3} \times \pi\left(\frac{2}{\sqrt{3}}\right)^2 - \frac{1}{2} \times 2 \times \frac{1}{\sqrt{3}} = \frac{4\pi}{9} - \frac{1}{\sqrt{3}}$

33.



Probability $= \frac{2}{3} \times \frac{2}{4} \times \frac{1}{2} = \frac{1}{6}$

34. $\underbrace{A, I, A, I, O}_{5}$ & $\underbrace{P, P, L, C, T, N}_{6}$

ways $= \frac{6!}{2!} \cdot {}^7C_5 \cdot \frac{5!}{2!2!} = (45)7!$

35. $A = \begin{bmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{bmatrix}$

$\Rightarrow$ det(A) = $(a - b)^2 (b - c)^2 (c - a)^2$

& det (4I) = 64

$\Rightarrow$ (a – b)(b – c)(c – a) = ±8

$\because$ (a – b) + (b – c) + (c – a) = 0

$\therefore$ $(a - b)^3 + (b - c)^3 + (c - a)^3$

= 3(a – b)(b – c)(c – a) = ±24.

36. $(AB^{-1}C)^{-1} = C^{-1}BA^{-1} = CBA$

(for involutary matrix $C^{-1} = C$, $A^{-1} = A$)

37. $x^2 - ax + b = 0$ has roots α, β

Then $\alpha + \beta = a$, $\alpha\beta = b$, Now

$v_{n+1} = \alpha^{n+1} + \beta^{n+1}$

$= (\alpha + \beta)(\alpha^n + \beta^n)$

$-\alpha\beta^n - \beta a^n$

$= (\alpha + \beta)(\alpha^n + \beta^n) - \alpha\beta(\alpha^{n-1} + \beta^{n-1})$

$v_{n+1} = av_n - bv_{n-1}$

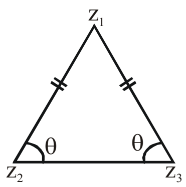
38. $(1 + x + x^2)^n = a_0 + a_1x + a_2x^2 + ... + a_{2n}x^{2n}$

Put $x = 1, \omega, \omega^2$ and add, we get

$3(a_0 + a_3 + a_6 + ...) = 3^n$

$\Rightarrow a_0 + a_3 + a_6 + ... = 3^{n-1}$.

39. $\dfrac{z_1 - z_2}{z_3 - z_2} = \dfrac{|z_1 - z_2|}{|z_3 - z_2|} e^{i\theta}$



$\dfrac{z_1 - z_3}{z_2 - z_3} = \dfrac{|z_1 - z_3|}{|z_2 - z_3|} e^{-i\theta}$

$\Rightarrow \left(\dfrac{z_1 - z_2}{z_3 - z_2} + \dfrac{z_1 - z_3}{z_3 - z_2}\right) =$ purely imaginary number.

$\arg\left(\dfrac{2z_1 - z_2 - z_3}{z_3 - z_2}\right) = \pm\dfrac{\pi}{2}$

40. P = all A^s together $= \dfrac{\lfloor 5}{\lfloor 3}$, Q = all B^s together $= \dfrac{\lfloor 6}{\lfloor 4}$

$n(P \cap Q) = \lfloor 3 \Rightarrow n(P \cup Q) = \dfrac{\lfloor 5}{\lfloor 3} + \dfrac{\lfloor 6}{\lfloor 4} - \lfloor 3 = 44$

42. $\dfrac{{}^6C_1 \times \lfloor 7}{6^7 \times \lfloor 2} = \dfrac{35}{6^3 \times 3}$

43. $|Z_1| = 1$, $|Z_2| = 1$

$Z_1^2 + Z_2^2 = 5$

so $\bar{Z}_1^2 + \bar{Z}_2^2 = 5$

$(Z_1 - \bar{Z}_1)^2 + (Z_2 - \bar{Z}_2)^2$

$= Z_1^2 + Z_2^2 + \bar{Z}_1^2 + \bar{Z}_2^2 - 2|Z_1|^2 - 2|Z_2|^2$

$10 - 4 = 6$

44. $(A^T - A)$ and $(A - A^T)$

Skew symmetric mat. of (3×3) order

and $|A^T - A| = |A - A^T| = 0$

45. Minimum value occurs

at $\theta = 0^o$

$8 + 2 = 10$

46. $\lambda = \bar{A}BC + \bar{B}CA + \bar{C}AB$

$= \left(\dfrac{1}{2} \times \dfrac{1}{3} \times \dfrac{1}{4}\right) + \left(\dfrac{2}{3} \times \dfrac{1}{4} \times \dfrac{1}{2}\right) + \left(\dfrac{3}{4} \times \dfrac{1}{2} \times \dfrac{1}{2}\right) = \dfrac{6}{24} = \dfrac{1}{4}$

$\mu = \lambda + ABC = \dfrac{1}{4} + \left(\dfrac{1}{2} \times \dfrac{1}{3} \times \dfrac{1}{4}\right) = \dfrac{7}{24}$

$\lambda + \mu = \dfrac{1}{4} + \dfrac{7}{24} = \dfrac{13}{24}$

47. $\left|z_1 z_2 z_3 \left(\dfrac{2|z_1|^2}{z_1} + \dfrac{3|z_2|^2}{z_2} + \dfrac{4|z_3|^2}{z_3}\right)\right|$

