NDA MATHS MOCK TEST - 140 (SOLUTION)

1. (C) Differential equation

$xdy - ydx = (x^3 + xy^2)dx$

$\Rightarrow xdy - ydx = x(x^2 + y^2)dx$

$\Rightarrow \frac{xdy - ydx}{x^2 + y^2} = x\,dx$

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

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

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

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

2. (B) In ΔABC,

sinA + sinB + sinC

$\Rightarrow 2\sin\frac{A+B}{2}.\cos\frac{A-B}{2} + 2\sin\frac{C}{2}.\cos\frac{C}{2}$

$\Rightarrow 2\sin\frac{180-C}{2}.\cos\frac{A-B}{2} + 2\sin\frac{C}{2}.\cos\frac{C}{2}$

$\Rightarrow 2\cos\frac{C}{2}.\cos\frac{A-B}{2} + 2\sin\frac{180-(A+B)}{2}.\cos\frac{C}{2}$

$\Rightarrow 2\cos\frac{C}{2}\left[\cos\frac{A-B}{2} + \sin\left[90 - \frac{A+B}{2}\right]\right]$

$\Rightarrow 2\cos\frac{C}{2}\left[\cos\frac{A-B}{2} + \cos\frac{A+B}{2}\right]$

$\Rightarrow 2\cos\frac{C}{2} \times 2\cos\frac{\frac{A-B}{2}+\frac{A+B}{2}}{2}.\cos\frac{\frac{A-B}{2}+\frac{A+B}{2}}{2}$

$\Rightarrow 4\cos\frac{C}{2} \times \cos\frac{A}{2} \times \cos\left(\frac{-B}{2}\right)$

$\Rightarrow 4\cos\frac{A}{2}.\cos\frac{B}{2}.\cos\frac{C}{2}$

3. (C) $y = x^3 + e^x$

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

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

$\frac{dx}{dy} = \frac{1}{3x^2 + e^x}$

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

$\frac{d^2x}{dy^2} = -1.(3x^2 + e^x)^{-2}\,(6x + e^x)\frac{dx}{dy}$

$\frac{d^2x}{dy^2} = -\frac{6x + e^x}{(3x^2 + e^x)^2} \times \frac{1}{3x^2 + e^x}$

$\frac{d^2x}{dy^2} = -\frac{6x + e^x}{(3x^2 + e)^3}$

4. (C) $n(S) = 6\times6\times6 = 216$

$E = \left\{\begin{matrix}(6,6,2),(6,5,3),(6,4,4),(6,3,5),(6,2,6)\\(5,6,3),(5,5,4),(5,4,5),(5,3,6),(4,6,4),\\(4,5,5),(4,4,6),(3,6,5),(3,5,6),(2,6,6)\end{matrix}\right\}$

$n(E) = 15$

The required Probability $P(E) = \frac{n(E)}{n(S)}$

$P(E) = \frac{15}{216} = \frac{5}{72}$

5. (B) $n = 10$

Number of diagonals $= \frac{n(n-3)}{2}$

$= \frac{10\times7}{2} = 35$

6. (B) $\frac{\sin^2 3A}{\sin^2 A} - \frac{\cos^2 3A}{\cos^2 A}$

$\Rightarrow \left(\frac{\sin 3A}{\sin A}\right)^2 - \left(\frac{\cos 3A}{\cos A}\right)^2$

$\Rightarrow \left(\frac{3\sin A - 4\sin^3 A}{\sin A}\right)^2 - \left(\frac{4\cos^3 A - 3\cos A}{\cos A}\right)^2$

$\Rightarrow (3 - 4\sin^2A)^2 - (4\cos^2A - 3)^2$

$\Rightarrow 9 + 16\sin^4A - 24\sin^2A - 16\cos^4A - 9 + 24\cos^2A$

$\Rightarrow 16(\sin^4A - \cos^4A) - 24(\sin^2A - \cos^2A)$

$\Rightarrow (\sin^2A - \cos^2A)(\sin^2A + \cos^2A) - 24(\sin^2A - \cos^2A)$

$\Rightarrow (\sin^2A - \cos^2A)[16(\sin^2A + \cos^2A) - 24]$

$\Rightarrow -(\cos^2A - \sin^2A)[16 - 24]$

$\Rightarrow 8\cos 2A$

7. (D) $I = \int_0^{\pi/2} \frac{\tan x - \cot x}{1 - \tan x.\cot x} dx$ ...(i)

$$I = \int_0^{\pi/2} \frac{\tan\left(\frac{\pi}{2} - x\right) - \cot\left(\frac{\pi}{2} - x\right)}{1 - \tan\left(\frac{\pi}{2} - x\right).\cot\left(\frac{\pi}{2} - x\right)} dx$$

