Test Pattern

JEE (Advanced)
TEST # 01
12-05-2024

ALLEN CAREER INSTITUTE KOTA (RAJASTHAN) path to success

DISTANCE LEARNING PROGRAMME
(Academic Session : 2024 - 2025)

JEE(Main + Advanced) : LEADER TEST SERIES / JOINT PACKAGE COURSE

Test Type : Unit Test # 01

ANSWER KEY

PART-1 : PHYSICS

SECTION-I (i)	Q.	1	2	3	4		
	A.	D	C	A	B		
SECTION-I (ii)	Q.	5	6	7	8		
	A.	A,C,D	A,B,C	A,C	A,B,C		
SECTION-I (iii)	Q.	9	10	11	12		
	A.	C	B	B	D		
SECTION-III	Q.	1	2	3	4	5	6
	A.	2	1	6	2	2	2
SECTION-IV	Q.	1	2				
	A.	A->PS,B->QR,C->QS,D->PS	A->PT,B->R,C->PQ,D->QRS				

PART-2 : CHEMISTRY

SECTION-I (i)	Q.	1	2	3	4		
	A.	B	C	C	A		
SECTION-I (ii)	Q.	5	6	7	8		
	A.	A,B,C	B,D	A,D	A,C		
SECTION-I (iii)	Q.	9	10	11	12		
	A.	A	D	D	A		
SECTION-III	Q.	1	2	3	4	5	6
	A.	2	5	5	2	5	6
SECTION-IV	Q.	1	2				
	A.	A->PRS,B->PQT,C->P,D->PQT	A->Q,B->P,C->R,D->T				

PART-3 : MATHEMATICS

SECTION-I (i)	Q.	1	2	3	4		
	A.	A	B	C	D		
SECTION-I (ii)	Q.	5	6	7	8		
	A.	A,B,C,D	A,D	A,C,D	A,C		
SECTION-I (iii)	Q.	9	10	11	12		
	A.	B	B	B	D		
SECTION-III	Q.	1	2	3	4	5	6
	A.	1	1	4	3	7	6
SECTION-IV	Q.	1	2				
	A.	A->Q,B->R,C->T,D->PT	A->PS,B->QR,C->PQT,D->PQT				

HINT – SHEET

PART-1 : PHYSICS

SECTION-I (i)

1. **Ans (D)**

$[F] = \left[\dfrac{Cr}{V^2}\right]$

$[M^1L^1T^{-2}] = \left[\dfrac{CL}{L^2}T^2\right]$

$[C] = [M^1L^2T^{-4}]$

2. **Ans (C)**

$\dfrac{d(T)}{dt} = d\dfrac{(T_0 + \alpha t^2 + \beta \sin t)}{dt}$

$= \dfrac{d(T_0)}{dt} + \dfrac{d(\alpha t^2)}{dt} + \dfrac{d(\beta \sin t)}{dt} = 2\alpha t + \beta \cos t$

$= \dfrac{2 \times 2}{\pi}\pi + (-4) \times \cos\pi$

$= 4 + (-4)(-1) = 4 + 4 = 8$ K/sec

3. **Ans (A)**

Since TIR occurs at surface AC, thus

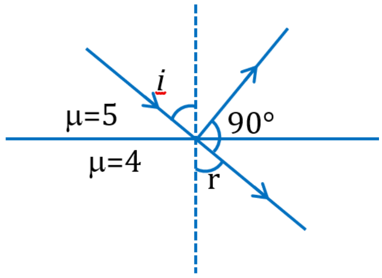
$1.5 \sin\theta = \dfrac{4}{3}\sin 90^\circ \Rightarrow \sin\theta = \dfrac{40}{4.5} = \dfrac{8}{9}$

Therefore $\sin\theta \geqslant \dfrac{8}{9}$

PART-1 : PHYSICS

SECTION-I (ii)

