KD Campus

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PLOT NO. 2 SSI, OPP METRO PILLAR 150, GT KARNAL ROAD, JAHANGIRPURI, DELHI: 110033

NDA MATHS MOCK TEST - 162 (SOLUTION)

1. (C) Let $f(x) = \log x$ and $f(y) = \log y$

Now, $f(xy) = \log(xy)$

$\Rightarrow f(xy) = \log x + \log y$

$\Rightarrow f(xy) = f(x) + f(y)$

2. (C) $A = \{x \in R,\ x^2 + 5x - 6 < 0\}$

$x^2 + 5x - 6 < 0$

$\Rightarrow (x + 6)(x - 1) < 0$

$\Rightarrow A = (-6, 1)$

and $B = \{x \in R : x^2 + 8x + 12 > 0$

$\Rightarrow x^2 + 8x + 12 > 0$

$\Rightarrow (x + 6)(x + 2) > 0$

$x \in (-\infty, -6) \cup (-2, \infty)$

Statement I

$(A \cap B) = (-2, 1)$

Statement I is correct.

Staement II

$A - B = (-6, -2)$

Statement II is correct.

Hence both statements are correct.

3. (D)

2	14	0
2	7	1
2	3	1
2	1	1
	0	

$$\begin{array}{r} 0\,.125 \\ \times\ 2 \\ \hline \boxed{0}.250 \\ \times\ 2 \\ \hline \boxed{0}.500 \\ \times\ 2 \\ \hline \boxed{1}.000 \end{array}$$

$(14)_{10} = (1110)_2$ $\quad$ $(0.125)_{10} = (0.001)_2$

Hence $(14.125)_{10} = (1110.001)_2$

4. (C) Planes $x + y + z + 1 = 0$ and $2x - 2y + 2z + 1 = 0$

Let angle between planes = θ

$$\text{Now, } \cos\theta = \frac{1\times 2 + 1\times(-2) + 1\times 2}{\sqrt{1^2+1^2+1^2}\sqrt{2^2+(-2)^2+2^2}}$$

$$\Rightarrow \cos\theta = \frac{2}{\sqrt{3}\sqrt{12}}$$

$$\Rightarrow \cos\theta = \frac{2}{6} \Rightarrow \cos\theta = \frac{1}{3}$$

5. (B) $I = \int_{-1}^{1} x^2 \,|x|\, dx$

$$I = \int_{-1}^{0} x^2(-x)\,dx + \int_0^1 x^2.x\ dx$$

$$I = -\int_{-1}^{0} x^3\,dx + \int_0^1 x^3\ dx$$

$$I = -\left[\frac{x^4}{4}\right]_{-1}^{0} + \left[\frac{x^4}{4}\right]_0^1$$

$$I = -\left[0 - \frac{(-1)^4}{4}\right] + \left[\frac{1}{4} - 0\right]$$

$$I = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}$$

6. (C) Let $y = \tan^{-1}\dfrac{2x}{1-x^2}$

let $x = \tan\theta \Rightarrow \theta = \tan^{-1}x$

$$y = \tan^{-1}\left(\frac{2\tan\theta}{1-\tan^2\theta}\right)$$

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

$y = 2\theta$

$y = 2\tan^{-1}x$

On differentiating both sides w.r.t. 'x'

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

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

and Let $z = \sin^{-1}\dfrac{2x}{1+x^2}$

$$\Rightarrow z = \sin^{-1}\left(\frac{2\tan\theta}{1+\tan^2\theta}\right)$$

$\Rightarrow z = \sin^{-1}(\sin 2\theta)$

$z = 2\theta$

$z = 2\tan^{-1}x$

On differentiating both sides w.r.t.'x'

$$\frac{dz}{dx} = 2\times\frac{1}{1+x^2}$$

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

$$\text{Now, } \frac{dy}{dz} = \frac{dy}{dx}\times\frac{dx}{dz}$$

$$\Rightarrow \frac{dy}{dz} = \frac{2}{1+x^2}\times\frac{1+x^2}{2}$$

$$\Rightarrow \frac{dy}{dz} = 1$$

7. (C) $$I = \int_a^b \frac{\phi(x)}{\phi(x)+\phi(a+b-x)}\,dx \qquad \ldots\text{(i)}$$

Prop.IV $\int_a^b f(x)dx = \int_a^b f(a+b-x)dx$

$$I = \int_a^b \frac{\phi(a+b-x)}{\phi(a+b-x)+\phi(x)}\,dx \qquad \ldots\text{(ii)}$$

from eq(i) and eq(ii)

$$2I = \int_a^b \frac{\phi(x)+\phi(a+b-x)}{\phi(x)+\phi(a+b-x)}\,dx$$

$$2I = \int_a^b 1.dx$$

$$2I = [x]_a^b$$

$$2I = b - a \Rightarrow I = \frac{b-a}{2}$$

8. (C) $n(S) = {}^9C_2 = 36$
E = {(1, 2), (1, 4), (1, 6), (2, 3), (2, 5), (2, 9), (3, 4), (3, 8), (4, 7), (4, 9), (5, 6), (5, 8), (6, 7), (8, 9)}
$n(E) = 14$

The required Probability = $\frac{14}{36} = \frac{7}{18}$

9. (B) Differential equation

$$\left(\frac{dy}{dx} - y\right)^{1/2} = \left(\frac{d^2y}{dx^2}\right)^{1/3}$$

$$\Rightarrow \left(\frac{dy}{dx} - y\right)^{3} = \left(\frac{d^2y}{dx^2}\right)^{2}$$

Order = 2 and Degree = 2

10. (C) $\lim\limits_{x\to\infty}\left(\frac{x+5}{x+3}\right)^{x+2}$

$$\Rightarrow \lim_{x\to\infty}\left(1+\frac{2}{x+3}\right)^{x+2}$$

$$\Rightarrow \lim_{x\to\infty}\left(1+\frac{2}{x+3}\right)^{\frac{x+3}{2}\times\frac{2(x+2)}{x+3}}$$

$$\Rightarrow e^{\lim\limits_{x\to\infty}\frac{2(x+2)}{x+3}} \qquad \left[\because \lim_{x\to\infty}\left(1+\frac{1}{x}\right)^{x} = e\right]$$

$$\Rightarrow e^{\lim\limits_{x\to\infty}\frac{2x\left(1+\frac{2}{x}\right)}{x\left(1+\frac{3}{x}\right)}}$$

$$\Rightarrow e^{2\left(\frac{1+0}{1+0}\right)} = e^2$$

11. (A) $\frac{1}{\log_3 30} + \frac{1}{\log_2 30} + \frac{1}{\log_5 30}$

$\Rightarrow \log_{30}3 + \log_{30}2 + \log_{30}5 \quad \left[\because \log_a b = \frac{1}{\log_b a}\right]$

$\Rightarrow \log_{30}(3\times2\times5)$
$\Rightarrow \log_{30}30 = 1$

12. (C) $I = \int e^{\ln x}.\cos x\, dx$

$I = \int x.\cos x\, dx$

$I = x.\int \cos x\, dx - \int\left\{\frac{d}{dx}(x)\int \cos x\, dx\right\}dx$

$I = x.\sin x - \int 1.\sin x\, dx$

$I = x.\sin x + \cos x + c$

13. (B) In ΔABC,
$a = 6,\ b = 8,\ c = 10$

$\cos A = \frac{b^2+c^2-a^2}{2bc}$

$\cos A = \frac{8^2+10^2-6^2}{2\times8\times10}$

$\cos A = \frac{64+100-36}{160}$

$\cos A = \frac{4}{5}$

Now, $\cos 2A = 2\cos^2 A - 1$

$\Rightarrow \cos 2A = 2\times\left(\frac{4}{5}\right)^2 - 1$

$\Rightarrow \cos 2A = \frac{32}{25} - 1 \Rightarrow \cos 2A = \frac{7}{25}$

14. (A) Sphere $x^2 + y^2 + z^2 + x + y + z = 0$
On comparing with general equation

$u = \frac{1}{2},\ v = \frac{1}{2},\ w = \frac{1}{2},\ d = 0$

Now, $r = \sqrt{u^2+v^2+w^2-d}$

$\Rightarrow r = \sqrt{\left(\frac{1}{2}\right)^2+\left(\frac{1}{2}\right)^2+\left(\frac{1}{2}\right)^2-0}$

$\Rightarrow r = 1\sqrt{\frac{1}{4}+\frac{1}{4}+\frac{1}{4}}$

$\Rightarrow r = \sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{2}$

15. (D) $\vec{a} = \hat{i} - 3x\hat{j} - 4y\hat{k}$ and $\vec{b} = \hat{i} + 4x\hat{j} + 3y\hat{k}$ are orthogonal to each other,

then $\vec{a}.\vec{b} = 0$

$\Rightarrow 1\times1 - 3x\times4x - 4y\times3y = 0$
$\Rightarrow 1 - 12x^2 - 12y^2 = 0$

$\Rightarrow 12x^2 + 12y^2 = 1 \Rightarrow x^2 + y^2 = \frac{1}{12}$

Hence it is circle.