$I = \int_0^{\pi/2} \frac{\cot x - \tan x}{1 - \tan x.\cot x}$ ...(ii)

from eq(i) and eq(ii)

$2I = 0 \Rightarrow I = 0$

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

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

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

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

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

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

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

by L-Hospital's Rule

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

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

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

10. (C) Straight line

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

Angle between the straight lines

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

$\Rightarrow \cos\theta = 0$

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

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

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

$= -1(-2 - 10) = 12$

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

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

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

On camparing

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

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

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

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

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

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

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

14. (B)

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

15. (C) $\lim_{x \to \infty} \left(\frac{x+8}{x+2}\right)^{x+4}$

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

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

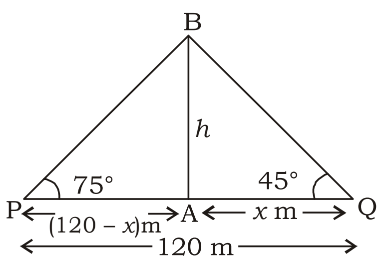
16. (C) $\lim_{n\to\infty} [5^n + 7^n]^{1/n}$

$\Rightarrow \lim_{n\to\infty} 7\left[\left(\frac{5}{7}\right)^n + 1\right]^{1/n}$

$\Rightarrow \lim_{n\to\infty} 7\left[1 + \frac{1}{\left(\frac{7}{5}\right)^n}\right]^{1/n}$

$\Rightarrow 7\left[1 + \frac{1}{\infty}\right]^0 = 7$

17. (C)



Let height of the aeroplane = h m

AQ = x m

In ΔABQ:-

$\tan 45° = \frac{AB}{AQ}$

$\Rightarrow 1 = \frac{h}{x} \Rightarrow x = h$

In ΔABP :-

$\tan 75° = \frac{AB}{AP}$

$\Rightarrow \frac{\sqrt{3}+1}{\sqrt{3}-1} = \frac{h}{120-x}$

$\Rightarrow \frac{\sqrt{3}+1}{\sqrt{3}-1} = \frac{h}{120-h}$

$\Rightarrow 120(\sqrt{3}+1) = 2\sqrt{3}\,h$

$\Rightarrow h = \frac{60(\sqrt{3}+1)}{\sqrt{3}}$

$\Rightarrow h = 20(3+\sqrt{3})$ m

18. (D) In ΔABC, if $\angle B = 15°, \angle C = 75°$, then $\angle A = 90°$

Sine Rule

$\Rightarrow \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$\Rightarrow \frac{a}{\sin 90} = \frac{b}{\sin 15} = \frac{c}{\sin 75}$

$\Rightarrow a = \frac{b}{\frac{(\sqrt{3}-1)}{2\sqrt{2}}} = \frac{c}{\frac{(\sqrt{3}+1)}{2\sqrt{2}}}$

$b = \frac{\sqrt{3}-1}{2\sqrt{2}}\,a$ and $c = \frac{\sqrt{3}+1}{2\sqrt{2}}\,a$

then $c\sqrt{3} - b = \frac{\sqrt{3}+1}{2\sqrt{2}}\,a \times \sqrt{3} - \frac{\sqrt{3}-1}{2\sqrt{2}}\,a$

$\Rightarrow c\sqrt{3} - b = \frac{3+\sqrt{3}-\sqrt{3}+1}{2\sqrt{2}}\,a$

$\Rightarrow c\sqrt{3} - b = \frac{4}{2\sqrt{2}}\,a$

$\Rightarrow c\sqrt{3} - b = \sqrt{2}\,a$

19. (A) In ΔABC, AB(c) = 5 cm, BC(a) = 12 cm, CA(b) = 13 cm

$s = \frac{5+12+13}{2} = 15$

Now, $\tan\frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$

$\Rightarrow \tan\frac{A}{2} = \sqrt{\frac{(15-13)\times(15-5)}{15\times(15-12)}}$

