

Test Date: 12/08/2020



# Aakash

Medical | IIT-JEE | Foundations  
(Divisions of Aakash Educational Services Limited)

**B**  
CODE

Regd. Office: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

**Mock Test**  
**for JEE (Advanced) - 2020**  
**Test - 5A (Paper - II)**

**ANSWERS**

**PHYSICS**

1. (B, C)
2. (B, C)
3. (A, C)
4. (A, D)
5. (A, C)
6. (A, C)
7. (A, C)
8. (A, D)
9. (01)
10. (50)
11. (60)
12. (24)
13. (02)
14. (18)
15. (A)
16. (B)
17. (A)
18. (B)

**CHEMISTRY**

19. (B, C)
20. (A, B, C)
21. (A)
22. (A, C, D)
23. (A, B, C)
24. (A, B, C, D)
25. (B, C, D)
26. (A, D)
27. (05)
28. (05)
29. (07)
30. (07)
31. (02)
32. (04)
33. (A)
34. (C)
35. (B)
36. (A)

**MATHEMATICS**

37. (A, C)
38. (A, D)
39. (A, C)
40. (A, B, D)
41. (A, C, D)
42. (A, D)
43. (B, C)
44. (A, B)
45. (02)
46. (04)
47. (13)
48. (02)
49. (07)
50. (07)
51. (D)
52. (C)
53. (B)
54. (B)

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**ANSWERS & SOLUTIONS**

**PART – I : PHYSICS**

1. Answer (B, C)

$$\frac{dy}{dx} = \frac{x}{a} = 1$$

$$a_0 = \frac{2}{3} g \sin \theta = \frac{\sqrt{2}}{3} g$$

2. Answer (B, C)

$$I = \frac{V_0}{R} \left[ 1 - e^{-\frac{tR}{L}} \right] + \frac{V_0}{R} e^{-\frac{t}{RC}}$$

$$= \frac{V_0}{R} + \frac{V_0}{R} \left[ e^{-\frac{t}{\tau}} - e^{-\frac{t}{2\tau}} \right]$$

$$= \frac{V_0}{R} + \frac{V_0}{R} e^{-\frac{t}{2\tau}} \left[ 1 - e^{-\frac{t}{2\tau}} \right]$$

$$= \frac{5V_0}{4R}$$

3. Answer (A, C)

$$\phi_{\text{initial}} = \frac{\mu_0 I a dx}{2\pi x}$$

$$= \frac{\mu_0 I a}{2\pi} \ln 2$$

$$q = \frac{\Delta\phi}{R} = \frac{2 \times 10^{-7}}{0.7} \times 0.7 = 2 \times 10^{-7}$$

4. Answer (A, D)

$$a_0 = \frac{10}{5} = 2 \text{ m/s}^2$$

$$\frac{1}{2}(10-2)t_0^2 = d$$

$$t_0 = \frac{\sqrt{d}}{2}$$

5. Answer (A, C)

$$\lambda N_1 + 2\lambda N_2 = A_0$$

$$\lambda N_1 = \frac{A_0}{4}$$

$$N_2 = \frac{3A_0}{8\lambda}$$

$$\frac{N_1}{N_2} = \frac{A_0 / 4}{3A_0 / 8} = \frac{2}{3}$$

$$\frac{A_0}{4} e^{-\lambda t_0} = 3 \times \frac{3}{4} A_0 e^{-2\lambda t_0}$$

$$e^{-\lambda t_0} = 9 e^{-2\lambda t_0}$$

$$e^{\lambda t_0} = 9$$

$$t_0 = \frac{2}{\lambda} \ln[3]$$

6. Answer (A, C)

$$K = \frac{K}{8} + |Q|$$

$$\frac{7K}{8} = |Q|$$

7. Answer (A, C)

$$\frac{mV_0 L}{2} = \frac{ML^2}{12} \omega$$

$$\omega = \left[ \frac{6V_0 m}{ML} \right]$$

$$MV = mV_0 \Rightarrow V = \frac{mV_0}{M}$$

$$\frac{mV_0}{M} + \frac{3mV_0}{M} = V_0$$

$$\frac{m}{M} = \frac{1}{4}$$

$$T = \frac{M}{2} \times \frac{36m^2V_0^2}{M^2L^2} \times \frac{L}{4} = \frac{9MV_0^2}{32L}$$