5. **Ans (A,C,D)**



$i + r = 90^\circ$

$r = 90 - i$

By snell's law

$\mu_i \sin i = \mu_2 \sin r$

$5 \sin i = 4 \sin(90 - i)$

$\tan i = \dfrac{4}{5}$; $\sin i = \dfrac{4}{\sqrt{41}}$

6. **Ans (A,B,C)**

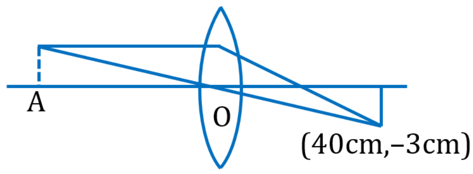


Image is real & inverted

Lens is converging

$v + u = 100$

$m = \dfrac{v}{u} = \dfrac{3}{2}$

$v = \dfrac{3}{2}u$

$\dfrac{3}{2}u + u = 100 \qquad 2.5\,u = 100$

$v = 60$

$OA = -60$

$r_A - r_0 = OA = -60$

$r_0 = r_A - 60$

$r_0 = 40 - 60 = -20$

7. **Ans (A,C)**

$$\frac{\mu}{v} - \frac{1}{\infty} = \frac{(\mu - 1)}{10}$$

$$v = \frac{10\mu}{\mu - 1} = \frac{10}{1 - \frac{1}{\mu}}$$

$$v_v < v_r$$

$$v_v = \frac{10}{0.615} \times 1.615$$

$$v_r = 10 \times \frac{1.6}{0.6}$$

$$v_v - v_r = \frac{16.15}{0.615} - \frac{16}{0.6}$$

$$= \frac{16.15 \times 0.6 - 16 \times 0.615}{0.6 \times 0.615} = 0.40\text{cm}$$

8. **Ans (A,B,C)**

For λ_{yellow}, the R.I of liquid and glass are same, so not deviation for yellow light.

The RI of blue light is higher in liquid i.e. light enters from denser to rarer medium, so bends away from normal

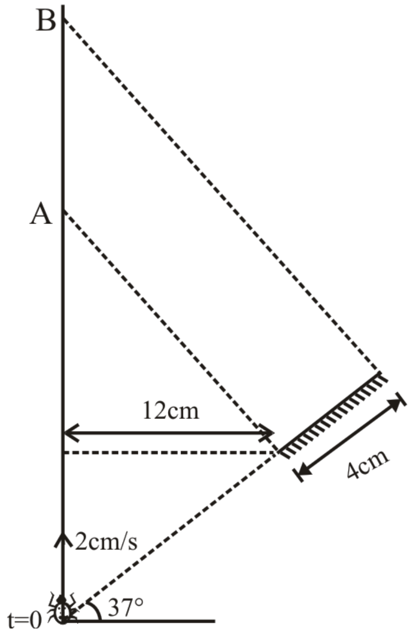
For Red light

$\mu_g > \mu_\ell$

PART-1 : PHYSICS

SECTION-I (iii)

10. **Ans (B)**



By geometry insect will observe its image at A, distance OA = 25cm

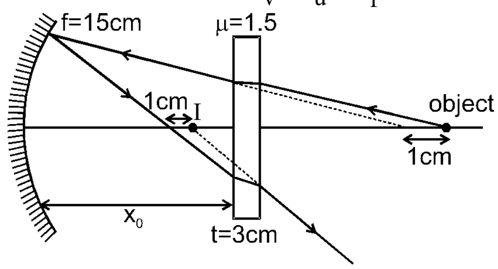
So time = 12.5 sec

It will observe its image for distance AB = $\frac{20}{3}$ cm, t = $\frac{10}{3}$

12. **Ans (D)**

The shift due to slab is $t\left(1 - \frac{1}{\mu}\right) = 3\left(1 - \frac{1}{1.5}\right)$ = 1cm towards left. Hence the object appears to mirror at a distance 61 – 1 = 60 cm.

From mirror formula $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$ we get v =20 cm.



Hence the mirror forms the image at v = 20 cms towards right. The slab again causes a shift of 1cm towards right. hence the final image is formed at a distance of 21 cm from pole.

Shifting of slab towards left does no cause any change to position of final image .