$\Rightarrow \tan\frac{A}{2} = \sqrt{\frac{2\times 10}{15\times 3}}$

$\Rightarrow \tan\frac{A}{2} = \frac{2}{3}$

then $\tan\left(2\times\frac{A}{4}\right) = \frac{2\tan\frac{A}{4}}{1-\tan^2\frac{A}{4}}$

$\Rightarrow \frac{2}{3} = \frac{2\tan\frac{A}{4}}{1-\tan^2\frac{A}{4}}$

$\Rightarrow 1 - \tan^2\frac{A}{4} = 3\tan\frac{A}{4}$

$\Rightarrow \tan^2\frac{A}{4} = 3\tan\frac{A}{4} - 1 = 0$

$\Rightarrow \tan\frac{A}{4} = \frac{-3 \pm \sqrt{(3)^2 - 4\times(1)(-1)}}{2\times 1}$

$\Rightarrow \tan\frac{A}{4} = \frac{-3 \pm \sqrt{13}}{2}$

Hence $\tan\frac{A}{4} = \frac{\sqrt{13}-3}{2}$

20. (D) $\tan 7\frac{1}{2} = \dfrac{\sin 2\frac{1}{2}}{\cos 7\frac{1}{2}} \times \dfrac{2\sin 7\frac{1}{2}}{2\sin 7\frac{1}{2}}$

$$\Rightarrow \tan 7\frac{1}{2} = \frac{1-\cos 15}{\sin 15}$$

$$\Rightarrow \tan 7\frac{1}{2} = \frac{1-\frac{\sqrt{3}+1}{2\sqrt{2}}}{\frac{\sqrt{3}-1}{2\sqrt{2}}}$$

$$\Rightarrow \tan 7\frac{1}{2} = \frac{2\sqrt{2}-\sqrt{3}-1}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$$

$$\Rightarrow \tan 7\frac{1}{2} = \frac{2\sqrt{6}-3-\sqrt{3}+2\sqrt{2}-\sqrt{3}-1}{3-1}$$

$$\Rightarrow \tan 7\frac{1}{2} = \sqrt{6}-\sqrt{3}+\sqrt{2}-2$$

21. (B) $y = x\sqrt{1+x^2}$

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

$$\frac{dy}{dx} = x \times \frac{1}{2}(1+x^2)^{-1/2}(2x) + \sqrt{1+x^2} \times 1$$

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

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

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

22. (A) $I = \int \dfrac{x^3}{1+x^8}\,dx$

$$I = \int \frac{x^3}{1+(x^4)^2}\,dx$$

Let $x^4 = t$

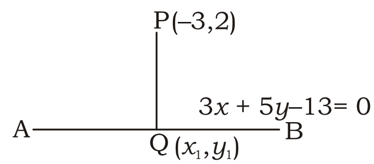
$$\Rightarrow 4x^3dx = dt \Rightarrow x^3\,dx = \frac{1}{4}dt$$

$$I = \int \frac{1}{4} \times \frac{1}{1+t^2}\,dt$$

$$I = \frac{1}{4}\tan^{-1}t + c$$

$$I = \frac{1}{4}\tan^{-1}x^8 + c$$

23. (D)



Let co-ordinates of the foot of perpendicular is Q (x_1, y_1)

Slope of line AB = $\dfrac{-3}{5}$

Slope of line PQ = $\dfrac{-1}{-3/5}$

$$\Rightarrow \frac{y_1-2}{x_1+3} = \frac{5}{3}$$

$\Rightarrow 5x_1 - 3y_1 + 21 = 0$ ...(i)

Point Q(x_1, y_1) lies on the line AB

$3x_1 + 5y_1 - 13 = 0$ ...(ii)

from eq(i) and eq(ii)

$x_1 = \dfrac{-33}{17}$ and $y_1 = \dfrac{64}{17}$

Hence foot of perpendicular = $\left(\dfrac{-33}{17}, \dfrac{64}{17}\right)$

24. (B) The staight lines $ax - by = c, bx - cy = a$ and $cx - ay = b$ are collinear,

then $\begin{vmatrix} a & -b & -c \\ b & -c & -a \\ c & -a & -b \end{vmatrix} = 0$