8. Answer (A, D)

$$\frac{\alpha}{T} \frac{dT}{dx} = Q$$

$$\alpha \ln\left(\frac{T}{T_1}\right) = Q \frac{L}{2}$$

$$\alpha \ln\left(\frac{T_2}{T_1}\right) = QL$$

$$T_0 = T_1 \left(\frac{T_2}{T_1}\right)^{1/2}$$

9. Answer (01)

$$\frac{GMm}{R^2} - T = ma$$

$$\frac{GMm}{(R+l)^2} + T = ma$$

10. Answer (50)

$$t = \frac{l}{V_0}$$

$$d = h_1 + h_2 - g \left(\frac{l}{V_0}\right)^2$$

11. Answer (60)

$$\frac{\sin i}{\sin r} = \sqrt{3}, r = 30^\circ$$

$$\delta = \pi + 2i - 4r$$

$$= \pi$$

19. Answer (B, C)

Activation energy is considered to be independent of temperature

20. Answer (A, B, C)

105.6% Oleum requires 5.6 g of water

21. Answer (A)

12. Answer (24)

Let V be velocity of C.O.M of rod

$$V = 3V_0$$

$$\omega = \frac{4V_0}{l/2} = \frac{8V_0}{l}$$

13. Answer (02)

$$9.5 \times S = 0.5 \times 38$$

$$S = 2\Omega$$

14. Answer (18)

$$I = I_0 \sin(\omega t - \phi)$$

$$Z = 50 \Omega$$

$$V_L = I_0 \times 40 \cos(\omega t - \phi)$$

$$V_R = I_0 \times 30 \sin(\omega t - \phi)$$

$$72 = 96 \cos(\omega t - \phi)$$

$$\cos(\omega t - \phi) = \frac{3}{4}$$

$$\sin(\omega t - \phi) = \frac{\sqrt{7}}{4}$$

$$V_R = \frac{72\sqrt{7}}{4} = 18\sqrt{7} V$$

$$= 18\sqrt{7} V$$

15. Answer (A)

16. Answer (B)

17. Answer (A)

18. Answer (B)

$$mg(n-2) = 2\mu_2 F$$

$$n = \frac{2\mu_2 F}{mg} + 2$$

$$n = 2 \left[ \frac{\mu_2 F}{mg} + 1 \right]$$

Independent of  $\mu$

## PART – II : CHEMISTRY

$$\text{Total vol. of B unoccupied by A} = 4 \times \frac{4}{3}\pi(R^3 - r^3)$$

$$V = \frac{14\pi R^3}{3}$$

$$\text{Vol. of unit cell} = a^3$$

$$4R = \sqrt{2}a$$

$$a = \frac{4R}{\sqrt{2}}$$

$$V = a^3 = \frac{64R^3}{2\sqrt{2}}$$

$$\begin{aligned}\frac{V}{V} &= \frac{14\pi R^3}{3} \times \frac{2\sqrt{2}}{64R^3} \\ &= \frac{72\sqrt{2}\pi}{48}\end{aligned}$$

22. Answer (A, C, D)

$Zn(OH)_2$  is soluble in excess of  $NH_4OH$

23. Answer (A, B, C)

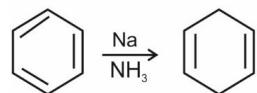
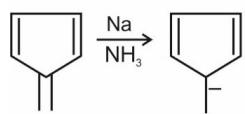
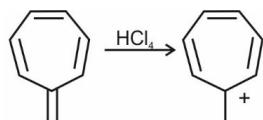
The value of  $X = 4$  ( $= 40 - 36$ )

$\therefore$  PQRS are the states

$$\therefore 5 - 3 = y - 2$$

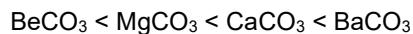
$$\therefore y = 4$$

24. Answer (A, B, C, D)

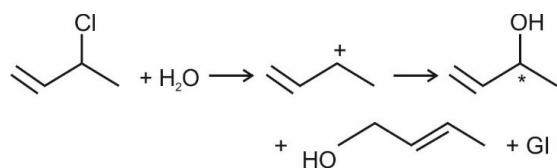


25. Answer (B, C, D)

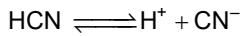
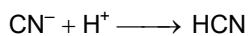
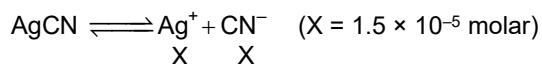
Order of Thermal stability is