16. (C) $\begin{vmatrix} a+x & a-x & a-x \\ a-x & a+x & a-x \\ a-x & a-x & a+x \end{vmatrix} = 0$

$R_2 \to R_2 - R_1,\ R_3 \to R_3 - R_1$

$\Rightarrow \begin{vmatrix} a+x & a-x & a-x \\ -2x & 2x & 0 \\ -2x & 0 & 2x \end{vmatrix} = 0$

$R_2 \to R_2 - R_3$

$\Rightarrow \begin{vmatrix} a+x & a-x & a-x \\ 0 & 2x & -2x \\ -2x & 0 & 2x \end{vmatrix} = 0$

$\Rightarrow (a+x)(4x^2-0) - (a-x)(0-4x^2) + (a-x)(0+4x^2) = 0$
$\Rightarrow 4ax^2 + 4x^3 + 4ax^2 - 4x^3 + 4ax^2 - 4x^3 = 0$
$\Rightarrow 12ax^2 - 4x^3 = 0$
$\Rightarrow 4x^2(3a - x) = 0$
$\Rightarrow x = 0,\ x = 3a$

17. (B) Let $\vec{a} = p(6\hat{i} + 3\hat{j} - 2\hat{k})$

Given that $|\vec{a}| = 7$

$\Rightarrow \sqrt{p^2\left[6^2 + 3^2 + (-2)^2\right]} = 7$

$\Rightarrow p^2 \times 49 = 49$

$\Rightarrow p = 1$

Hence $p = 1$

18. (C) Word "SORRY"

Total arrangement = $\frac{5!}{2!} = 60$

Total arrangement when two 'R's come together = $\frac{4!}{2!} = 12$

Total arrangement when two 'R's should not be together = 60 –12 = 48

19. (C) Given that = A = {1, 2, 3, 5, 7}

$n(A) = 5$

$P(A) = 2^5 = 32$

20. (D) $\lim\limits_{n\to\infty} \frac{1^3 + 2^3 + 3^3 + \ldots.. + n^3}{1^2 + 2^2 + 3^2 + \ldots.. + n^2}$

$$\Rightarrow \lim_{n\to\infty} \frac{\frac{n^2(n+1)^2}{4}}{\frac{n}{6}(n+1)(2n+1)}$$

$$\Rightarrow \lim_{n\to\infty} \frac{\frac{n^2 \times n^2\left(1+\frac{1}{n}\right)^2}{4}}{\frac{n^3}{6}\left(1+\frac{1}{n}\right)\left(2+\frac{1}{n}\right)}$$

$$\Rightarrow \lim_{n\to\infty} \frac{3n}{2} \frac{\left(1+\frac{1}{n}\right)^2}{\left(1+\frac{1}{n}\right)\left(2+\frac{1}{n}\right)} = \infty$$

21. (D)

22. (B) $n(s) = {}^8C_2 = 28$

$n(E) = {}^5C_2 \times {}^4C_0 = 10\times1 = 10$

The required Probability $= \frac{n(E)}{n(s)} = \frac{10}{28} = \frac{5}{14}$

23. (B) $I = \int x^2.\cos^2 x^3.\sin x^3\, dx$

Let $\cos x^3 = t$

$\Rightarrow -3x^2.\sin x^3 dx = dt$

$\Rightarrow x^2 \sin x^3\, dx = \frac{-1}{3} dt$

$I = \frac{-1}{3}\int t^2\, dt$

$I = \frac{-1}{3} \times \frac{t^3}{3} + c$

$I = -\frac{1}{9}\cos^3 x^3 + c$

24. (B) $f(x) = 2^{\cos x}$

On differentiating both sides w.r.t. 'x'

$f'(x) = 2^{\cos x}.\log 2.(-\sin x)$

$f'(x) = -\sin x.\log 2.2^{\cos x}$

25. (C) tan195° + cot255°

$\Rightarrow$ tan(180 + 15) + cot(180 + 75)

$\Rightarrow$ tan15 + cot75

$\Rightarrow$ tan15 + tan15

$\Rightarrow$ 2 tan15

$\Rightarrow 2\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right) \times \frac{\sqrt{3}-1}{\sqrt{3}-1}$

$\Rightarrow 2\times\frac{(\sqrt{3}-1)^2}{3-1}$

$\Rightarrow 2\times\frac{(3+1-2\sqrt{3})}{2} = 4 - 2\sqrt{3}$

26. (B) $I = \int \frac{dx}{\sqrt{9+x^2}}$

$I = \log|x + \sqrt{x^2+9}| + c$

27. (D) $(\vec{a}+\vec{b})\times(\vec{a}-\vec{b})$

$\Rightarrow (\vec{a}\times\vec{a}) + (\vec{b}\times\vec{a}) - (\vec{a}\times\vec{b}) - (\vec{b}\times\vec{b})$

$\Rightarrow 0 - (\vec{a}\times\vec{b}) - (\vec{a}\times\vec{b}) = -2(\vec{a}\times\vec{b})$

28. (A) $y = \tan^{-1}\left(\frac{3-2\tan\sqrt{x}}{2+3\tan\sqrt{x}}\right)$

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

Let $\frac{3}{2} = \tan\phi \Rightarrow \phi = \tan^{-1}\left(\frac{3}{2}\right)$

$y = \tan^{-1}\left(\frac{\tan\phi - \tan\sqrt{x}}{1+\tan\phi.\tan\sqrt{x}}\right)$

$y = \tan^{-1}[\tan(\phi - \sqrt{x})]$

$y = \phi - \sqrt{x}$

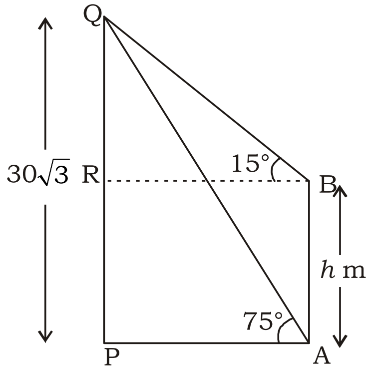
$y = \tan^{-1}\left(\frac{3}{2}\right) - \sqrt{x}$

On differentiating both sides w.r.t.'x'

$\frac{dy}{dx} = 0 - \frac{1}{2\sqrt{x}}$

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

29. (B)



Let AB = h m = PR

and QR = $30\sqrt{3} - h$

In ΔQRB

$$\tan 15° = \frac{QR}{RB}$$

$$\Rightarrow \frac{\sqrt{3}-1}{\sqrt{3}+1} = \frac{30\sqrt{3}-h}{RB} \quad \text{...(i)}$$

In ΔAPQ

$$\tan 75° = \frac{PQ}{PA}$$

$$\Rightarrow \frac{\sqrt{3}+1}{\sqrt{3}-1} = \frac{30\sqrt{3}}{RB} \quad \text{...(ii)}$$

from eq(i) and eq(ii)

$$\frac{(\sqrt{3}-1)^2}{(\sqrt{3}+1)^2} = \frac{30\sqrt{3}-h}{30\sqrt{3}}$$

$$\Rightarrow \frac{4-2\sqrt{3}}{4+2\sqrt{3}} = \frac{30\sqrt{3}-h}{30\sqrt{3}}$$

$$\Rightarrow \frac{2-\sqrt{3}}{2+\sqrt{3}} = \frac{30\sqrt{3}-h}{30\sqrt{3}}$$

$\Rightarrow 60\sqrt{3} - 90 = 60\sqrt{3} - 2h + 90 - \sqrt{3}\,h$

$\Rightarrow (2 - \sqrt{3})h = 180$

$$\Rightarrow h = \frac{180}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}}$$

$h = 180(2 + \sqrt{3})$

Hence height of the pole = $180(2 + \sqrt{3})$ m

30. (C) Let $\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$

$$\vec{a}\times\hat{i} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ a_1 & a_2 & a_3 \\ 1 & 0 & 0 \end{vmatrix}$$

$$\vec{a}\times\hat{i} = \hat{i}\,(0) - \hat{j}\,(-a_3) + \hat{k}\,(-a_2)$$

$$\vec{a}\times\hat{i} \;\Rightarrow a_3\hat{j} - a_2\hat{k}$$

$$|\,\vec{a}\times\hat{i}\,|^2 = |\,a_3\hat{j} - a_2\hat{k}\,|^2$$

$$|\,\vec{a}\times\hat{i}\,|^2 = a_3^2 + a_2^2$$

Similarly

$|\,\vec{a}\times\hat{j}\,|^2 = a_1^2 + a_3^2$ and $|\,\vec{a}\times\hat{k}\,|^2 = a_1^2 + a_2^2$

Now, $|\,\vec{a}\times\hat{i}\,|^2 + |\,\vec{a}\times\hat{j}\,|^2 + |\,\vec{a}\times\hat{k}\,|^2$

$\Rightarrow a_3^2 + a_2^2 + a_1^2 + a_3^2 + a_1^2 + a_2^2$

$\Rightarrow 2(a_1^2 + a_2^2 + a_3^2) = 2|\,\vec{a}\,|^2$

31. (C) Let the equation of circle

$x^2 + y^2 + 2gx + 2fy + c = 0$ ...(i)

it passes through the point (1, 2)

$1^2 + 2^2 + 2g\times2 + 2f\times2 + c = 0$

$\Rightarrow 4g + 4f + c = -5$ ...(ii)

eq(i) passes through the point (–1, 0)

$(-1)^2 + 0^2 + 2g\times(-1) + 2f\times0 + c = 0$

$\Rightarrow -2g + c = -1$ ...(iii)

eq(i) passes through the point (3, – 4)

$3^2 + (-4)^2 + 2g\times3 + 2f\times(-4) + c = 0$

$\Rightarrow 6g - 8f + c = -25$ ...(iv)

On solving eq(ii), (iii) and (iv)

$$g = \frac{-8}{5},\; f = \frac{7}{5},\; c = \frac{-21}{5}$$

from eq(i)

$$x^2 + y^2 + 2\left(\frac{-8}{5}\right)x + 2\left(\frac{7}{5}\right)y - \frac{21}{5} = 0$$

$\Rightarrow 5x^2 + 5y^2 - 16x + 14y - 21 = 0$

32. (B) $y = (\sec x)^{(\sec x)\ldots\ldots\infty}$

$\Rightarrow y = (\sec x)^y$

taking log both sides

$\Rightarrow \log y = y\log\sec x$ ...(i)