$\Rightarrow a(bc - a^2) + b(-b^2 + ca) - c(-ab + c^2) = 0$

$\Rightarrow abc - a^3 - b^3 + abc + abc - c^3 = 0$

$\Rightarrow a^3 + b^3 + c^3 - 3abc = 0$

$\Rightarrow (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca) = 0$

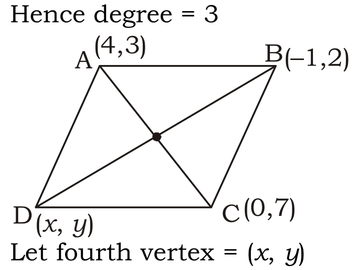
$\Rightarrow a+b+c = 0$ or $a^2 + b^2+c^2 - ab - bc - ca = 0$

25. (A) $\dfrac{d^2y}{dx^2} = \left[\left(1 - x\dfrac{dy}{dx}\right)^4\right]^{1/3}$

$$\left(\frac{d^2y}{dx^2}\right)^3 = \left(1 - x\frac{dy}{dx}\right)^4$$

Hence degree = 3

26. (C)



Let fourth vertex = (x, y)

Diagonals of a parallelogram are perpendicular besector to each other,

then $\dfrac{x-1}{2} = \dfrac{4+0}{2} \Rightarrow x = 5$

and $\dfrac{y+2}{2} = \dfrac{3+7}{2} \Rightarrow y = 8$

Fourth vertex = (5, 8)

27. (C) Differential equation

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

Let $x + y = t$

$1+\frac{dy}{dx} = \frac{dt}{dx} \Rightarrow \frac{dy}{dx} = \frac{dt}{dx} - 1$

$\Rightarrow \frac{dt}{dx} - 1 = \tan^2 t$

$\Rightarrow \frac{dt}{dx} = 1 + \tan^2 t$

$\Rightarrow \frac{dt}{dx} = \sec^2 t$

$\Rightarrow 2\cos^2 t\, dt = 2dx$

$\Rightarrow (1+ \cos 2t)dt = 2dx$

On integrating

$\Rightarrow t + \frac{\sin 2t}{2} = 2x + \frac{c}{2}$

$\Rightarrow 2t + \sin 2t = 4x + c$

$\Rightarrow 2(x + y) + \sin 2(x + y) = 4x + c$

$\Rightarrow \sin 2(x + y) = 2(x - y) + c$

28. (A) A = {1, 2, 3, 4} and B = {1, 2, 5}

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

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

Now, (A×B) ∩ (B×A) = {(1,1), (1,2), (2,1), (2,2)}

29. (C) S = 0.3 + 0.33 + 0.333 +........n terms

S = $\frac{1}{3}$(0.9 + 0.99 + 0.999+........n terms)

$S = \frac{1}{3}\left[\left(1-\frac{1}{10}\right)+\left(1-\frac{1}{100}\right)+......n \text{ terms}\right]$

$S = \frac{1}{3}(1 + 1 + ...n \text{ terms}) -$

$\frac{1}{3}\left(\frac{1}{10}+\frac{1}{100}+....n \text{ terms}\right)$

$S = \frac{1}{3} \times n - \frac{1}{3} \times \frac{\frac{1}{10}\left(1-\frac{1}{10^n}\right)}{1-\frac{1}{10}}$

$S = \frac{1}{3}\left[n - \frac{1}{9}\left(1-\frac{1}{10^n}\right)\right]$

30. (C) $\lim_{x\to\infty}\left[\frac{x^2-5x-2}{x^2+x+7}\right]^x$

We know that

$\lim_{x\to\infty}[f(x)]^{g(x)} = e^{\lim_{x\to\infty} g(x)[f(x)-1]}$

$\Rightarrow e^{\lim_{x\to\infty} x\left[\frac{x^2-5x-2}{x^2+x+7}-1\right]}$

$\Rightarrow e^{\lim_{x\to\infty} x\left[\frac{x^2-5x-2-x^2-x-7}{x^2+x+7}\right]}$

$\Rightarrow e^{\lim_{x\to\infty} x\left[\frac{-6x-9}{x^2+x+7}\right]}$

$\Rightarrow e^{\lim_{x\to\infty}\frac{x^2\left[-6-\frac{9}{x}\right]}{x^2\left[1+\frac{1}{x}+\frac{7}{x^2}\right]}}$