26. Answer (A, D)



27. Answer (05)



X

$$K_a = \frac{[H^+][CN^-]}{[HCN]}$$

$$[CN^-] = \frac{4 \times 10^{-10} \times 1.5 \times 10^{-5}}{[H^+]}$$

$$K_{SP} = [Ag^+][CN^-]$$

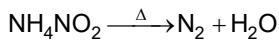
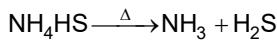
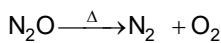
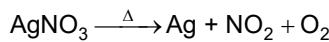
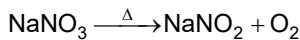
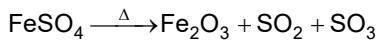
$$= \frac{1.5 \times 10^{-5} \times 4 \times 10^{-10} \times 1.5 \times 10^{-5}}{[H^+]}$$

$$[H^+] = \frac{1.5 \times 1.5 \times 4 \times 10^{-20}}{9 \times 10^{-15}}$$

$$= 10^{-5}$$

$$pH = 5$$

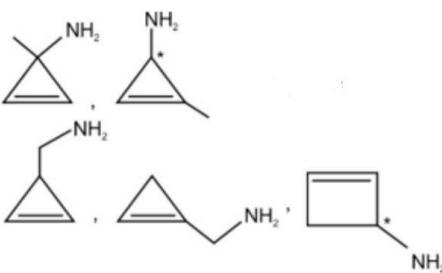
28. Answer (05)



29. Answer (07)

$SF_6$ ,  $CCl_4$ ,  $CF_4$ ,  $CHI_3$  and  $PH_3$  will not hydrolyse easily

30. Answer (07)



31. Answer (02)

Number of moles of  $\text{NH}_3$  (initial)

$$= \frac{0.48 \times 5}{0.08 \times 300}$$

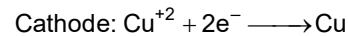
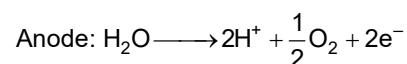
$$= 0.1 \text{ mol}$$

Copper tetra ammine complex will be formed.

 $\therefore 0.01$  mole  $\text{CuSO}_4$  will consume  $0.04$  mol of  $\text{NH}_3$  $\therefore$  Final number of mole of  $\text{NH}_3 = 0.06$ 

$$P_{\text{final}} = \frac{0.06 \times 0.08 \times 300}{5} = 0.288 \text{ atm}$$

32. Answer (04)

For 1<sup>st</sup> part of electrolysis

$$1.27 \text{ g Cu}^{+2} = 0.02 \text{ mol}$$

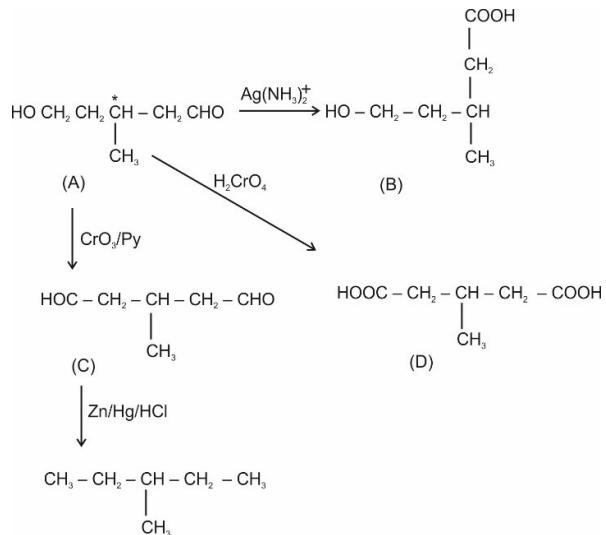
No. of moles of  $\text{H}^+$  produced =  $0.04$  molFinal vol. of solution =  $100 \text{ ml}$ 