PART-1 : PHYSICS

SECTION-III

1. Ans (2)

$$\left.\begin{array}{l} p \propto m_0^a \\ p \propto v^b \\ p \propto t_0^c \end{array}\right]$$

$p = k[M]^a\,[LT^{-1}]^b\,[T]^c$

$ML^2T^{-3} = M^aL^bT^{-b+c}$

$a = 1$

$b = 2$

$-b + c = -3$

$-2 + c = -3$

$c = -1$

$p \propto v^2 \Rightarrow p = kv^2$

2. Ans (1)

$V = \frac{1}{3}\pi r^2 h$

Also $\frac{h}{r} = \frac{10}{5} \Rightarrow r = \frac{h}{2}$

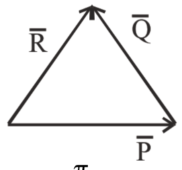
$\Rightarrow V = \frac{1}{3}\pi\frac{h^3}{4} = \frac{1}{12}\pi h^3$

$\frac{dV}{dt} = \frac{\pi h^2}{4}\frac{dh}{dt}$

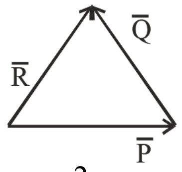
$9 = \frac{\pi(6)^2}{4}\frac{dh}{dt}$

$\frac{dh}{dt} = \frac{1}{\pi}$

3. Ans (6)



$\theta_1 = \frac{\pi}{3}$



$\theta_2 = \frac{2\pi}{3}$

$\therefore\ \theta_1 = \frac{\theta_2}{2}$

$\Rightarrow x = 2$

4. Ans (2)

$\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R}$

$\frac{\mu}{2R} - \frac{1}{\infty} = \frac{\mu - 1}{R}$

$\frac{\mu}{2R} = \frac{\mu - 1}{R}$

$\mu = 2$

5. Ans (2)

At point O

$\mu_1 \sin i = \mu_2 \sin r$

$\frac{3}{2} \times \sin\theta_c = \frac{4}{3}\sin r$

$\sin r = \frac{3}{4}$

At point E

$\frac{4}{3} \times \frac{3}{4} = 1 \times \sin\theta$

$\sin\theta = \frac{\pi}{2}$

6. **Ans (2)**

$$\frac{1}{10} = \left(\frac{1.5}{1} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$\frac{1}{-20} = \left(\frac{1.5}{\mu} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$-2 = \frac{1.5 - 1}{\left(\frac{1.5}{\mu} - 1\right)}$$

$$-2\left(\frac{1.5}{\mu} - 1\right) = 1.5 - 1$$

$$\frac{-3}{\mu} + 2 = 0.5$$

$$\frac{-3}{\mu} = -1.5$$

$$\mu = 2 = 1 + \frac{1}{10}t$$

$$\frac{1}{10}t = 1$$

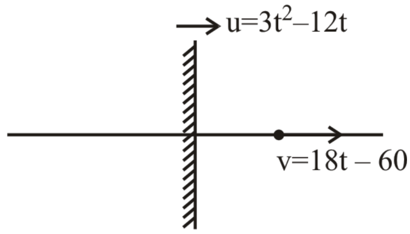
$$t = 10 = 5n$$

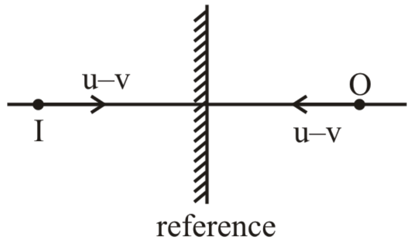
$$n = 2 \text{ sec}$$

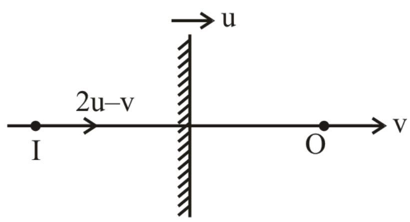
PART-1 : PHYSICS

SECTION-IV

2. **Ans (A->PT,B->R,C->PQ,D->QRS)**







$\therefore$ $v_{img} = (6t^2 - 24t) - (18t - 60)$

$= 6t^2 - 42t + 60$

(A) $0 = 6(t^2 - 7t + 10) = 6(t - 2)(t - 5)$

$\therefore \quad t = 2 \,\&\, 5$

(B) $a_{img} = 12t - 42$

(C) $a_{img} < 0$

$= 12t - 42 < 0$

$= t < 3.5$

PART-2 : CHEMISTRY

SECTION-I (i)

1. **Ans (B)**

A is present on corner and Face centre, B is present in Alternate T.Vs

Along one Body digonal two atom of A and one atom of B is present will be removed

$$A \longrightarrow 6 \times \frac{1}{8} + 6 \times \frac{1}{2} = \frac{15}{4}$$

$$B \longrightarrow 4 - 1 = 3$$

So the formula will be A_5B_4

3. Ans (C)

$$\frac{32}{2x+3y}=0.2$$

$$\frac{92.8}{3x+4y}=0.4$$

Hence x = 56 & y = 16.