$\Rightarrow e^{\frac{-6+0}{1+0+0}} = e^{-6}$

31. (D) We know that

$\frac{-\pi}{2} \le \sin^{-1}y \le \frac{\pi}{2}$

Now, $\frac{-\pi}{2} \le \sin^{-1}(\log_2 3x) \le \frac{\pi}{2}$

$\Rightarrow -1 \le \log_2 3x \le 1$

$\Rightarrow 2^{-1} \le 3x \le 2^1$

$\Rightarrow \frac{2^{-1}}{3} \le x \le \frac{2}{3}$

$\Rightarrow \frac{1}{6} \le x \le \frac{2}{3}$

Hence domain = $\left[\frac{1}{6},\frac{2}{3}\right]$

32. (B) Given that $\tan\theta = \frac{x}{y}$

Now, $\frac{x\sin\theta - y\cos\theta}{x\sin\theta + y\cos\theta}$

$\Rightarrow \frac{x\tan\theta - y}{x\tan\theta + y}$

$\Rightarrow \frac{x\times\frac{x}{y}-y}{x\times\frac{x}{y}+y} = \frac{x^2-y^2}{x^2+y^2}$

33. (B) Let $y = 6^{57}$

On taking log both sides

$\Rightarrow \log_{10}y = 57\log_{10}6$

$\Rightarrow \log_{10}y = 57\times0.7782$

$\Rightarrow \log_{10}y = 44.3574$

Hence no. of digits = 44+1 = 45

34. (A) $f(x) = \tan x - \tan^2 x + \tan^3 x \ldots\ldots \infty$

$$f(x) = \frac{\tan x}{1-(-\tan x)} = \frac{\tan x}{1+\tan x}$$

Now, $I = \int_0^{\pi/2} \cot x . f(x) dx$

$$\Rightarrow I = \int_0^{\pi/2} \cot x . \frac{\tan x}{1+\tan x} dx$$

$$\Rightarrow I = \int_0^{\pi/2} \frac{1}{1+\frac{\sin x}{\cos x}} dx$$

$$\Rightarrow I = \int_0^{\pi/2} \frac{\cos x}{\sin x + \cos x} dx \quad \ldots(i)$$

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

$$\Rightarrow I = \int_0^{\pi/2} \frac{\sin x}{\cos x + \sin x} dx \quad \ldots(i)$$

from eq(i) and eq(ii)

$$2I = \int_0^{\pi/2} \frac{\sin x + \cos x}{\sin x + \cos x} dx$$

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

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

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

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

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

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

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

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

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

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

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

36. (C) Let $y = \cos^2 \tan^{-1}\sqrt{\frac{1-x}{1+x}}$

Let $x = \cos 2\theta$ ...(i)

$$\Rightarrow y = \cos^2 \tan^{-1}\sqrt{\frac{1-\cos 2\theta}{1+\cos 2\theta}}$$

$$\Rightarrow y = \cos^2 \tan^{-1}\sqrt{\frac{2\sin^2\theta}{2\cos^2\theta}}$$

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

$$\Rightarrow y = \cos^2\theta$$

$$\Rightarrow y = \frac{1+\cos 2\theta}{2}$$

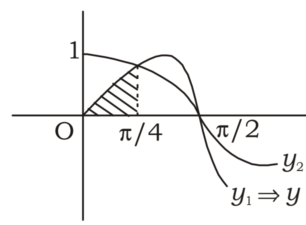
$$\Rightarrow y = \frac{1+x}{2} \quad \text{[form eq(i)]}$$

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

$$\Rightarrow \frac{dy}{dx} = \frac{1}{2}$$

Hence $\frac{dy}{dx}\left[\cos^2 \tan^{-1}\sqrt{\frac{1-x}{1+x}}\right] = \frac{1}{2}$

37. (C)



The required Area $= \int_0^{\pi/4} y_1\, dx$

$$= \int_0^{\pi/4} \sin 2x\, dx$$

$$= \left[\frac{-\cos 2x}{2}\right]_0^{\pi/4}$$

$$= \frac{-1}{2}[\cos 2x]_0^{\pi/4}$$

$$= \frac{-1}{2}\left[\cos\frac{\pi}{2} - \cos 0\right]$$

$$= \frac{-1}{2}[0-1] = \frac{1}{2} \text{ sq.unit}$$

38. (D) Lines $5x + 12y + 5 = 0$ and $15x + 36y + 13 = 0$

$$\Rightarrow 5x + 12y + \frac{13}{3} = 0$$

The required distance (D) $= \frac{5-\frac{13}{3}}{\sqrt{(5)^2+(12)^2}}$

$$= \frac{2}{3\times 13}$$

$$= \frac{2}{39}$$

39. (A) The equation of line

$$y + 6 = \frac{3}{11}(x + 1)$$

$\Rightarrow 11y + 66 = 3x + 3$

$\Rightarrow 3x - 11y = 63$

40. (C) Equation of circle

$x^2 + y^2 - x + y - 14 = 0$

$(x - 2)(x + 1) + (y + 4)(y - 3) = 0$

End points of the diameter are (2, – 4) and (–1, 3).