$$[\text{H}^+] = 0.4 \text{ M}$$

$$\text{pH} = -\log 0.4 = 0.4 = X; 10X = 4$$

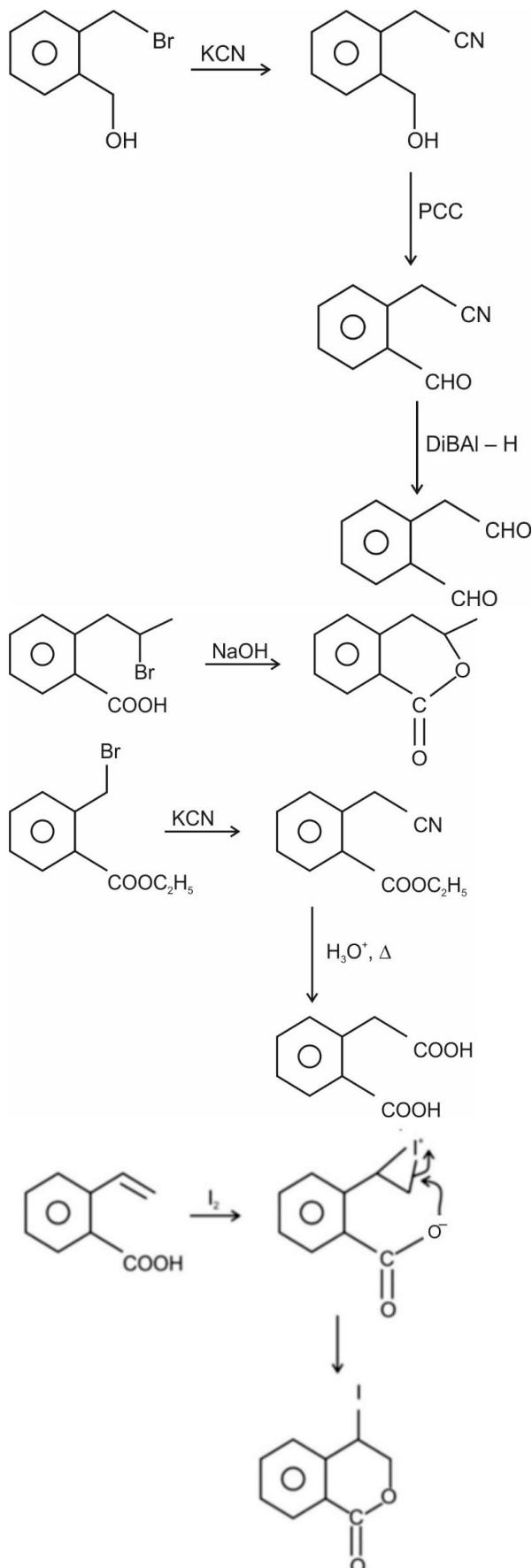
33. Answer (A)

34. Answer (C)

**Solution for Q33 and Q34**

35. Answer (B)

36. Answer (A)

**Solution for Q35 and Q36**

**PART – III : MATHEMATICS**

37. Answer (A, C)

$$\sqrt{1 - \sin A} = \left| \sin \frac{A}{2} - \cos \frac{A}{2} \right|$$

$$\text{and } \sqrt{1 + \sin A} = \left| \sin \frac{A}{2} + \cos \frac{A}{2} \right|$$

Now we can remove modulus sign according to the values of  $\sin \frac{A}{2}$  and  $\cos \frac{A}{2}$

38. Answer (A, D)

$$(a) x + \frac{a}{x^2} > 2, \forall x \in (0, \alpha)$$

$$\Rightarrow \frac{x}{2} + \frac{x}{2} + \frac{a}{x^2} > 2$$

$$\therefore AM \geq GM$$

$$\Rightarrow \frac{\frac{x}{2} + \frac{x}{2} + \frac{a}{x^2}}{3} \geq \left( \frac{x}{2} \cdot \frac{x}{2} \cdot \frac{a}{x^2} \right)^{1/3}$$

$$\Rightarrow x + ax^{-2} \geq 3 \frac{a^{1/3}}{4^{1/3}} > 2$$

$$\Rightarrow \frac{3^3 a}{4} > 8 \Rightarrow a > \frac{32}{27}$$

$$(B) f(x, y, z) = x^2 - 2x + 1 + 4y^2 - 12y + 9 + 3z^2 - 6z + 3 + 1$$

Hence least value of  $f(x, y, z) = 1$

$$\text{When } x = 1, y = \frac{3}{2}, z = 1$$

(C)  $A.M \geq G.M$ 

$$= \frac{\sin x + \cos x}{2} \geq \sqrt{\sin \theta \cos \theta}$$

$$\Rightarrow \sin \theta \cos \theta \leq \frac{1}{4} \Rightarrow xy \leq \frac{1}{4}$$

Let

$$\sin \theta = x, \cos \theta = y \quad \& \quad (1 + \operatorname{cosec} \theta)(1 + \sec \theta) \geq P$$

$$\Rightarrow \left(1 + \frac{1}{x}\right)\left(1 + \frac{1}{y}\right) \geq P$$

$$\Rightarrow (x+1)(1+y) \geq pxy$$

$$\Rightarrow 1+x+y+xy \geq pxy$$

$$\Rightarrow 2 \geq (P-1)xy$$

$$\Rightarrow xy \leq \frac{2}{P-1} \quad \left( \text{But } xy \leq \frac{1}{4} \right)$$

$$\Rightarrow \frac{2}{P-1} \leq \frac{1}{4} \Rightarrow P-1 \geq 8 \leq P \leq 9$$

(D) Let  $a < b$  &  $f(x) = |x-a| + |x-b|, \forall x \in R$  So,  $f(x)$  is decreasing in  $(-\infty, a)$ , constant in  $[a, b]$  and increasing in  $[b, \infty)$

Have

$$f(0) = f(1) = f(-1)$$

$$\Rightarrow \{-1, 0, 1\} \in [a, b] \therefore |a-b|_{\min} = 2$$

39. Answer (A, C)

$$\because f(n) = f(n-1)A; A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \text{ (say)}$$

$$\Rightarrow \begin{bmatrix} t_{n+1} & t_n \\ t_n & t_{n-1} \end{bmatrix} = \begin{bmatrix} t_n & t_{n-1} \\ t_{n-1} & t_{n-2} \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix}; n = 2, 3$$