On differentiating both sides w.r.t.'x'

$$\Rightarrow \frac{1}{y}\frac{dy}{dx} = y\times\frac{\sec x.\tan x}{\sec x} + \frac{dy}{dx}.\log\sec x$$

$$\Rightarrow \frac{dy}{dx} = y^2.\tan x + \frac{dy}{dx}(y\log\sec x)$$

$$\Rightarrow \frac{dy}{dx} = y^2.\tan x + \log y.\frac{dy}{dx} \quad \text{[from eq(i)]}$$

$$\Rightarrow (1 - \log y)\frac{dy}{dx} = y^2.\tan x$$

$$\Rightarrow \frac{dy}{dx} = \frac{y^2.\tan x}{1-\log y}$$

33. (D) Equation

$x^2 + \alpha x + \beta = 0$

Roots are α and β,

then $\alpha + \beta = -\alpha$

$\Rightarrow 2\alpha + \beta = 0$ ...(i)

and $\alpha.\beta = \beta \Rightarrow \alpha = 1$

from eq(i)

$2\times 1 + \beta = 0 \Rightarrow \beta = -2$

New quadratic equation

$\Rightarrow -x^2 - \alpha x - \beta$

$\Rightarrow -x^2 - x + 2$

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

$\Rightarrow -\left(x + \frac{1}{2}\right)^2 + \frac{9}{4}$

Hence greatest value of the equation = $\frac{9}{4}$

34. (B) Equation

$5x^2 + 4 = 0$

Roots are sinα and sinβ,

then $\sin\alpha + \sin\beta = 0$

and $\sin\alpha.\sin\beta = \frac{4}{5}$

$\Rightarrow \text{cosec}\alpha.\text{cosec}\beta = \frac{5}{4}$

35. (B) Equation

$|x-4|^2 + |x-4| - 2 = 0$

Let $x - 4 = y$

$y^2 + |y| - 2 = 0$

(i) When $y \geq 0$

$y^2 + y - 2 = 0$

$\Rightarrow (y+2)(y-1) = 0$

$\Rightarrow y = -2, 1$

$\Rightarrow y = 1$

$\Rightarrow x - 4 = 1 \Rightarrow x = 5$

(ii) when $y < 0$

$y^2 - y - 2 = 0$

$\Rightarrow (y-2)(y+1) = 0$

$\Rightarrow y = 2, -1$

$\Rightarrow y = -1$

$\Rightarrow x - 4 = -1 \Rightarrow x = 3$

Hence sum of all real roots = 5 + 3 = 8

36. (B) No. of triangle = ${}^9C_3 - {}^4C_3$

$= 84 - 4 = 80$

37. (C) Equation $4x^2 - 8x - \log_2 A = 0$ has real roots,

then $B^2 - 4AC \geq 0$

$\Rightarrow (-8)^2 - 4\times4(-\log_2 A) \geq 0$

$\Rightarrow 16\log_2 A \geq -64$

$\Rightarrow \log_2 A \geq -4$

$\Rightarrow A \geq 2^{-4} \Rightarrow A \geq \frac{1}{16}$

Hence minimum value of A = $\frac{1}{16}$

38. (A) Equation $ax^2 + x + b = 0$

Let roots are α and β.

$\alpha + \beta = \frac{-1}{a}$ and $\alpha\beta = \frac{b}{a}$

A.T.Q

$\alpha + \beta = \frac{1}{\alpha^2} + \frac{1}{\beta^2}$

$\Rightarrow \alpha + \beta = \frac{\alpha^2 + \beta^2}{(\alpha\beta)^2}$

$\Rightarrow \alpha + \beta = \frac{(\alpha+\beta)^2 - 2\alpha\beta}{(\alpha\beta)^2}$

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

$\Rightarrow \frac{-1}{a} = \frac{1 - 2ab}{b^2}$

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

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

Hence $\frac{1}{a}, \frac{a}{b}, \frac{1}{b^2}$ are in A.P.

$\Rightarrow \frac{ab}{a}, \frac{a.ab}{b}, \frac{ab}{b^2}$ are in A.P.

$\Rightarrow b, a^2, \frac{a}{b}$ are in A.P.

39. (D) Let $\vec{a} = 2\hat{i} - \hat{j} - 2\hat{k}$ and $\vec{b} = 2\hat{i} - \hat{j} + 2\hat{k}$

Projection of $\vec{a}$ on $\vec{b}$ = $\frac{\vec{a}.\vec{b}}{|\vec{b}|}$

$= \frac{2\times2 - 1\times(-1) - 2\times2}{\sqrt{2^2 + (-1)^2 + 2^2}}$

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

40. (C) Equation $x^2 + kx + c = 0$

Let roots are α and β,

$\alpha + \beta = -k$ and $\alpha\beta = c$

A.T.Q

$\alpha^2 + \beta^2 = 4c$

$\Rightarrow (\alpha + \beta)^2 = 2\alpha\beta = 4c$

$\Rightarrow k^2 - 2c = 4c$

$\Rightarrow k^2 = 6c$

41. (B) $(3\omega^2 + 2 + 2\omega)^{23}$

$\Rightarrow [3\omega^2 + 2(1+\omega)]^{23}$

$\Rightarrow [3\omega^2 - 2\omega^2]^{23}$ $[\because 1 + \omega + \omega^2 = 0]$

$\Rightarrow (\omega^2)^{23}$

$\Rightarrow \omega^{46} = \omega^{3\times45+1} = \omega$ $[\because \omega^3 = 1]$

42. (A) In ΔABC, $a + b = 2c$

$$s = \frac{a+b+c}{2}$$

$$s = \frac{2c+c}{c} = \frac{3c}{2}$$

Now, $\tan\frac{A}{2}.\tan\frac{B}{2}$

$$\Rightarrow \sqrt{\frac{(s-b)(s-c)}{s(s-a)}} \times \sqrt{\frac{(s-a)(s-c)}{s(s-b)}}$$

$$\Rightarrow \sqrt{\frac{(s-b)(s-c)(s-a)(s-c)}{s^2(s-a)(s-b)}}$$

$$\Rightarrow \frac{s-c}{s} = \frac{\frac{3c}{2}-c}{\frac{3c}{2}} = \frac{\frac{c}{2}}{\frac{3c}{2}} = \frac{1}{3}$$

43. (B) Differential equation

$$\tan\left(\frac{dy}{dx}\right) = x$$

$$\Rightarrow \frac{dy}{dx} = \tan^{-1}x$$

$\Rightarrow dy = \tan^{-1}x\, dx$

On integrating

$$\Rightarrow \int dy = \int \tan^{-1}x\, dx$$

$$\Rightarrow y = \tan^{-1}x\int 1.dx - \int\left\{\frac{d}{dx}(\tan^{-1}x).\int 1.dx\right\}dx$$

$$\Rightarrow y = (\tan^{-1}x).x - \int\frac{1}{1+x^2}.x\ dx$$

Let $1 + x^2 = t$

$$2x\,dx = dt \Rightarrow xdx = \frac{1}{2}dt$$

$$\Rightarrow y = x.\tan^{-1}x - \frac{1}{2}\int\frac{1}{t}dx$$

$$\Rightarrow y = x.\tan^{-1}x - \frac{1}{2}\log t + c$$

$$\Rightarrow y = x.\tan^{-1}x - \frac{1}{2}\log(1+x^2) + c$$

44. (C) $\begin{bmatrix}3 & -5 & x\end{bmatrix}\begin{bmatrix}1 & 2 & 3\\ 4 & -1 & 0\\ 3 & 2 & 5\end{bmatrix}\begin{bmatrix}1\\ 0\\ -2\end{bmatrix} = [0]$

$$\Rightarrow \begin{bmatrix}3 & -5 & x\end{bmatrix}\begin{bmatrix}1\times1+2\times0+3\times(-2)\\ 4\times1-1\times0+0\times(-2)\\ 3\times1+2\times0+5\times(-2)\end{bmatrix} = [0]$$

$$\Rightarrow \begin{bmatrix}3 & -5 & x\end{bmatrix}\begin{bmatrix}-5\\ 4\\ -7\end{bmatrix} = [0]$$

$\Rightarrow [3\times(-5) - 5\times4 + x\times(-7)] = [0]$

$\Rightarrow [-15 - 20 - 7x] = [\ 0]$

$\Rightarrow -35 = 7x \Rightarrow x = -5$

45. (D) Let $y = \tan^{-1}\left(\frac{1-\sqrt{1-x^2}}{x}\right)$

and $z = \cos^{-1}x \Rightarrow x = \cos z$

$$y = \tan^{-1}\left(\frac{1-\sqrt{1-\cos^2 z}}{\cos z}\right)$$

$$y = \tan^{-1}\left(\frac{1-\sin z}{\cos z}\right)$$

$$y = \tan^{-1}\left[\frac{1-\cos\left(\frac{\pi}{2}-z\right)}{\sin\left(\frac{\pi}{2}-z\right)}\right]$$

$$y = \tan^{-1}\left[\frac{2\sin^2\left(\frac{\pi}{4}-\frac{z}{2}\right)}{2\sin\left(\frac{\pi}{4}-\frac{z}{2}\right).\cos\left(\frac{\pi}{4}-\frac{z}{2}\right)}\right]$$

$$y = \tan^{-1}\left[\frac{\sin\left(\frac{\pi}{4}-\frac{z}{2}\right)}{\cos\left(\frac{\pi}{4}-\frac{z}{2}\right)}\right]$$

$$y = \tan^{-1}\left(\tan\left(\frac{\pi}{4}-\frac{z}{2}\right)\right)$$

$$y = \frac{\pi}{4} - \frac{z}{2}$$

On differentiating both sides w.r.t.'z'

$$\frac{dy}{dz} = \frac{-1}{2}$$

46. (C) In the expansion of $\left(x^3 - \frac{1}{x^5}\right)^9$

$$T_{r+1} = {}^9C_r(x^3)^{9-r}\left(\frac{-1}{x^5}\right)^r$$

$T_{r+1} = {}^9C_r x^{27-8r}(-1)^r$

Here $27 - 8r = 3$

$\Rightarrow 8r = 24 \Rightarrow r = 3$

47. (D) Equation of line which passes through the point (–1, 3) and (3, 4)