$|z_1||z_2||z_3||2\bar{z}_1 + 3\bar{z}_2 + 4\bar{z}_3|$

$2 \times 3 \times 4 \times 9 = 216$

48. It is given ${}^mC_0 + {}^mC_1 + {}^mC_2 = 46$

$\Rightarrow 2m + m(m - 1) = 90$

$\Rightarrow m^2 + m - 90 = 0$

$\Rightarrow m = 9$ as $m > 0$

Now $(r + 1)^{th}$ term of $\left(x^2 + \dfrac{1}{x}\right)^m$ is

$= {}^mC_r (x^2)^{m - r} \left(\dfrac{1}{x}\right)^r$

For this to be independent of x

$2m - 3r = 0 \Rightarrow r = 6$

49. As we are interested in coefficient of t^{50}, we shall ignore all the term with exponent more than 50. Thus we can write as

$(1 + {}^{25}C_1 t^2 + \ldots\ldots + {}^{25}C_{25} t^{50}) \times (1 + t^{25} + t^{40} + t^{45} + t^{47})$

As all the terms in the first have even exponent we can ignore t^{25}, t^{45} and t^{47} too thus coefficient of t^{50} is

$= {}^{25}C_{25} + {}^{25}C_5 = 1 + {}^{25}C_5$

50. replace z by z – 2

$(z - 2)^4 + (z - 2)^3 + (z - 2)^2 + (z - 2) + 1 = 0$

so $\prod_{i=1}^{4} (z_i + 2) = 16 - 8 + 4 - 2 = 11$

51. ${}^7C_3 = 35$

53. ${}^9C_3 \left(\dfrac{1}{6}\right)^3 \left(\dfrac{5}{6}\right)^6 \times \left(\dfrac{1}{6}\right)$

$= \dfrac{84 \times 5^6}{6^{10}}$

54. $\dfrac{\bar{H}}{H} = \dfrac{5}{2}; \dfrac{\bar{w}}{w} = \dfrac{4}{3}$

$H = \dfrac{2}{7}, w = \dfrac{3}{7}$

$\bar{H} = \dfrac{5}{7}, \ \bar{w} = \dfrac{4}{7}$

$\Rightarrow 1 - \bar{H}\bar{w} = K$

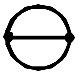
$1 - \dfrac{20}{49} = K$

$49K = 29$

55. ${}^{10}C_2 + {}^{10}C_2$
$= 45 + 45 = 90$

56. $C = \dfrac{Z_1 + Z_2}{2}$

$r = \dfrac{|z_1 - z_2|}{2}$

(6, 1)  (4, –3)

57. $\alpha = 3 + 4i$
$\beta = 3 - 4i$
and $\alpha + \beta + \gamma = 0$
so $\gamma = -6$
$\alpha\beta\gamma = -(25)(6) = -150$

59. $\cos\theta + i\sin\theta = \dfrac{3}{z} - 2$

$\cos\theta + i\sin\theta = \dfrac{3-2z}{z}$

$1 = \dfrac{|3-2z|}{|z|}$

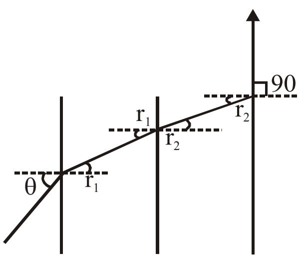
$|z|^2 = |3-2z|^2 \Rightarrow \quad x^2 + y^2 - 4x + 3 = 0$

$\boxed{\text{put } z = x + iy}$

61. ${}_1\mu_3 = \dfrac{n_0/2}{n_0} = \dfrac{\sin\theta}{\sin r_1}$

${}_2\mu_3 = \dfrac{n_0/6}{n_0/2} = \dfrac{\sin r_1}{\sin r_2}$

${}_3\mu_4 = \dfrac{n_0/8}{n_0/6} = \dfrac{\sin r_2}{\sin 90}$



on multiply, $\Rightarrow \theta = \sin^{-1}\left(\dfrac{1}{8}\right)$

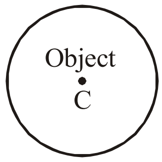
63. $f^1 = \dfrac{f}{2} = \dfrac{15}{2} = 7.5$ cm

cancave mirror

$\dfrac{1}{-7.5} = \dfrac{1}{-20} + \dfrac{1}{v}$

$v = -12$ cm

64. $R = 6$ cm



$\mu = \dfrac{1}{1.5}$

$u = 6$ cm

$\dfrac{m}{v} - \dfrac{1}{u} = \dfrac{M-1}{R}$

$v = 6$ cm

65. I^{st} surface

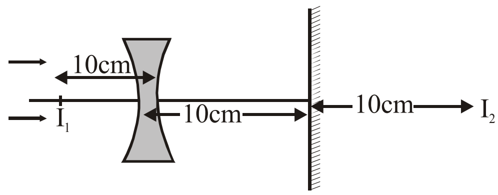
$\dfrac{1.5}{v} = \dfrac{1}{(-mR)} = \dfrac{1.5-1}{\infty}$

II^{nd} surface

$\dfrac{1/1.5}{\infty} - \dfrac{1}{-(R+1.5mR)} = \dfrac{1/1.5 - 1}{-R}$

$m = 4/3$

66.



$\dfrac{1}{10} = \dfrac{1}{v} - \dfrac{1}{30}$

$\dfrac{1}{v} = \dfrac{1}{7.5}$

v= 7.5 cm
From the mirror = 10–75
= 2.5 cm

69. $I_{max} = 4I$

$\Rightarrow 2I = I + I + 2\sqrt{II}\cos\phi$

$2I = 4I\cos^2\dfrac{\phi}{2} \Rightarrow \cos\dfrac{\phi}{2} = \dfrac{1}{\sqrt{2}}$

$\Rightarrow \dfrac{1}{2}.\dfrac{2\pi}{\lambda}\ t(\mu - 0) = \dfrac{\pi}{4}$

$t = \dfrac{\lambda}{\left(\dfrac{3}{2}-1\right)}\mu$

$t = \dfrac{\lambda}{2}$