....

$$\Rightarrow \begin{bmatrix} t_n + t_{n-1} & t_n \\ t_{n-1} + t_{n-2} & t_{n-1} \end{bmatrix} = \begin{bmatrix} at_n + ct_{n-1} & bt_n + dt_{n-1} \\ at_{n-1} + ct_{n-2} & bt_{n-1} + dt_{n-2} \end{bmatrix}$$

$$\Rightarrow a = c = 1 = b \text{ and } d = 0$$

$$\Rightarrow A = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$$

$$\text{Since } f(n) = f(n-1)A = f(n-2)A^2 = \dots$$

$$= f(1)A^{(n-1)}$$

$$\text{Now } f(1) = \begin{bmatrix} t_2 & t_1 \\ t_1 & t_0 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} = A$$

$$\text{So } f(n) = A^n$$

$$\Rightarrow \det(f(n)) = (\det A)^n$$

40. Answer (A, B, D)

$$(A) \frac{1}{a_n} - \frac{1}{a_n + 1} = \frac{1}{a_n + 1}$$

$$\therefore S_n = \sum \frac{1}{a_n + 1} = \frac{1}{a_1} - \frac{1}{a_{n+1}}$$

$$\Rightarrow S_{2017} = 2 - \frac{1}{a_{2018}}$$

$$\text{But } a_{2018} > 1$$

$$\Rightarrow 0 < \frac{1}{a_{2018}} < 1$$

$$\Rightarrow [S_{2017}] = 1$$

(B)  $\frac{100+n}{2}, 10\sqrt{n}, \frac{900n}{100+n}$  are terms of series clearly

$n$  even and perfect square  $n = 4k^2$

$$H.m = \frac{200k^2}{251k^2} (100 < n \leq 500, 25 < k^2 \leq 125)k^2$$

- = 50, 75, 100, 125
- $\Rightarrow k^2 = 100$  only possible
- $n = 400$
- (C) GE = 20. 20!
- $\Rightarrow 7^3$  divides  $n = 3$
- (D)  $\frac{10}{2}(2a + 9d) = a + 57d$

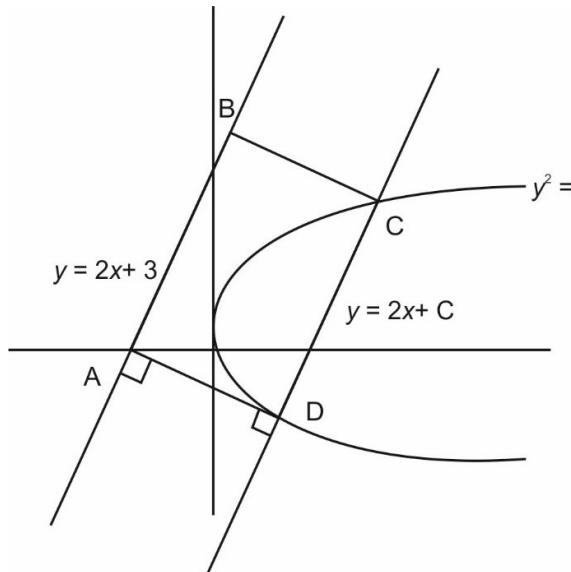
$$\Rightarrow a = \frac{4d}{3}$$

$$\Rightarrow a = 3l, a = 4 \text{ (least)}$$

41. Answer (A, C, D)

Let CD:  $y = 2x + C \Rightarrow y^2 = 2(y - C)$

$$CD^2 = 5(1 - 2C) = AD^2 = \left| \frac{C - 3}{\sqrt{5}} \right|^2$$



$$\Rightarrow 25 - 50C = C^2 - 6C + 9$$

$$\Rightarrow C^2 + 44C - 16 = 0$$

$$\Rightarrow C = 2(-11 + 5\sqrt{5}), 2(-11 - 5\sqrt{5})$$

$$\text{Intercept on } x\text{-axis} = -\frac{C}{2} = 11 + 5\sqrt{5} \text{ or } 11 - 5\sqrt{5}$$

$$\text{Area of square} = 5(1 - 2C) = 25 (9 \pm 4\sqrt{5})$$

$$= 25(\sqrt{5} \pm 2)^2$$

If point of intersection of tangents at C & D is P (h, k) then CD is chord of contact of P, hence