4. Ans (A)

$P = P_B^\circ X_B + P_T^\circ X_T$

$120 = 150(X_B) + 50(1 - X_B)$

$100X_B = 70$

$X_B = 0.7$

$$Y_B = \frac{X_B P_B^0}{P} = \frac{0.7 \times 150}{120} = 0.875$$

$$\frac{Y_B}{Y_T} = \frac{7}{1}$$

$Y_T = 1 - 0.875 = 0.125$

PART-2 : CHEMISTRY

SECTION-I (ii)

5. Ans (A,B,C)

(A) For solution Z_2 at P_1 pressure

$X_A = 0.25$ $X_B = 0.75$

$Y_A = 0.5$ $Y_B = 0.5$

(B) For solution Z_2 at P_3 pressure $\longrightarrow$ solution will not vapourise so

$X_A = 0.4$; $X_B = 0.6$

(C) For sulution Z_1 at P_2 pressure $\longrightarrow$ solution will not vapourise so

$X_A = 0.2$; $X_B = 0.8$

6. Ans (B,D)

	$3A$	+	$2B$	$\rightarrow$	A_3B_2
initial mole	3		3		0
final mole	0		3–2		1

	A_3B_2	+	$2C$	$\rightarrow$	$A_3B_2C_2$
initial mole	1		1		0
final mole	$1-\frac{1}{2}$		0		$\frac{1}{2}$

8. Ans (A,C)

	H_2	+	½ O_2	$\longrightarrow$	$H_2O(l)$
$\Rightarrow$	30		25		-
	0		10		-

Volume contraction = 55 – 10 = 45

	H_2	+	½ O_2	$\longrightarrow$	$H_2O(l)$
$\Rightarrow$	10		45		0
	0		40		-

$\therefore$ Volume contraction = 55 – 40 = 15 mL

	H_2	+	½ O_2	$\longrightarrow$	$H_2O(l)$
$\Rightarrow$	40		15		0
	10		0		-

$\therefore$ Volume contraction 55 – 10 = 45

	H_2	+	½ O_2	$\longrightarrow$	$H_2O(l)$
$\Rightarrow$	35		20		0
	0		2.5		-

Volume contraction 55 – 2.5 = 52.5 mL

PART-2 : CHEMISTRY

SECTION-III

1. **Ans (2)**

Formula of density $= \dfrac{Z \times M}{N_A \times a^3}$

For FCC unit cell Z = 4

Edge length $a = 4 \times 10^{-8}$ cm

$$M = \frac{d \times N_A \times a^3}{Z}$$

$$= \frac{8 \times 6 \times 10^{23} \times 64 \times 10^{-24}}{4} \text{ gm/mol}$$

$$\text{No. of atoms} = \frac{\text{wt (gm)}}{\text{molar mass}} \times NA$$

$$= \frac{256 \times 10 \times 6 \times 10^{23}}{8 \times 6 \times 16} = 2 \times 10^{24} \text{ (Value of N = 2)}$$

3. **Ans (5)**

$\Delta T_f = K_f \times m \times i$

$$7 = 14 \times \frac{75.2}{94} \times \left(1 - \alpha + \frac{\alpha}{2}\right)$$

$\alpha = 0.75 = 75\%$

4. **Ans (2)**

12 gm CH_3COOH is present in 100 ml of solution

120 gm CH_3COOH is present in 1000 ml of solution

$M_2 = \dfrac{120}{60} = 2,$ Now we are mixing

500 ml, 2M CH_3COOH + 2M, 600 ml CH_3COOH

$M_1V_1 + M_2V_2 = M_3V_3$

$500 \times 2 + 600 \times 2 = M_3 \times 1100$,

$M_3 = \dfrac{2200}{1100} = 2$

5. **Ans (5)**

Ions in $Al_2(SO_4)_3 = \dfrac{1368}{342} \times N_A \times 5 = 20 \times N_A$

Ions in Na_3PO_4 = (n moles) $\times N_A \times 4$

$\Rightarrow n \times N_A \times 4 = 20 \times N_A \Rightarrow n = 5$ moles.