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

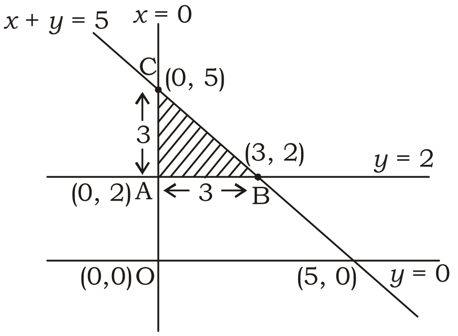
$$\Rightarrow y - 3 = \frac{1}{4}(x+1)$$

$\Rightarrow x - 4y + 13 = 0$ ...(i)

Now, length of the perpendicular from the point (4, –2) on the line (i)

$$p = \frac{4-4(-2)+13}{\sqrt{1^2+(-4)^2}} \Rightarrow p = \frac{25}{\sqrt{27}}$$

48. (C)



Area of ΔABC = $\frac{1}{2}\times AB\times AC$

$= \frac{1}{2}\times 3\times 3 = \frac{9}{2}$ sq.unit

49. (B) $y = \frac{x^2}{2!}+\frac{x^2}{3!}+\ldots.\infty$

$y = \left(1-x+\frac{x^2}{2!}+\frac{x^3}{3!}+\ldots..\infty\right)-1-x$

$y = e^x - 1 - x$

On differentiating both sides w.r.t 'x'

$\frac{dy}{dx} = e^x - 0 - 1$

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

50. (B) $\begin{vmatrix} a^3+1 & a & a^2 \\ b^3+1 & b & b^2 \\ c^3+1 & c & c^2 \end{vmatrix} = 0$

$\Rightarrow \begin{vmatrix} a^3 & a & a^2 \\ b^3 & b & b^2 \\ c^3 & c & c^2 \end{vmatrix} + \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = 0$

$\Rightarrow abc \begin{vmatrix} a^2 & 1 & a \\ b^2 & 1 & b \\ c^2 & 1 & c \end{vmatrix} + \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = 0$

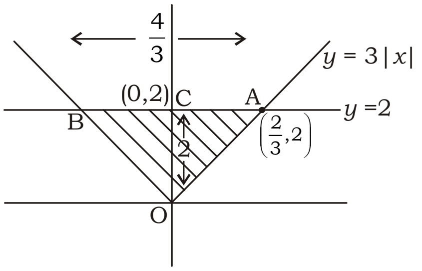
$\Rightarrow abc \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} + \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = 0$

$\Rightarrow (abc+1)\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = 0$

$\Rightarrow abc + 1 = 0, \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} \neq 0$

$\Rightarrow abc = -1$

51. (C)



Area of ΔAOB = $\frac{1}{2}\times OC\times AB$

$= \frac{1}{2}\times 2\times\frac{4}{3} = \frac{4}{3}$ sq.unit

52. (B) Let $a + ib = \sqrt{i}$

On squaring both sides

$(a^2 - b^2) + 2abi = i$

On comparing

$a^2 - b^2 = 0$ and $2ab = 1$ …(i)

Now, $(a^2 + b^2)^2 = (a^2 - b^2)^2 + (2ab)^2$

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

$\Rightarrow a^2 + b^2 = 1$ …(ii)

from eq(i) and eq(ii)

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

and $2b^2 = 1 \Rightarrow b^2 = \frac{1}{2} \Rightarrow b = \pm\frac{1}{\sqrt{2}}$

Hence $\sqrt{i} = \pm\left(\frac{1+i}{\sqrt{2}}\right)$

53. (C) $\log_4[\log_4[\log_4 x] = \log_4 4$

$\Rightarrow \log_4[\log_4 x] = 4$

$\Rightarrow \log_4 x = 4^4$

$\Rightarrow \log_4 x = 256$

$\Rightarrow x = 4^{256}$

54. (B) sin10° + sin50° – sin70°

$\Rightarrow \sin 10 + 2\cos\frac{50+70}{2}.\sin\frac{50-70}{2}$

$\Rightarrow \sin 10 + 2\cos 60.\sin(-10)$

$\Rightarrow \sin 10 - 2\times\frac{1}{2}\sin 10 = 0$

55. (D) $f(x) = \frac{\tan(e^{x-3}-1)}{\ln(x-2)}$

Now, $\lim_{x\to 3} f(x)$

$\Rightarrow \lim_{x\to 3}\frac{\tan(e^{x-3}-1)}{\ln(x-2)}$ $\left[\frac{0}{0}\right]$

by L-Hospital's Rule

$\Rightarrow \lim_{x\to 3}\frac{\sec^2(e^{x-3}-1).e^{x-3}}{\frac{1}{x-2}}$

$\Rightarrow \lim_{x\to 3}(x-2).e^{x-3}.\sec^2(e^{x-3}-1)$

$\Rightarrow (3-2).e^{3-3}.\sec^2(e^{3-3}-1)$

$\Rightarrow 1.e^0.\sec^2 0 = 1\times1\times1 = 1$

56. (A) Given that A = 12, H = 27
We know that
$G^2 = AH$
$\Rightarrow G^2 = 12\times27 \Rightarrow G = 18$

57. (D) $\cot\left(7\frac{1}{2}\right) \Rightarrow \frac{\cos 7\frac{1}{2}}{\sin 7\frac{1}{2}}$

$$\Rightarrow \frac{2\cos^2 7\frac{1}{2}}{2\sin 7\frac{1}{2}.\cos 7\frac{1}{2}} \Rightarrow \frac{1+\cos 15}{\sin 15}$$

$$\Rightarrow \frac{1+\frac{\sqrt{3}+1}{2\sqrt{2}}}{\frac{\sqrt{3}-1}{2\sqrt{2}}} \Rightarrow \frac{2\sqrt{2}+\sqrt{3}+1}{\sqrt{3}-1}\times\frac{\sqrt{3}+1}{\sqrt{3}+1}$$

$$\Rightarrow \frac{2\sqrt{6}+3+\sqrt{3}+2\sqrt{2}+\sqrt{3}+1}{3-1}$$

$$\Rightarrow \frac{2\sqrt{6}+2\sqrt{3}+2\sqrt{2}+4}{2}$$

$$\Rightarrow \sqrt{6}+\sqrt{3}+\sqrt{2}+2$$

58. (C) $\lim\limits_{x\to\infty}\frac{(2x-5)(x+3)}{(x+1)(3x-4)}$

$$\Rightarrow \lim_{x\to\infty}\frac{x^2\left(2-\frac{5}{x}\right)\left(1+\frac{3}{x}\right)}{x^2\left(1+\frac{1}{x}\right)\left(3-\frac{4}{x}\right)}$$

$$\Rightarrow \frac{(2-0)(1+0)}{(1+0)(3-0)} = \frac{2}{3}$$

59. (B) $I = \int\frac{dx}{\sin^2 x.\cos^2 x}$

$I = \int\frac{(\sin^2 x+\cos^2 x)dx}{\sin^2 x.\cos^2 x}$ $[\because \sin^2 x+\cos^2 x=1]$

$I = \int(\sec^2 x+\text{cosec}^2 x)\,dx$

$I = \tan x - \cot x + c$

60. (C) $\text{cosec}^{-1}\left(\frac{1+x^2}{2x}\right)$

Let $x = \tan\theta \Rightarrow \theta = \tan^{-1}x$

$$\Rightarrow \text{cosec}^{-1}\left(\frac{1+\tan^2\theta}{2\tan\theta}\right)$$

$$\Rightarrow \text{cosec}^{-1}\left(\frac{\sec^2\theta}{2\tan\theta}\right)$$

$$\Rightarrow \text{cosec}^{-1}\left(\frac{\frac{1}{\cos^2\theta}}{\frac{2\sin\theta}{\cos\theta}}\right)$$

$$\Rightarrow \text{cosec}^{-1}\left(\frac{1}{2\sin\theta.\cos\theta}\right)$$

$$\Rightarrow \text{cosec}^{-1}\left(\frac{1}{\sin 2\theta}\right)$$

$\Rightarrow \text{cosec}^{-1}(\text{cosec}2\theta) = 2\theta = 2\tan^{-1}x$

61. (D) $\begin{bmatrix}1 & 2\\ -3 & 4\end{bmatrix} + 2X = \begin{bmatrix}4 & 3\\ 2 & -6\end{bmatrix}$

$$\Rightarrow 2X = \begin{bmatrix}4 & 3\\ 2 & -6\end{bmatrix} - \begin{bmatrix}1 & 2\\ -3 & 4\end{bmatrix}$$

$$\Rightarrow 2X = \begin{bmatrix}3 & 1\\ 5 & -10\end{bmatrix}$$

$$\Rightarrow X = \begin{bmatrix}3/2 & 1/2\\ 5/2 & -5\end{bmatrix}$$

62. (B) $y = x^x$
taking log both sides
$\Rightarrow \log y = x.\log x$
On differentiating both sides w.r.t.'x'

$$\Rightarrow \frac{1}{y}\frac{dy}{dx} = x\times\frac{1}{x} + (\log x).1$$

$$\Rightarrow \frac{dy}{dx} = y(1+\log x)$$

$$\Rightarrow \frac{dy}{dx} = x^x(1+\log x)$$

63. (D) $6\cos^2\theta - 2\cos 2\theta - 3 = 0$
$\Rightarrow 6\cos^2\theta - 2(2\cos^2\theta - 1) - 3 = 0$
$\Rightarrow 6\cos^2\theta - 4\cos^2\theta - 1 = 0$
$\Rightarrow 2\cos^2\theta = 1$

$$\Rightarrow \cos^2\theta = \left(\frac{1}{\sqrt{2}}\right)^2 \Rightarrow \theta = 45°$$