Equation of the diameter

$$y + 4 = \frac{3+4}{-1-2}(x - 2)$$

$\Rightarrow 7x + 3y = 2$

41. (D) Hyperbola $\frac{x^2}{9} - \frac{y^2}{\lambda^2} = 1$

$$e^2 = 1 + \frac{\lambda^2}{9}$$

$$e = \frac{\sqrt{9+\lambda^2}}{3}$$

foci = $(\pm\sqrt{9+\lambda^2}, 0)$

ellipse $\frac{x^2}{49} + \frac{y^2}{36} = 1$

$$e^2 = 1 - \frac{36}{49}$$

$$e = \frac{\sqrt{13}}{7}$$

foci = $(\pm\sqrt{13}, 0)$

foci are coincide.

then $\sqrt{9+\lambda^2} = \sqrt{13} \Rightarrow \lambda^2 = 4$

42. (B) $I = \int \frac{1}{\sin\left(x+\frac{\pi}{4}\right).\sin\left(x+\frac{\pi}{2}\right)}dx$

$$I = \frac{1}{\sin\frac{\pi}{4}}\int \frac{\sin\left[\left(x+\frac{\pi}{2}\right)-\left(x+\frac{\pi}{4}\right)\right]}{\sin\left(x+\frac{\pi}{4}\right).\sin\left(x+\frac{\pi}{2}\right)}dx$$

$$I = \sqrt{2}\int \frac{\sin\left(x+\frac{\pi}{2}\right).\cos\left(x+\frac{\pi}{4}\right) - \cos\left(x+\frac{\pi}{2}\right).\sin\left(x+\frac{\pi}{4}\right)}{\sin\left(x+\frac{\pi}{4}\right).\sin\left(x+\frac{\pi}{2}\right)}dx$$

$$I = \sqrt{2}\int\left[\cot\left(x+\frac{\pi}{4}\right) - \cot\left(x+\frac{\pi}{2}\right)\right]dx$$

$$I = \sqrt{2}\left[\log\sin\left(x+\frac{\pi}{4}\right) - \log\sin\left(x+\frac{\pi}{2}\right)\right] + c$$

$$I = \sqrt{2}\log\left[\frac{\sin\left(x+\frac{\pi}{4}\right)}{\sin\left(x+\frac{\pi}{2}\right)}\right] + c$$

43. (C)

2	31	1
2	15	1
2	7	1
2	3	1
2	1	1
	0	

0 .75
× 2
[1].50
× 2
[1].00

$(0.25)_{10} = (0.11)_2$

$(37)_{10} = (100101)_2$

Hence $(31.75)_{10} = (11111.11)_2$

44. (B) Let $y = f(x) = \frac{6^x - 6^{-x}}{6^x + 6^{-x}}$

by Componendo & Dividendo Rule

$$\Rightarrow \frac{y+1}{y-1} = \frac{6^x - 6^{-x} + 6^x + 6^{-x}}{6^x - 6^{-x} - 6^x - 6^{-x}}$$

$$\Rightarrow \frac{y+1}{1-y} = \frac{2\times 6^x}{-2\times 6^{-x}}$$

$$\Rightarrow \frac{y+1}{y-1} = 6^{2x}$$

$$\Rightarrow 2x = \log_6\frac{y+1}{1-y}$$

$$\Rightarrow x = \frac{1}{2}\log_6\frac{y+1}{1-y}$$

$$\Rightarrow f^{-1}(y) = \frac{1}{2}\log_6\left(\frac{1+y}{1-y}\right)$$

$$\Rightarrow f^{-1}(x) = \frac{1}{2}\log_6\left(\frac{1+x}{1-x}\right)$$

45. (A) $\frac{\log_{64}4 + \log_{27}3}{\log_2 32 + \log_5 125}$

$$\Rightarrow \frac{\log_{4^3}4 + \log_{3^3}3}{\log_2 2^5 + \log_5 5^3}$$

$$\Rightarrow \frac{\frac{1}{3}\log_4 4 + \frac{1}{3}\log_3 3}{5\log_2 2 + 3\log_5 5}$$

$$\Rightarrow \frac{\frac{1}{3}+\frac{1}{3}}{5+3}$$

$$\Rightarrow \frac{2}{3\times 8} = \frac{1}{12}$$

46. (B) Word "PARENTS"

No. of permutations = 7!