6. **Ans (6)**

$P_T = x = P_A^o x_A + P_B^o X_B$ .... (1)

$$x_A = \frac{n_A}{n_A + n_B} = \left(\frac{\frac{w}{80}}{\frac{w}{80} + \frac{w}{120}}\right)$$

$x_A = \dfrac{3}{5}, \; x_B = \dfrac{2}{5}$

From equation (1)

$$x = 40 \times \frac{3}{5} + 30 \times \frac{2}{5}$$

x = 36 torr

$$\frac{x}{6} = \frac{36}{6} = 6$$

PART-3 : MATHEMATICS

SECTION-I (i)

1. **Ans (A)**

Put $x = \cos\theta$

$$y = \frac{|\sin\theta|}{1 + |\cos\theta|}$$

2. **Ans (B)**

Put $x \longrightarrow \frac{1}{x}$

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

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

$$\therefore f(x^2) = \frac{(1-x^2)(3+2x^2)}{5x^2}$$

3. **Ans (C)**

$x^{100} = \left(x^2 - 3x + 2\right) Q(x) + ax - b$

Put x=1

$1 = a - b$

4. **Ans (D)**

$\alpha + \beta \Rightarrow \frac{-b}{a} < 0 \Rightarrow \frac{b}{a} > 0$

$\alpha\beta < 0 \Rightarrow \frac{c}{a} < 0$

PART-3 : MATHEMATICS

SECTION-I (ii)

5. **Ans (A,B,C,D)**

clearly, $\operatorname{cosec}^{-1}x = \pm\frac{\pi}{2}$

Also, $\operatorname{cosec}^{-1}y = \pm\frac{\pi}{2}$ & $\operatorname{cosec}^{-1}z = \pm\frac{\pi}{2}$

$\therefore x,y,z \in \{-1,1\}$

6. **Ans (A,D)**

$a = \sin^{-1}(\sin 4) = \pi - 4$

$b = \cos^{-1}(\cos 4) = 2\pi - 4$

$c = \tan^{-1}(\tan 4) = 4 - \pi$

$d = \cot^{-1}(\cot 4) = 4 - \pi$

7. **Ans (A,C,D)**

$\sin^{-1}(x^2 + x + 1) + \cos^{-1}(ax + 1) = \frac{\pi}{2}$ ... (1)

$\Rightarrow x^2 + x + 1 = ax + 1$ ... (2)

$\Rightarrow x^2 + (1 - a)x = 0$

It has exactly two solutions.

$\Rightarrow$ Exactly two real roots (different)

$\Rightarrow$ Disc. $> 0 \Rightarrow (1 - a)^2 - 4(1)(0) > 0$

$\Rightarrow (1 - a)^2 > 0 \Rightarrow a \neq 1$

$\therefore$ 1 is the only integer that 'a' can't attain to satisfy equation 2.

Now $\frac{3}{4} \leqslant x^2 + x + 1 \leqslant 1$ and $ax + 1 \in \left[\frac{3}{4}, 1\right]$

$\Rightarrow \frac{-1}{4} \leqslant x^2 + x \leqslant 0$

$x^2 + x \le 0$ and $4x^2 + 4x + 1 \ge 0$

$\Rightarrow x(x + 1) \le 0$ and $(2x + 1)^2 \ge 0$

$\Rightarrow x \in (-1, 0]$

For $a = -1$

$x^2 + x + 1 = -x + 1$

$\Rightarrow x^2 + 2x = 0 \Rightarrow x(x + 2) = 0$

$\Rightarrow x = 0$ or $x = -2$

$\Rightarrow ax + 1 = 0$ or 3 but $(ax + 1) \in \left[\frac{3}{4}, 1\right]$

and also $-2 \notin [1, 0]$

$\therefore a \neq 1$; (only one solution, not two solution)

For $a = 0$; $x^2 + x + 1 = 1$

$\Rightarrow x(x + 1) = 0 \Rightarrow x = 0$ or $x = -1$

$\therefore \sin^{-1}(x^2 + x + 1) + \cos^{-1}(ax + 1) = \frac{p}{2}$ is satisfied by $x = 0$, $x = -1$ and $a = 0$

For $a = 2$

$x^2 + x + 1 = 2x + 1 \Rightarrow x^2 - x = 0$

$\Rightarrow x = 0$ or 1, but $1 \notin [-1, 0]$

Thus $a \neq -1, 1$ and 2.