Now, $\sec^2 3\theta = \sec^2 135°$
$\Rightarrow \sec^2 3\theta = \sec^2(90 + 45)$
$\Rightarrow \sec^2 3\theta = (-\text{cosec }45)^2$
$\Rightarrow \sec^3 3\theta = (\sqrt{2})^2 = 2$

64. (D) $f(x) = \begin{cases}\frac{a\sin 2x - b\cos x}{\frac{\pi}{2}-x}, & x > \frac{\pi}{2}\\ 4, & x = \frac{\pi}{2}\\ \frac{2b\cos x}{\frac{\pi}{2}-x}, & x < \frac{\pi}{2}\end{cases}$ is

continuous function, then

$$\lim_{x\to\left(\frac{\pi}{2}\right)^-} f(x) = \lim_{x\to\left(\frac{\pi}{2}\right)^+} f(x) = f\left(\frac{\pi}{2}\right)$$

Now, $= \lim_{x\to\left(\frac{\pi}{2}\right)^-} f(x) = f\left(\frac{\pi}{2}\right)$

$$\Rightarrow \lim_{x\to\frac{\pi}{2}} \frac{2b\cos x}{\frac{\pi}{2}-x} = 4$$

by L-Hospital Rule

$$\Rightarrow \lim_{x\to\frac{\pi}{2}} \frac{-2b\sin x}{-1} = 4$$

$$\Rightarrow 2b \sin\frac{\pi}{2} = 4$$

$$\Rightarrow 2b = 4 \Rightarrow b = 2$$

and $\lim_{x\to\left(\frac{\pi}{2}\right)^+} f(x) = f\left(\frac{\pi}{2}\right)$

$$\Rightarrow \lim_{x\to\frac{\pi}{2}} \frac{a\sin 2x - b\cos x}{\frac{\pi}{2}-x} = f\left(\frac{\pi}{2}\right)$$

by L-Hospital's Rule

$$\Rightarrow \lim_{x\to\frac{\pi}{2}} \frac{2a\cos x + b\sin x}{-1} = 4$$

$$\Rightarrow \frac{2a\cos\pi + b\sin\pi}{-1} = 4$$

$$\Rightarrow \frac{-2a+0}{-1} = 4 \Rightarrow a = 2$$

Hence $= a - b = 2 - 2 = 0$

65. (A) Linear equations

$x + 4y - 3z = 2$
$2x + 7y - 4z = \alpha$
$-x - 5y + 5z = \beta$

Let $A = \begin{bmatrix} 1 & 4 & -3 \\ 2 & 7 & -4 \\ -1 & -5 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 2 \\ \alpha \\ \beta \end{bmatrix}$

Using Elementary method

$$[A/B] = \left[\begin{array}{ccc|c} 1 & 4 & -3 & 2 \\ 2 & 7 & -4 & \alpha \\ -1 & -5 & 5 & \beta \end{array}\right]$$

$R_2 \to R_2 - 2R_1$ and $R_3 \to R_3 + R_1$

$$[A/B] = \left[\begin{array}{ccc|c} 1 & 4 & -3 & 2 \\ 0 & -1 & 2 & \alpha-4 \\ 0 & -1 & 2 & \beta+2 \end{array}\right]$$

$R_3 \to R_3 - R_2$

$$[A/B] = \left[\begin{array}{ccc|c} 1 & 4 & -3 & 2 \\ 0 & -1 & 2 & \alpha-4 \\ 0 & 0 & 0 & \beta-\alpha+6 \end{array}\right]$$

has inifinitely many solutions, then

$\beta - \alpha + 6 = 0 \Rightarrow \alpha - \beta = 6$

Hence pair (α, β) cannot take the value $(-3, 3)$.

66. (C) $T_n = (n+2)(n+3)$

$T_n = n^2 + 5n + 6$

Now, $S_n = \Sigma(T_n)$

$$\Rightarrow S_n = \Sigma(n^2 + 5n + 6)$$

$$\Rightarrow S_n = \Sigma n^2 + 5\Sigma n + 6\Sigma 1$$

$$\Rightarrow S_n = \frac{n}{6}(n+1)(2n+1) + 5\times\frac{n(n+1)}{2} + 6n$$

$$\Rightarrow S_n = \frac{n}{6}[2n^2 + 3n + 1 + 15n^2 + 15n + 36n]$$

$$\Rightarrow S_n = \frac{n}{6}[17n^2 + 54n + 1]$$

$$S_5 = \frac{5}{6}[17\times25 + 54\times25 + 1]$$

$$S_5 = \frac{5}{6}\times1776 = 1480$$

67. (A) Differential equation

$$x\frac{dy}{dx} + 2y = x^3$$

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

On comparing with general equation

$P = \frac{2}{x}$, $Q = x^2$

$$\text{I.F.} = e^{\int P\,dx}$$

$$\text{I.F.} = e^{\int\frac{2}{x}dx}$$

$$\text{I.F.} = e^{2\log x} = e^{\log x^2} = x^2$$

Solution of the differential equation

$$y \times \text{I.F.} = \int Q\times\text{I.F.}\,dx$$

$$y \times x^2 = \int x^2 \times x^2\,dx$$

$$\Rightarrow yx^2 = \int x^4\,dx$$

$$\Rightarrow yx^2 = \frac{x^5}{5} + c$$

$$\Rightarrow y = \frac{x^3}{5} + \frac{c}{x^2}$$

68. (A) Quadratic equation

$x^2 + px + q = 0$

One root is $3+\sqrt{8}$ and other roots is $3-\sqrt{8}$.

Sum of roots $= 3+\sqrt{8} + 3-\sqrt{8}$

$\Rightarrow -p = 6 \Rightarrow p = -6$

and products of roots $= (3+\sqrt{8})(3-\sqrt{8})$

$\Rightarrow q = 9 - 8 \Rightarrow q = 1$

Quadratic equation

$x^2 - 6x + 1 = 0$

69. (A) Given that $e = \frac{3}{5}$

and $2be = 36$

$\Rightarrow 2b \times \frac{3}{5} = 36 \Rightarrow b = 30$

Now, $e^2 = 1 - \frac{a^2}{b^2}$

$\Rightarrow \frac{9}{25} = 1 - \frac{a^2}{900}$

$\Rightarrow \frac{a^2}{900} = 1 - \frac{9}{25}$

$\Rightarrow \frac{a^2}{900} = \frac{16}{25} \Rightarrow a^2 = 576$

Equation of ellipse

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

$\Rightarrow \frac{x^2}{576} + \frac{y^2}{900} = 1$

70. (B) $I = \int_0^1 \frac{\sin^{-1} x}{\sqrt{1-x^2}}\, dx$

Let $\sin^{-1}x = t$ when $x \to 0,\ t \to 0$

$\frac{1}{\sqrt{1-x^2}}\, dx = dt$ $x \to 1,\ t \to \frac{\pi}{2}$

$I = \int_0^{\pi/2} t\, dx$

$I = \left[\frac{t^2}{2}\right]_0^{\pi/2}$

$I = \frac{1}{2} \times \frac{\pi^2}{4} = \frac{\pi^2}{8}$

71. (D) $\lim_{x\to 3} \frac{4^{x/2} - 8}{2^{2x} - 64}$ $\left[\frac{0}{0}\right]$ from

by L-Hospital's Rule

$\Rightarrow \lim_{x\to 3} \frac{4^{x/2}(\log 4) \times \left(\frac{1}{2}\right) - 0}{2^{2x}(\log 2) \times (2) - 0}$

$\Rightarrow \lim_{x\to 3} \frac{2^x \times \frac{1}{2} \times 2\log 2}{2^{2x} \times 2\log 2}$

$\Rightarrow \frac{1}{2} \times \frac{2^3}{2^6} = \frac{1}{16}$

72. (C) Straight line

$\frac{x-1}{3} = \frac{y+2}{4} = \frac{z-1}{-2}$ and $\frac{x+1}{-2} = \frac{y-4}{4} = \frac{z+5}{5}$

Let angle between the straight lines = θ

Now, $\cos\theta = \frac{3 \times (-2) + 4 \times 4 + (-2) \times 5}{\sqrt{3^2 + 4^2 + (-2)^2}\sqrt{(-2)^2 + 4^2 + 5^2}}$

$\Rightarrow \cos\theta = 0$

$\Rightarrow \theta = 90° = \frac{\pi}{2}$

73. (B) Determinant $\begin{vmatrix} 2 & 5 & 1 \\ 6 & 4 & 3 \\ 2 & -1 & 0 \end{vmatrix}$

Cofactor of 0 $= (-1)^{3+3}\begin{vmatrix} 2 & 5 \\ 6 & 4 \end{vmatrix}$

$= 8 - 30 = -22$

74. (B) $\begin{bmatrix} 2 & 1 \\ 4 & 1 \end{bmatrix} \times \begin{bmatrix} -2 & -4 \\ 3 & -\lambda \end{bmatrix} = \begin{bmatrix} -1 & -2 \\ -5 & -10 \end{bmatrix}$

$\Rightarrow \begin{bmatrix} -4+3 & -8-\lambda \\ -8+3 & -16-\lambda \end{bmatrix} = \begin{bmatrix} -1 & -2 \\ -5 & -10 \end{bmatrix}$