47. (C) $\begin{vmatrix} \omega & 1 & 4\omega^4 \\ 3\omega^2 & 3 & 12\omega^5 \\ 2\omega^3 & 2 & 8\omega^6 \end{vmatrix}$

$\Rightarrow 4\times3\times2 \begin{vmatrix} \omega & 1 & \omega^4 \\ \omega^2 & 1 & \omega^5 \\ \omega^3 & 1 & \omega^6 \end{vmatrix}$

$\Rightarrow 24 \begin{vmatrix} \omega & 1 & \omega \\ \omega^2 & 1 & \omega^2 \\ \omega^3 & 1 & 1 \end{vmatrix}$

$\Rightarrow 24\times0 = 0$ [∵ Two columns are identical.]

48. (B) $\sqrt{19+8\sqrt{3}} = \sqrt{(4+\sqrt{3})^2}$

$\sqrt{19+8\sqrt{3}} = 4 + \sqrt{3}$

49. (C) The required Probability = $\frac{1}{7}$

50. (D) $\lim_{x\to0} \frac{5x^3+2x^2+15}{3x+2x^2+4x^3}$

$\Rightarrow \lim_{x\to0} \frac{x^3\left(5+\frac{2}{x}+\frac{15}{x^3}\right)}{x^3\left(\frac{3}{x^2}+\frac{2}{x}+4\right)}$

$\Rightarrow \lim_{x\to0} \frac{5+\frac{2}{x}+\frac{15}{x^3}}{\frac{3}{x^2}+\frac{2}{x}+4}$

$\Rightarrow \frac{5+0+0}{0+0+4} = \frac{5}{4}$

51. (C) $\int_0^{2\pi} |\sin x|\, dx = 2\int_0^{\pi} \sin x \; dx$

$= 2\left[-\cos x\right]_0^{\pi}$

$= 2[-\cos\pi + \cos 0]$

$= 2[+1+1] = 4$

52. (A) Let $y = x.ln\tan x$

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

$\Rightarrow \frac{dy}{dx} = x \times \frac{1}{\tan x} \times \sec^2 x + ln\tan x \times 1$

$\Rightarrow \frac{dy}{dx} = x.\sec x.\tan x + ln\tan x$

53. (C) $\vec{a} = -6\hat{i} + m\hat{j} + 2\hat{k}$ and $\vec{b} = 3\hat{i} + 4\hat{j} + 3\hat{k}$

Now, $\cos\theta = \frac{\vec{a}.\vec{b}}{|\vec{a}||\vec{b}|}$

$\Rightarrow \cos\frac{\pi}{2} = \frac{\left(-6\hat{i}+m\hat{j}+2\hat{k}\right).\left(3\hat{i}+4\hat{j}+3\hat{k}\right)}{\sqrt{(-6)^2+m^2+2^2}\sqrt{3^2+4^2+3^2}}$

$\Rightarrow 0 = \frac{-18+4m+6}{\sqrt{36+m^2+4}\sqrt{9+16+9}}$

$\Rightarrow 4m - 12 = 0 \Rightarrow m = 3$

54. (C) We know that

$(1+x)^n = {}^nC_0 + {}^nC_1 x + {}^nC_2 x^2 + {}^nC_3 x^3 + ... + {}^nC_n x^n$

On putting $x = 1$

$\Rightarrow (1+1)^n = {}^nC_0 + {}^nC_1 + {}^nC_2 + {}^nC_3 + ... + {}^nC_n$

$\Rightarrow 2^n = 1 + \sum_{r=1}^{n} C(n,r)$

$\Rightarrow \sum_{r=1}^{n} C(n,r) = 2$

55. (C) Deteminant $\begin{vmatrix} 1 & 2 & 0 & 4 \\ -1 & 3 & -2 & 4 \\ 0 & -5 & -4 & 2 \\ 6 & -1 & 0 & -3 \end{vmatrix}$