$$yk = 2(x + h) \equiv y = 2x + C \Rightarrow P\left(\frac{C}{2}, 1\right)$$

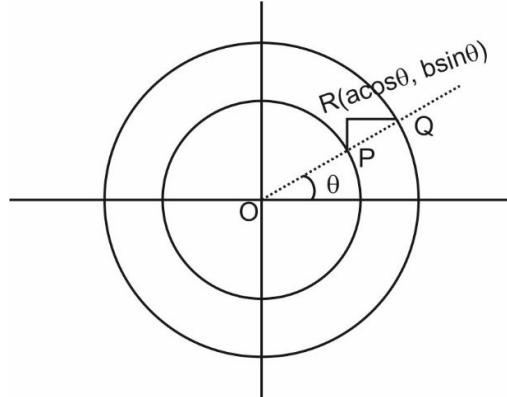
42. Answer (A, D)

$$P(H) = P, P(T) = 1 - P$$

A wins if A throws a Tail before B tosses a Head  
 $P(A) = P$  (T or HIT or HTHTT or ....)

$$\Rightarrow \frac{1-P}{1-P(1-P)} = \frac{1}{2} \Rightarrow P = \frac{\sqrt{5}-1}{2}$$

43. Answer (B, C)



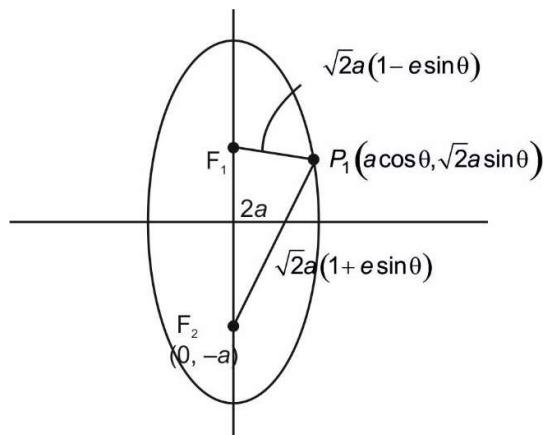
$\therefore$  Point R is  $(a\cos\theta, b\sin\theta)$  so locus of R is the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 (b > a)$

$$\therefore be = a \Rightarrow e = \frac{a}{b} = \sqrt{1 - \frac{a^2}{b^2}}$$

$$\Rightarrow 2a^2 = b^2 \Rightarrow e = \frac{1}{\sqrt{2}}$$

If incentre is  $(h, k)$ , then  $h = \left(\frac{a}{\sqrt{2}+1}\right)\cos\theta$ , then

$$h = \left(\frac{a}{\sqrt{2}+1}\right)\cos\theta \text{ and } K = \sin\theta$$



So locus of incentre will be an ellipse having

$$\text{eccentricity} = \sqrt{1 - \left(\frac{1}{\sqrt{2}+1}\right)^2} = \sqrt{2\sqrt{2} - 2}$$

Similarly locus of centroid is also an ellipse having eccentricity  $\frac{1}{\sqrt{2}}$

44. Answer (A, B)

Point P(1,1) lie on the line  $x + 2y = 3$

So let suppose slope of line L will be then equation of line L be  $y - 1 = m(x - 1)$  ... (i) & point P will be (1, 1)

Then point Q will be the point of intersection of line L & the given line  $x + 2y = 1$

$$y - 1 = m(1 - 2y - 1)$$

$$y - 1 = m(-2y)$$

$$2my + y = 1$$

$$y = \frac{1}{2m+1} \text{ & } x = 1 - 2y$$

$$x = 1 - \frac{2}{2m+1}$$

$$x = \frac{2m+1-2}{2m+1}$$

$$x = \frac{2m-1}{2m+1}$$

$$\text{So point Q will be } \left[ \frac{2m-1}{2m+1}, \frac{1}{2m+1} \right]$$

A line from P which is  $\perp$  to given line as follow

$$y - 1 = -\frac{1}{m}(x - 1)$$

$$my - m = -x + 1$$

$$my = -x + m + 1$$

$$y = \frac{-1x}{m} + \frac{m+1}{m}$$

Similarly equation of line which passes through point Q &  $\perp$  to given line 1 L (1)  $\left[ \frac{2m-1}{2m+1}, \frac{1}{2m+1} \right]$

$$\text{slope is } -\frac{1}{m}$$

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

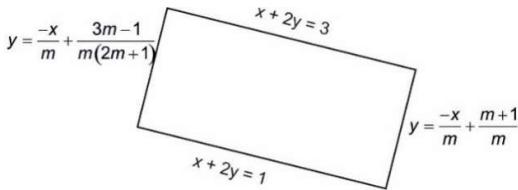
$$\frac{(2m+1)y-1}{2m+1} = \frac{-1}{m} \left( \frac{(2m+1)x-(2m-1)}{2m+1} \right)$$