$\Rightarrow \begin{bmatrix} -1 & -8-\lambda \\ -5 & -16-\lambda \end{bmatrix} = \begin{bmatrix} -1 & -2 \\ -5 & -10 \end{bmatrix}$

On camparing

$-8 - \lambda = -2 \Rightarrow \lambda = -6$

75. (D) $I = \int \frac{dx}{x(1+\log x)^3}$

Let $1 + \log x = t \Rightarrow \frac{1}{x}\, dx = dt$

$I = \int \frac{dt}{t^3}$

$I = \frac{t^{-3+1}}{-3+1} + c$

$I = \frac{-1}{2} \times \frac{1}{t^2} + c$

$I = \frac{-1}{2(1+\log x)^2} + c$

76. (A)

II (sinθ, cosecθ)→'+' other→'–'	I All positive
(tanθ, cotθ)→'+' other→'–' III	(cosθ, secθ)→'+' other→'–' IV

77. (C) The number of ways = 10 × 9 = 90

78. (D) $I = \int_0^{\pi/2} \frac{f(x)}{f(x)+f\left(\frac{\pi}{2}-x\right)}\,dx$ ...(i)

Prop. IV $\int_0^a f(x)\,dx = \int_0^a f(a-x)\,dx$

$I = \int_0^{\pi/2} \frac{f\left(\frac{\pi}{2}-x\right)}{f(x)+f\left(\frac{\pi}{2}-x\right)}\,dx$ ...(ii)

From eq(i) and eq(ii)

$$2I = \int_0^{\pi/2} \frac{f(x)+f\left(\frac{\pi}{2}-x\right)}{f(x)+f\left(\frac{\pi}{2}-x\right)}\,dx$$

$$2I = \int_0^{\pi/2} 1\,dx$$

$$2I = [x]_0^{\pi/2}$$

$$2I = \frac{\pi}{2} - 0 \Rightarrow I = \frac{\pi}{4}$$

79. (A) Equation $8x - 6y = 7$
and $6x + 8y = 8$

$$\frac{8}{6} \neq \frac{-6}{8} \neq \frac{7}{8}$$

Equations have a unique solutions.

80. (B) Let $a + ib = \sqrt{(4+6\sqrt{5}i)}$

On squaring both sides

$(a^2 - b^2) + 2abi = 4 + 6\sqrt{5}\,i$

On comparing

$a^2 - b^2 = 4$ and $2ab = 6\sqrt{5}$ ...(i)

Now, $(a^2 + b^2)^2 = (a^2 - b^2)^2 = 4a^2b^2$

$\Rightarrow (a^2 + b^2)^2 = 16 + 180$

$\Rightarrow a^2 + b^2 = 14$ ...(ii)

from eq(i) and eq(ii)

$2a^2 = 18,\ 2b^2 = 10$

$a = \pm 3,\ b = \pm\sqrt{5}$

Square root of $(4 + 6\sqrt{5}\,i)$ is $\pm(3 + \sqrt{5}\,i)$.

81. (C) $z = \frac{1}{\sin\theta + i(1+\cos\theta)}$

$$z = \frac{1}{2\sin\frac{\theta}{2}.\cos\frac{\theta}{2} + i \times 2\cos^2\frac{\theta}{2}}$$

$$z = \frac{1}{2\cos\frac{\theta}{2}}\left[\frac{1}{\sin\frac{\theta}{2} + i \times \cos\frac{\theta}{2}}\right]$$

$$z = \frac{1}{2}\sec\frac{\theta}{2}\left[\frac{\sin\frac{\theta}{2} - i\cos\frac{\theta}{2}}{\sin^2\frac{\theta}{2} - i^2\cos^2\frac{\theta}{2}}\right]$$

$$z = \frac{1}{2}\sec\frac{\theta}{2}\left[\sin\frac{\theta}{2} - i\cos\frac{\theta}{2}\right]$$

$$z = \frac{1}{2}\left[\tan\frac{\theta}{2} - i\right]$$

Imaginary part of $z = \frac{-1}{2}$

82. (A) Let $z = \begin{bmatrix} \omega & \omega^2 & 1+\omega^2 \\ 1 & \omega & \omega+\omega^2 \\ \omega^2 & 1 & 1+\omega \end{bmatrix}$

$$|z| = \begin{vmatrix} \omega & \omega^2 & 1+\omega^2 \\ 1 & \omega & \omega+\omega^2 \\ \omega^2 & 1 & 1+\omega \end{vmatrix}$$

$C_1 \to C_1 + C_3$

$$|z| = \begin{vmatrix} 1+\omega+\omega^2 & \omega^2 & 1+\omega^2 \\ 1+\omega+\omega^2 & \omega & \omega+\omega^2 \\ 1+\omega+\omega^2 & 1 & 1+\omega \end{vmatrix}$$

$$|z| = \begin{vmatrix} 0 & \omega^2 & 1+\omega^2 \\ 0 & \omega & \omega+\omega^2 \\ 0 & 1 & 1+\omega \end{vmatrix}$$

$|z| = 0 = 1 + \omega + \omega^2$

83. (A) $\frac{d}{dx}\left(\frac{\sin^{-1}x}{\sqrt{1-x^2}}\right)$

$$\Rightarrow \frac{\sqrt{1-x^2} \times \frac{1}{\sqrt{1-x^2}} - \left(\sin^{-1}x\right) \times \frac{-2x}{2\sqrt{1-x^2}}}{\left(\sqrt{1-x^2}\right)^2}$$

$$\Rightarrow \frac{1 + \frac{x}{\sqrt{1-x^2}}\sin^{-1}x}{1-x^2}$$

$$\Rightarrow \frac{\sqrt{1-x^2} + x.\sin^{-1}x}{\left(1-x^2\right)^{3/2}}$$

84. (C) $AA^T = 1$

$\Rightarrow |AA^T| = 1$

$\Rightarrow |A|^2 = 1$

$\Rightarrow |A| = \pm 1$

85. (C) $\lim_{x\to\infty} \frac{2x^4 + 5x^3 + 6x}{5x^5 + 3x + 4x^2}$

$$\Rightarrow \lim_{x\to\infty} \frac{x^4\left(2 + \frac{5}{x} + \frac{6}{x^2}\right)}{x^5\left(5 + \frac{3}{x^4} + \frac{4}{x^3}\right)}$$

$$\Rightarrow \lim_{x\to\infty} \frac{\left(2 + \frac{5}{x} + \frac{6}{x^2}\right)}{x\left(5 + \frac{3}{x^4} + \frac{4}{x^3}\right)} = \frac{1}{\infty} = 0$$

86. (B) $\int_1^2 \left\{k^2+(1-k)x+2x^3\right\} dx \leq 10$

$$\Rightarrow \left[k^2x+(1-k)\frac{x^2}{2}+\frac{2x^4}{4}\right]_1^2 \leq 10$$

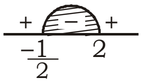
$$\Rightarrow (2k^2+(1-k)\times2+8)-\left(k^2+(1-k)\times\frac{1}{2}+\frac{1}{2}\right) \leq 10$$

$$\Rightarrow k^2 - \frac{3k}{2} + 9 \leq 10$$

$\Rightarrow 2k^2 - 3k + 18 \leq 20$

$\Rightarrow 2k^2 - 3k - 2 \leq 0$

$\Rightarrow (2k+1)(k-2) \leq 0$



Hence $\frac{-1}{2} \leq k \leq 2$

87. (A) $\sin\left(\sin^{-1}\frac{12}{13}+\cos^{-1}x\right) = 1$

$$\Rightarrow \sin^{-1}\frac{12}{13} + \cos^{-1}x = \sin^{-1}(1)$$

$$\Rightarrow \sin^{-1}\frac{12}{13} + \cos^{-1}x = \frac{\pi}{2}$$

$$\Rightarrow \cos^{-1}x = \frac{\pi}{2} - \sin^{-1}\frac{12}{13}$$

$$\Rightarrow \cos^{-1}x = \cos^{-1}\frac{12}{13} \Rightarrow x = \frac{12}{13}$$

88. (A) $f(x) = \frac{1}{\sqrt{55+x^2}}$

On differentiating both sides w.r.t. 'x'

$$f'(x) = \frac{-(2x)}{2(55+x^2)^{\frac{3}{2}}}$$

$$f'(x) = \frac{-x}{(55+x^2)^{\frac{3}{2}}}$$

Now, $\lim\limits_{x\to3} \frac{f(3)-f(x)}{x^3-27}$ $\left[\frac{0}{0}\right]$Form

by L-Hospital's Rule

$$\Rightarrow \lim_{x\to3} \frac{-f'(x)}{3x^2}$$

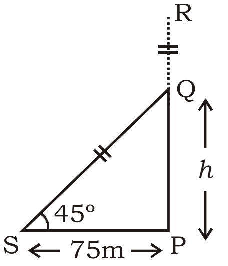
$$\Rightarrow \lim_{x\to3} \frac{x}{3x^2(55+x^2)^{\frac{3}{2}}}$$

$$\Rightarrow \lim_{x\to3} \frac{1}{3x(55+x^2)^{\frac{3}{2}}}$$

$$\Rightarrow \frac{1}{3\times3(55+3^2)^{\frac{3}{2}}} = \frac{1}{4608}$$

89. (C) The required Probability $P(A)=\frac{n(E)}{n(S)}=\frac{1}{52}$

90. (B)



We know that QR = QS

Let PQ = h m

In ΔPSQ :

$$\tan45° = \frac{PQ}{PS}$$

$$\Rightarrow 1 = \frac{h}{75} \Rightarrow h = 75 \qquad \ldots(i)$$

$$\text{Now, } \sin45° = \frac{PQ}{QS}$$

$$\Rightarrow \frac{1}{\sqrt{2}} = \frac{h}{QS}$$

$$\Rightarrow \frac{1}{\sqrt{2}} = \frac{75}{QS} \Rightarrow QS = 75\sqrt{2} = QR$$