8. Ans (A,C)

$$\sin^{-1}\left(\frac{\sqrt{x}}{2}\right)+\sin^{-1}\left(\sqrt{\frac{1-x}{4}}\right)+\tan^{-1}y=\frac{2\pi}{3}$$

Here $x \in [0,4]$

Now we have

$$\sin^{-1}\left(\frac{\sqrt{x}}{2}\right)+\cos^{-1}\frac{\sqrt{x}}{2}+\tan^{-1}y=\frac{2\pi}{3}$$

$$\Rightarrow y=\frac{1}{\sqrt{3}}$$

maximum value of $x^2+y^2=16+\frac{1}{3}=\frac{49}{3}$

& minimum value of $x^2+y^2=0^2+\frac{1}{3}=\frac{1}{3}$

PART-3 : MATHEMATICS

SECTION-I (iii)

9. Ans (B)

Since it's an invertible function so it must be

linear so x = k must be a factor of numarator.

$$f(x)=\frac{x^2-2x-8}{x^2-4}=\frac{(x-4)(x+2)}{(x-2)(x+2)}$$

So, $x \neq 2, -2$

$$f(x)=\frac{x-4}{x-2}=y\ ,\ y\neq\frac{3}{2}$$

$$\Rightarrow x-4=xy-2y$$

$$\Rightarrow 2y-4=x(y-1)$$

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

$$\therefore f^{-1}(x)=\frac{2x-4}{x-1}, x\neq 1$$

10. Ans (B)

Since it's an invertible function so it must be

linear so x = k must be a factor of numarator.

$$f(x)=\frac{x^2-2x-8}{x^2-4}=\frac{(x-4)(x+2)}{(x-2)(x+2)}$$

So, $x \neq 2, -2$

$$f(x)=\frac{x-4}{x-2}=y\ ,\ y\neq\frac{3}{2}$$

$$\Rightarrow x-4=xy-2y$$

$$\Rightarrow 2y-4=x(y-1)$$

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

$$\therefore f^{-1}(x)=\frac{2x-4}{x-1}, x\neq 1$$

11. Ans (B)

$k \in \left(-2, \frac{1}{4}\right]$

2 integer

12. Ans (D)

$k \in \phi$

PART-3 : MATHEMATICS

SECTION-III

1. Ans (1)

Multiply all the three equations

$$\left(x+\frac{1}{y}\right)\left(y+\frac{1}{z}\right)\left(z+\frac{1}{x}\right)=\frac{28}{3}$$

$$xyz+\frac{1}{xyz}+\left(x+\frac{1}{y}\right)+\left(y+\frac{1}{z}\right)+\left(z+\frac{1}{x}\right)=\frac{28}{3}$$

$$xyz+\frac{1}{xyz}=2$$

$$\Rightarrow xyz=1$$

2. **Ans (1)**

$$x^3 - 12x + 1 = 0 \begin{cases} \alpha \\ \beta \\ \gamma \end{cases}$$

use $\alpha + \beta + \gamma = 0$ & $\alpha\beta\gamma = -1$

3. **Ans (4)**

$\alpha + \beta = 4, \quad \alpha\beta = 1$

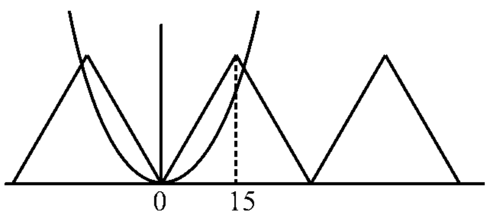
$$\text{Let } \frac{a_{n+1} + a_{n-1}}{a_n} = \frac{\alpha^{n+1} + \beta^{n+1} + \alpha^{n-1} + \beta^{n-1}}{\alpha^n + \beta^n}$$