$$m(2m+1)y - m = -(2m+1)x + (2m-1)$$

$$m[2m+1]y = -(2m+1)x + 3m - 1$$

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

A parallelogram is formed



Area of parallelogram

$$A = \left| \frac{(C_1 - C_2)(d_1 - d_2)}{m_1 - m_2} \right|$$

$$A = \left| \frac{(3-1) \left[ \frac{3m-1}{m(2m+1)} - \frac{m+1}{m} \right]}{-\frac{1}{m} - \left( -\frac{1}{2} \right)} \right|$$

$$A = \left| \frac{2 \left[ \frac{(3m-1) - (m+1)(2m+1)}{m(2m+1)} \right]}{\frac{m-2}{2m}} \right|$$

$$A = \left| 4 \left[ \frac{(3m-1) - (2m^2 + 3m + 1)}{(2m+1)(m-2)} \right] \right|$$

$$A = \left| 4 \left[ \frac{3m-1-2m^2-3m-1}{(2m+1)(m-2)} \right] \right|$$

$$= \left| 4 \left[ \frac{2(m^2+1)}{(2m+1)(m-2)} \right] \right|$$

$$A = \left| 8 \left[ \frac{(m^2+1)}{2m^2-3m-2} \right] \right|$$

$$\frac{dA}{dm} = 0$$

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

$$[4m^3 - 6m^2 - 4m] - [4m^3 - 3m^2 + 4m - 3] = 0$$

$$-3m^2 - 8m + 3 = 0$$

$$-3m^2 - 9m + m + 3 = 0$$

$$m = -3, m = 1/3$$

$$-3(m+3) + 1(m+3) = 0$$

For both value of m there are same Area =  $\frac{16}{5}$

45. Answer (02)

$$\text{Let } nx = t$$

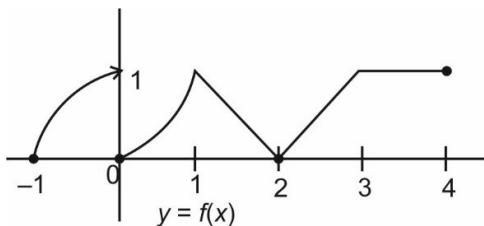
$$A_n = \frac{1}{n} \int_{\frac{n}{n+1}}^1 \frac{\tan^{-1} t}{\sin^{-1} t} dt$$

$$\lim_{n \rightarrow \infty} n^2 A_n = \lim_{z \rightarrow 0} \frac{\int_1^{1+z} \frac{\tan^{-1} t}{\sin^{-1} t} dt}{z}$$

$$\lim_{z \rightarrow 0} \frac{\tan^{-1} \left( \frac{1}{1+z} \right)}{\sin^{-1} \left( \frac{1}{1+z} \right)} \cdot \frac{1}{(1+z)^2}$$

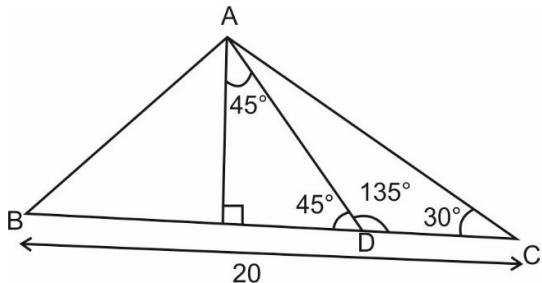
$$= \frac{1}{2}$$

46. Answer (04)



Function  $f(x)$  is discontinuous at  $x = 0$  and non-differentiable at  $x = 0, 1, 2$  and  $3$

47. Answer (13)



Let  $AD = l$

$$\Delta = \frac{1}{2} \cdot 20l \cdot \sin 45^\circ$$

$$\Rightarrow l = 5\sqrt{2}$$

IN  $\triangle ABC$

$$\frac{CD}{\sin 15^\circ} = \frac{l}{\sin 30^\circ}$$

$$\Rightarrow CD = \left( \frac{\sqrt{3}-1}{2\sqrt{2}} \right) \frac{5\sqrt{2}}{1/2}$$