Length of a tree = PQ + QR

$= 75 + 75\sqrt{2} = 75(\sqrt{2}+1)$ m

91. (B) Given that $f(x) = bx + c$, $g(x) = ax + d$

Now, $fog(x) = gof(x)$

$\Rightarrow f[g(x)] = g[f(x)]$

$\Rightarrow f[ax + d] = g[bx + c]$

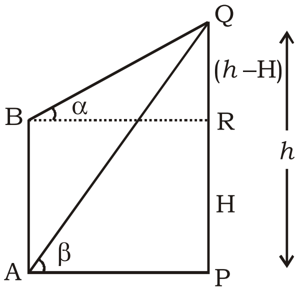
$\Rightarrow b(ax + d) + c = a(bx + c) + d$

$\Rightarrow abx + bd + c = abx + ac + d$

$\Rightarrow bd + c = ac + d$

$\Rightarrow f(d) = g(c)$

92. (A)



Let height of a building (AB) = H m

In ΔRBQ :

$$\tan\alpha = \frac{RQ}{BR} = \frac{h - H}{BR}$$

$$\Rightarrow AP = BR = \frac{h - H}{\tan\alpha} \qquad \ldots(i)$$

In ΔAPQ :-

$$\tan\beta = \frac{PQ}{AP}$$

$$\Rightarrow \tan\beta = \frac{h \times \tan\alpha}{h - H} \qquad \text{[from eq. (i)]}$$

$\Rightarrow h\tan\beta - H\tan\beta = h\tan\alpha$

$\Rightarrow H\tan\beta = h(\tan\beta - \tan\alpha)$

$$\Rightarrow H = \frac{h(\tan\beta - \tan\alpha)}{\tan\beta}$$

93. (D) $f(x) = \tan^{-1}\left[\frac{\sqrt{x}(1+x)}{1 - x^2}\right]$

$$\Rightarrow f(x) = \tan^{-1}\left[\frac{\sqrt{x} + x^{\frac{3}{2}}}{1 - \sqrt{x}.x^{\frac{3}{2}}}\right]$$

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

On differentiating both side w.r.t. 'x'

$$\Rightarrow f'(x) = \frac{1}{1+x} \times \frac{1}{2} \times \frac{1}{\sqrt{x}} + \frac{1}{1+x^3} \times \frac{3}{2}\, x^{\frac{1}{2}}$$

$$\Rightarrow f'(x) = \frac{1}{2\sqrt{x}} \times \frac{1}{1+x} + \frac{3\sqrt{x}}{2(1+x^3)}$$

$$\Rightarrow f'(4) = \frac{1}{2\sqrt{4}} \times \frac{1}{1+4} + \frac{3\sqrt{4}}{2(1+64)}$$

$$\Rightarrow f'(4) = \frac{1}{4} \times \frac{1}{5} + \frac{3 \times 2}{2 \times 65} = \frac{29}{260}$$

94. (C) $I = \int \frac{dx}{\sqrt{4x^2 - 20x + 29}}$

$$I = \frac{1}{2}\int \frac{dx}{\sqrt{x^2 - 5x + \frac{29}{4}}}$$

$$I = \frac{1}{2}\int \frac{dx}{\sqrt{\left(x - \frac{5}{2}\right)^2 + 1^2}}$$

$$I = \frac{1}{2}\log\left|\left(x - \frac{5}{2}\right) + \sqrt{\left(x - \frac{5}{2}\right)^2 + 1^2}\right| + c$$

$$I = \frac{1}{2}\log|2x - 5 + \sqrt{4x^2 - 20x + 29}\,| + c$$

95. (D) $y = a^{x^2 \log_a \cos x}$

$$\Rightarrow y = a^{\log_a (\cos x)^{x^2}}$$

$$\Rightarrow y = (\cos x)^{x^2}$$

taking log both sides

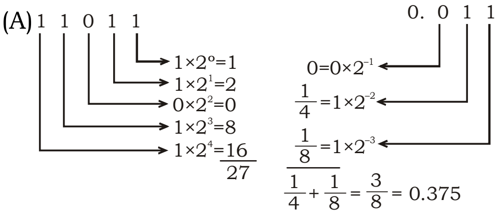
$\Rightarrow \log y = x^2.\log\cos x$

On differentiating both sides w.r.t. 'x'

$$\Rightarrow \frac{1}{y}\frac{dy}{dx} = x^2 \times \frac{(-\sin x)}{\cos x} + (\log\cos x) \times 2x$$

$$\Rightarrow \frac{dy}{dx} = y(-x^2.\tan x + 2x.\log\cos x)$$

96. (A)



Hence $(11011.011)_2 = (27.375)_{10}$

97. (C) $\left(\frac{d^2y}{dx^2} + y\frac{dy}{dx}\right)^{\frac{1}{2}} = \left(\frac{d^3y}{dx^3}\right)^{\frac{1}{4}}$

$$\Rightarrow \left(\frac{d^2y}{dx^2} + y\frac{dy}{dx}\right)^2 = \frac{d^3y}{dx^3}$$

Order = 3, Degree = 1

98. (B) 5

99. (D) A = {0, 1, 2, 3} and B = {0, 1, 4, 5}

A × B = {(0, 0), (0, 1), (0, 4), (0, 5), (1, 0), (1, 1), (1, 4), (1, 5), (2, 0), (2, 1), (2, 4), (2, 5), (3, 0), (3, 1), (3, 4), (3, 5)}

B × A = {(0, 0), (0, 1), (0, 2), (0, 3), (1, 0), (1, 1), (1, 2), (1, 3), (4, 0), (4,1), (4, 2), (4, 3), (5, 0), (5, 1), (5, 2,) (5, 3)}

Now, (B × A) ∩ (A × B) = {(0, 0), (0, 1), (1, 0), (1, 1)}

100. (D) $I = \int \frac{\log\left(x - \sqrt{1+x^2}\right)}{\sqrt{1+x^2}}\, dx$

Let $\log\left(x - \sqrt{1+x^2}\right) = t$

$$\Rightarrow \frac{1}{x - \sqrt{1+x^2}} \times \left[1 - \frac{1 \times 2x}{2\sqrt{1+x^2}}\right] dx = dt$$

$$\Rightarrow \frac{1}{x - \sqrt{1+x^2}} \times \frac{\sqrt{1+x^2} - x}{2\sqrt{1+x^2}}\, dx = dt$$

$$\Rightarrow \frac{-1}{2\sqrt{1+x^2}}\, dx = dt \Rightarrow \frac{1}{\sqrt{1+x^2}}\, dx = -2dt$$

$$I = \int t(-2\,dt)$$

$$I = -2 \times \frac{t^2}{2} + C$$

$$I = -\left[\log(x - \sqrt{1+x^2}\right]^2 + c$$

101. (B) Let $y = 4^{67}$

taking log both sides

$\Rightarrow \log_{10} y = 67 \log_{10} 4$

$\Rightarrow \log_{10} y = 67 \times 2 \log_{10} 2$

$\Rightarrow \log_{10} y = 134 \times 0.3010$

$\Rightarrow \log_{10} y = \; = 40.334$

The required no. of digits = 40 + 1 = 41

102. (C) Given that s = 5 cm and r = 3 cm

Now $\theta = \frac{s}{r}$

$\Rightarrow \theta = \left(\frac{5}{3}\right)^c$

$\Rightarrow \theta = \left(\frac{5}{3} \times \frac{180}{\pi}\right)^0$

$\Rightarrow \theta = \left(\frac{300}{\pi}\right)^0$

103. (D) $A = \begin{bmatrix} -2 & 1 \\ -6 & 5 \end{bmatrix}$

$|A| = -10 + 6 = -4$

We know that

$A(AdjA) = |A|^{n-1} I$ [where n is order]

Now, $A(AdjA) = |A|^{2-1} I$

$\Rightarrow A(AdjA) = |A|\ I$

$\Rightarrow A(AdjA) = -4I$

104. (C) Lines $\frac{2x-1}{12} = \frac{1-y}{3} = \frac{z-1}{-2}$

$\Rightarrow \frac{2\left(x-\frac{1}{2}\right)}{12} = \frac{-(y-1)}{3} = \frac{z-1}{-2}$

$\Rightarrow \frac{x-\frac{1}{2}}{6} = \frac{y-1}{-3} = \frac{z-1}{-2}$

Distance ratios = <6, –3, –2>

105. (C) Given that $e = \frac{1}{\sqrt{6}}$

and $\frac{2a}{e} = \sqrt{12}$

$\Rightarrow \frac{2 \times a}{1/\sqrt{6}} = \sqrt{12} \Rightarrow a = \frac{1}{\sqrt{2}}$

Now, $b^2 = a^2\ (1 - e^2)$

$\Rightarrow b^2 = \frac{1}{2} \times \left(1 - \frac{1}{6}\right)$

$\Rightarrow b^2 = \frac{1}{2} \times \frac{5}{6} \Rightarrow b^2 = \frac{5}{12}$

Equation of ellipse

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

$\Rightarrow \frac{x^2}{1/2} + \frac{y^2}{5/12} = 1$

$\Rightarrow 10x^2 + 12y^2 = 5$

106. (B) Word "OFFICER"