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

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

$$= \alpha + \beta = 4$$

4. **Ans (3)**



Number of solutions are three

5. **Ans (7)**

$f(x) + f(-x) = 12$

put $x = \frac{1}{2}$

6. **Ans (6)**

$y = x + \frac{1}{x}; \quad x = \frac{y \pm \sqrt{y^2 - 4}}{2}$

PART-3 : MATHEMATICS

SECTION-IV

1. **Ans (A->Q,B->R,C->T,D->PT)**

$$\left[\begin{array}{l} x^2 - 8x + a = 0 \begin{array}{l} \alpha \\ 3\beta \end{array} \\ \alpha + 3\beta = 8 \quad — ① \\ \alpha(3\beta) = a \quad — ② \end{array}\right. \quad \& \quad \left[\begin{array}{l} x^2 - bx + 16 = 0 \begin{array}{l} \alpha \\ 4\beta \end{array} \\ \alpha + 4\beta = b \quad — ③ \\ \alpha(4\beta) = 16 \quad — ④ \end{array}\right.$$

By (2) & (4) $\Rightarrow$ a = 12

$\therefore$ Equation $x^2 - 8x + a = 0$ is $x^2 - 8x + 12 = 0$

New roots are x = 2 or 6.

If common root $\alpha = 2$, then $\beta = 2$ for which we get 3β & 4β both are integers.

But, if common root is $\alpha = 6$, then $\beta = \frac{2}{3}$ for which (4β) is not integer.

Hence, common root is 2.

$\therefore$ a = 12 & $b = \alpha + 4\beta = 2 + (4(2) = 10$

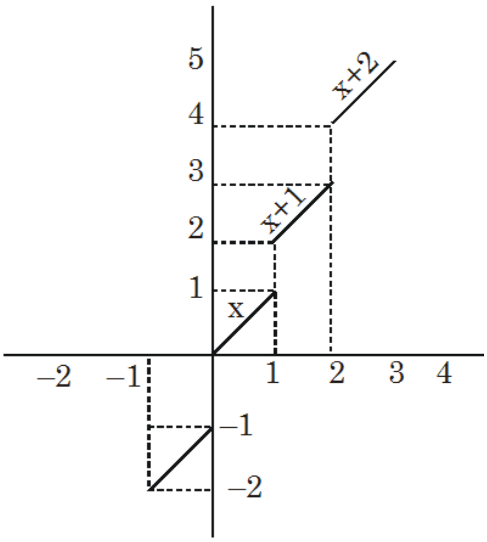
$\therefore$ (a + b) = 12 + 10 = 22

2. Ans (A->PS,B->QR,C->PQT,D->PQT)

$$\vdots$$

(A) $f(x) = x + [x] = \begin{cases} x-2 & x \in (-2,-1) \\ x=1 & x \in [-1,0) \\ x & x \in [0,1) \\ x+1 & x \in [1,2) \\ x+2 & x \in [2,3) \end{cases}$

$$\vdots$$

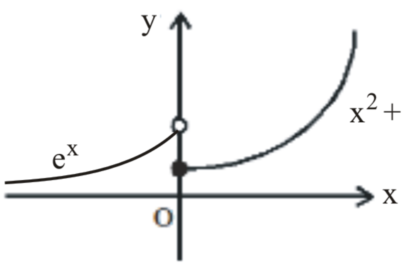


f(x) is injective but not surjective

(B) $f : R \longrightarrow (0, \infty)$

$$f(x) = \begin{cases} e^x & x < 0 \\ x^2 + \frac{1}{2} & x \geqslant 0 \end{cases}$$

Non injective surjective



(C) $f : (0, \infty) \longrightarrow R$

$f(x) = x^3 - 2x^2 + 2x + \log x$

$f'(x) = \underbrace{3x^2 - 4x + 2}_{a>0} + \frac{1}{x} \Rightarrow f'(x) > 0$

D<0

$\therefore$ Always +ve

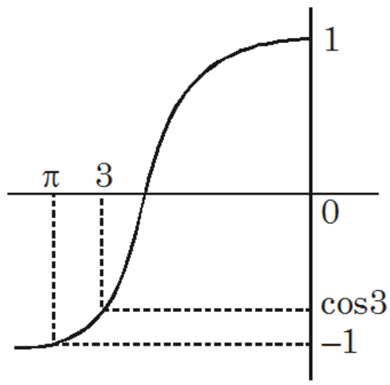
$\therefore$ f(x) is increasing $\Rightarrow$ one one

Also Range of f(x) is R

$\therefore$ f(x) is one one onto

(D) $f : [-3, 0] \longrightarrow [\cos 3, 1]$

$f(x) = \cos x$



one one onto