$$\Rightarrow CD = 5(\sqrt{3}-1)$$

$$\text{So } \frac{BD}{CD} = \frac{20-CD}{CD}$$

$$= \frac{4}{\sqrt{3}-1} - 1$$

$$= 2(\sqrt{3}+1) - 1$$

$$= 2\sqrt{3} + 1$$

48. Answer (02)

$$f(x) = (3g(x) - x^2)^2 + x^4$$

$$M = \int_0^1 x^4 dx = \frac{1}{5} \text{ and } g(x) = \frac{x^2}{3}$$

$$\therefore \phi'(x) = \int_0^x g(y) dy - e^x + e^{-x}$$

$$\phi''(x) = g(x) - e^x - e^{-x} < 0 \quad \forall x \in R$$

So  $n = 0$

49. Answer (07)

$$\frac{x^3}{(x-z)(x-y)} + \frac{y^3}{(y-z)(y-x)} + \frac{z^3}{(z-x)(z-y)}$$

$$= \frac{(x+y+z)(x-y)(y-z)(z-x)}{(x-y)(y-z)(z-x)} = x+y+z$$

$\therefore$  Total number of possible values = 7

50. Answer (07)

Let  $a = l+f$ , where  $0 < f < 1$  and  $l \in N$

$$\therefore \int_0^a [x] dx = \int_0^a d(dx)$$

$$\Rightarrow \int_0^1 0 \cdot dx + \int_1^2 1 \cdot dx + \int_2^3 2 \cdot dx + \dots + \int_l^{l+f} l \cdot dx = \frac{l^2}{2}$$

$$\Rightarrow (1+2+3+\dots+(l+1)) + lf = \frac{l^2}{2}$$

$$\Rightarrow \frac{l(l-1)}{2} + lf = \frac{l^2}{2}$$

$$\Rightarrow f = \frac{1}{2}$$

Hence  $a = 1.5, 2.5$  and  $3.5$

$$\Rightarrow [N] = 7$$

51. Answer (D)

52. Answer (C)

**Solution for Q51 & Q52**

$$\therefore |\bar{a}| = 2 \Rightarrow \bar{x} \cdot \bar{y} + \bar{y} \cdot \bar{z} + \bar{z} \cdot \bar{x} = \frac{1}{2} \dots (i)$$

$$\because \bar{a} \cdot \bar{x} = \frac{3}{2} \Rightarrow \bar{x} \cdot \bar{y} + \bar{z} \cdot \bar{x} = \frac{1}{2} \quad \dots \text{(ii)}$$

$$\because \bar{a} \cdot \bar{y} = \frac{7}{4} \Rightarrow \bar{x} \cdot \bar{y} + \bar{y} \cdot \bar{z} = \frac{3}{4} \quad \dots \text{(iii)}$$

From (i), (ii) and (iii),

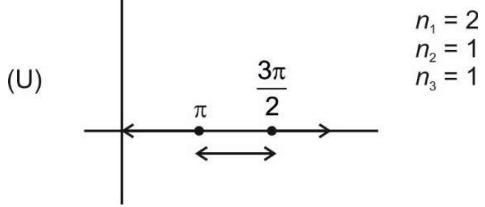
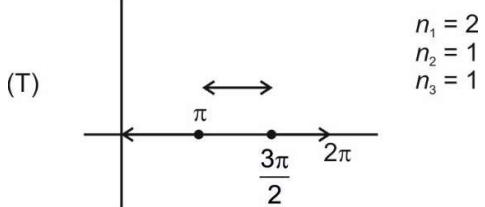
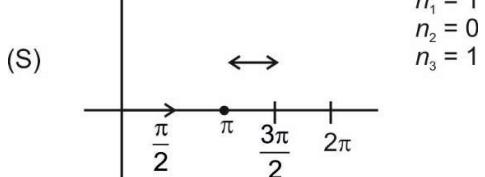
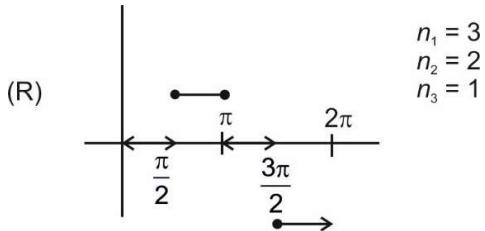
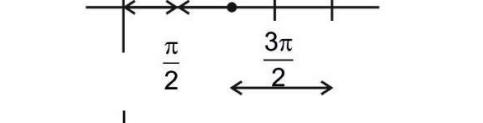
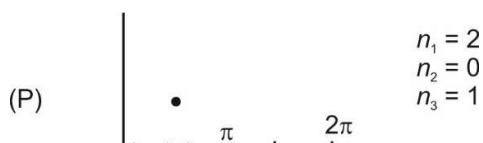
$$\bar{x} \cdot \bar{y} = \frac{3}{4}, \bar{y} \cdot \bar{z} = 0 \text{ and } \bar{z} \cdot \bar{x} = -\frac{1}{4}$$

$$\text{So, } \bar{a} = \bar{x} + \bar{y} + \bar{z}, \bar{b} = -\frac{1}{4}\bar{y} - \frac{3}{4}\bar{z} \text{ and } \bar{c} = -\frac{1}{4}\bar{y}$$

53. Answer (B)

54. Answer (B)

### Solution for Q53 & Q54



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