The number of Permutations = $\frac{7!}{2!}$

= 2520

107. (B) $I = \int e^x \left(\frac{3x-1}{x^{4/3}}\right) dx$

$I = 3\int e^x \left(\frac{3x-1}{3x^{4/3}}\right) dx$

$I = 3\int e^x \left(x^{-1/3} - \frac{1}{3}x^{-4/3}\right) dx$

We know that $\int e^x \left[f(x) + f'(x)\right] = e^x.f(x) + c$

$I = 3e^x.\ x^{-1/3} + c$

$I = \frac{3e^x}{x^{1/3}} + c$

108. (B) In the expansion of $\left(\frac{2x}{y} - \frac{y}{6x}\right)^6$

Total term = 6 + 1 = 7

Middle term = $\left(\frac{6}{2} + 1\right)^{\text{th}} = 4^{\text{th}}$

$T_4 = T_{3+1} = {}^6C_3 \left(\frac{2x}{y}\right)^3 \left(\frac{-y}{6x}\right)^3$

$T_4 = 20 \times \frac{8x^3}{y^3} \left(\frac{-y^3}{216x^3}\right) = \frac{-20}{27}$

109. (A)

110. (C) Digits 0, 1, 2, 4, 5, 7, 9

when last digit is '0'

$\boxed{4}\underset{\substack{\downarrow\\ 0}}{\boxed{1}} = 4$

when last digit is '2'

$\boxed{4}\underset{\substack{\downarrow\\ 2}}{\boxed{1}} = 4$

when last digit is '4'

$\boxed{3}\underset{\substack{\downarrow\\ 4}}{\boxed{1}} = 3$

The required numbers = 4 + 4 + 3 = 11

111. (B) n(S) = 16

E = {(HHHT), (HTHH), (HHTH), (THHH)}

n(E) = 4

The required Probability $= \frac{n(E)}{n(S)} = \frac{4}{16} = \frac{1}{4}$

112. (C) tan750 – cot330

⇒ tan(720 + 30) – cot(360 – 30)

⇒ tan30 + cot30

$\Rightarrow \frac{1}{\sqrt{3}} + \sqrt{3} = \frac{4}{\sqrt{3}}$

113. (D) $\frac{\sin 330.\cos 75.\tan 135}{\cos 435.\sin 750.\cot 225}$

$\Rightarrow \frac{\sin(360-30).\cos 75.\tan(90+45)}{\cos(360+75).\sin(720+30).\cot(180+45)}$

$\Rightarrow \frac{-\sin 30.\cos 75.(-\tan 45)}{\cos 75.\sin 30.\cot 45}$

$\Rightarrow \frac{-\frac{1}{2}\times\cos 75\times(-1)}{\cos 75\times\frac{1}{2}\times 1} = 1$

114. (B) Curve $2x^2 + 3y^2 = 10$

$\Rightarrow \frac{2x^2}{10} + \frac{3y^2}{10} = 1$

$\Rightarrow \frac{x^2}{5} + \frac{y^2}{10/3} = 1$

here, $a^2 = 5 \Rightarrow a = \sqrt{5}$

$b^2 = 10/3 \Rightarrow b = \sqrt{\frac{10}{3}}$

Area = $\pi\, ab$

$= \pi \times \sqrt{5} \times \sqrt{\frac{10}{3}} = 5\sqrt{\frac{2}{3}}\ \pi$ sq. unit

115. (C) Differential equation

$\frac{dy}{dx} + y\cot x = \sin x$

On comparing with general equation

P = $\cot x$, Q = $\sin x$

I.F. = $e^{\int \mathrm{P}\,dx}$

$= e^{\int \cot x\,dx}$

$= e^{\ln\sin x} = \sin x$

Solution of differential equation

$\Rightarrow y \times \text{I.F.} = \int Q\times\text{I.F.}\ dx$

$\Rightarrow y.\sin x = \int \sin x.\sin x\ \ dx$

$\Rightarrow y.\sin x = \int \frac{1-\cos 2x}{2}\ \ dx$

$\Rightarrow y.\sin x = \frac{1}{2}\left[x - \frac{\sin 2x}{2}\right] + c$

$\Rightarrow y.\sin x = \frac{1}{4}\,(2x - \sin 2x) + c$

$\Rightarrow 4y.\sin x = 2x - \sin 2x + c$

116. (D) $f(x) = \frac{\sqrt{\log_e\left(36-2x-x^2\right)}}{x-1}$

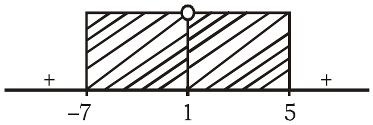
Now, $\log_e(36 - 2x - x^2) \geq 0$

$\Rightarrow 36 - 2x - x^2 \geq 1$

$\Rightarrow x^2 + 2x + 1 - 36 \leq 0$

$\Rightarrow x^2 + 2x - 35 \leq 0$

$\Rightarrow (x + 7)\,(x - 5) \leq 0$



Domain = [–7, 5] – {1}

117. (B) $\sin(-3180) = -\sin 3180$

$= -\sin(360 \times 9 - 60)$

$= -(-\sin 60) = \frac{\sqrt{3}}{2}$

118. (D) $A = \begin{bmatrix} -7 & 12 \\ -2 & 3 \end{bmatrix}$

$|A| = -21 + 24 = 3$

Co-factiors of A –

$C_{11} = (-1)^{1+1}\,(3) = 3$, $C_{12} = (-1)^{1+2}\,(-2) = 2$

$C_{21} = (-1)^{2+1}\,(12) = -12$, $C_{22} = (-1)^{2+2}\,(-7) = -7$

$C = \begin{bmatrix} 3 & 2 \\ -12 & -7 \end{bmatrix}$

$\text{Adj } A = C^T = \begin{bmatrix} 3 & -12 \\ 2 & -7 \end{bmatrix}$

$A^{-1} = \frac{\text{Adj}\,A}{|A|}$

$A^{-1} = \frac{1}{3}\begin{bmatrix} 3 & -12 \\ 2 & -7 \end{bmatrix} \Rightarrow 3A^{-1} = \begin{bmatrix} 3 & -12 \\ 2 & -7 \end{bmatrix}$

Now, $A + 2A^{-1}$

$\Rightarrow \begin{bmatrix} -7 & 12 \\ -2 & 3 \end{bmatrix} + \begin{bmatrix} 3 & -12 \\ 2 & -7 \end{bmatrix}$

$\Rightarrow \begin{bmatrix} 4 & 0 \\ 0 & -4 \end{bmatrix}$

119. (C) $\frac{\cos 9x - \cos 5x}{\sin 9x - 2\sin 7x + \sin 5x}$

$\Rightarrow \frac{2\sin 7x.\sin(-2x)}{\sin 9x + \sin 5x - 2\sin 7x}$

$\Rightarrow \frac{-2\sin 2x.\sin 7x}{2\sin 7x.\cos 2x - 2\sin 7x}$

$\Rightarrow \frac{-2\sin 2x.\sin 7x}{2\sin 7x(\cos 2x - 1)}$

$\Rightarrow \frac{-\sin 2x}{-(1-\cos 2x)}$

$\Rightarrow \frac{2\sin x.\cos x}{2\sin^2 x} = \cot x$

120. (D) $\lim_{x\to 0} \frac{7^x - 1}{x}$ $\left[\frac{0}{0}\right]$ form

by L-Hospital's Rule

$\Rightarrow \lim_{x\to 0} \frac{7^x \log 7 - 0}{1}$

$\Rightarrow 7^0 \log 7 = \log 7$

KD Campus Pvt. Ltd

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NDA (MATHS) MOCK TEST - 162 (Answer Key)

1.	(C)	21.	(D)	41.	(B)	61.	(D)	81.	(C)	101.	(B)
2.	(C)	22.	(B)	42.	(A)	62.	(B)	82.	(A)	102.	(C)
3.	(D)	23.	(B)	43.	(B)	63.	(D)	83.	(A)	103.	(D)
4.	(C)	24.	(B)	44.	(C)	64.	(B)	84.	(C)	104.	(C)
5.	(B)	25.	(C)	45.	(D)	65.	(A)	85.	(C)	105.	(C)
6.	(C)	26.	(B)	46.	(C)	66.	(C)	86.	(B)	106.	(B)
7.	(C)	27.	(D)	47.	(D)	67.	(A)	87.	(A)	107.	(B)
8.	(C)	28.	(A)	48.	(C)	68.	(A)	88.	(A)	108.	(B)
9.	(B)	29.	(B)	49.	(B)	69.	(A)	89.	(C)	109.	(A)
10.	(C)	30.	(C)	50.	(B)	70.	(B)	90.	(B)	110.	(C)
11.	(A)	31.	(C)	51.	(C)	71.	(D)	91.	(B)	111.	(B)
12.	(C)	32.	(B)	52.	(B)	72.	(C)	92.	(A)	112.	(C)
13.	(B)	33.	(D)	53.	(C)	73.	(B)	93.	(D)	113.	(D)
14.	(A)	34.	(B)	54.	(B)	74.	(B)	94.	(C)	114.	(B)
15.	(D)	35.	(B)	55.	(D)	75.	(D)	95.	(D)	115.	(C)
16.	(C)	36.	(B)	56.	(A)	76.	(A)	96.	(A)	116.	(D)
17.	(B)	37.	(C)	57.	(D)	77.	(C)	97.	(C)	117.	(B)
18.	(C)	38.	(A)	58.	(C)	78.	(D)	98.	(B)	118.	(D)
19.	(C)	39.	(D)	59.	(B)	79.	(A)	99.	(D)	119.	(C)
20.	(D)	40.	(C)	60.	(C)	80.	(B)	100.	(D)	120.	(D)

Note:- If your opinion differs regarding any answer, please message the mock test and question number to 8860330003

Note:- Whatsapp with Mock Test No. and Question No. at 7053606571 for any of the doubts, also share your suggestions and experience of Sunday Mock

Note:- If you face any problem regarding result or marks scored, please contact 9313111777