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

$= 1(12 - 0) - 0 + 4(0 + 24)$

$= 12 + 96 = 108$

56. (D) Hyperbola $3x^2 - 4y^2 = 1$

$\Rightarrow \frac{x^2}{1/3} - \frac{y^2}{1/4} = 1$

$a^2 = \frac{1}{3}$, $b^2 = \frac{1}{4}$

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

$\Rightarrow e = \sqrt{1+\frac{1/4}{1/3}} \Rightarrow e = \frac{\sqrt{7}}{2}$

foci = $(\pm ae, 0)$

$= \left(\pm\frac{1}{\sqrt{3}}\times\frac{\sqrt{7}}{2}, 0\right) = \left(\pm\frac{1}{2}\sqrt{\frac{7}{3}}, 0\right)$

57. (A) $f(x) = 3x^3 + 5x^2 - 6x + 7$

$f'(x) = 9x^2 + 10x - 6$

$f''(x) = 18x + 10$

Now, $3f'(0) - 4f''(-1)$

$\Rightarrow 3[9\times0+10\times0-6] - 4[18\times(-1)+10]$

$\Rightarrow -18 - 4\times(-8) = 14$

58. (B) $I = \int \sin^2\theta\, d\theta + \int \cot^2\theta.\sin^2\theta\, d\theta$

$I = \int\left(\sin^2\theta + \frac{\cos^2\theta}{\sin^2\theta}.\sin^2\theta\right) d\theta$

$I = \int\left(\sin^2\theta + \cos^2\theta\right) d\theta$

$I = \int 1\, d\theta$

$I = \theta + c$

59. (A) We know that

$1^3 + 2^3 + 3^3 + ...+ n^3 = \frac{n^2(n+1)^2}{4}$

The arithmetic mean $= \frac{n^2(n+1)^2}{4\times n}$

$= \frac{n(n+1)^2}{4}$

60. (D) $y = \sin(\ln x)$ ...(i)

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

$\Rightarrow \frac{dy}{dx} = \cos(\ln x) \times \frac{1}{x}$

$\Rightarrow x\frac{dy}{dx} = \cos(\ln x)$

Again, differentiating

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

$\Rightarrow x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} = -y$ [from eq(i)]

61. (C) In the expansion of $\left(2x - \frac{1}{3x^2}\right)^6$

$T_{r+1} = {}^6C_r\,(2x)^{6-r}\left(\frac{-1}{3x^2}\right)^r$

$T_{r+1} = {}^6C_r\,2^{6-r}\left(\frac{-1}{3}\right)^r x^{6-3r}$

Here, $6 - 3r = -3 \Rightarrow r = 3$

The required coefficient $= {}^6C_3\,2^3\left(\frac{-1}{3}\right)^3$

$= 20\times 8\times\left(\frac{-1}{27}\right)$

$= \frac{-160}{27}$

62. (A) $f(x) = \begin{cases} 3ax - 4b, & x < 2 \\ 5, & x = 2 \\ 2a + bx, & x > 2 \end{cases}$ is continuous

at $x = 2$, then

$\lim_{x\to 2^-} f(x) = \lim_{x\to 2^+} f(x) = f(2)$

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

$\Rightarrow \lim_{x\to 2} 3ax - 4b = 5$

$\Rightarrow 3a\times 2 - 4b = 5 \Rightarrow 6a - 4b = 5$ ...(i)

and $\lim_{x\to 2^+} f(x) = f(2)$

$\Rightarrow \lim_{x\to 2} 2a + bx = 5$

$\Rightarrow 2a + b\times 2 = 5 \Rightarrow 2a + 2b = 5$ ...(ii)

On solving eq(i) and eq(ii)

$a = \frac{3}{2}$, $b = 1$

63. (B) $\cot^{-1}\frac{15}{8} + \sin^{-1}\frac{3}{5}$

$\Rightarrow \tan^{-1}\frac{8}{15} + \tan^{-1}\frac{3}{4}$

$\Rightarrow \tan^{-1}\left(\frac{\frac{8}{15} + \frac{3}{4}}{1 - \frac{8}{15}\times\frac{3}{4}}\right)$

$\Rightarrow \tan^{-1}\left(\frac{77}{36}\right) = \sin^{-1}\left(\frac{77}{85}\right)$

64. (D) Sphere $x^2 + y^2 + z^2 - 6x - 4y + 2z - 2 = 0$

$u = -3,\ v = -2,\ w = 1,\ d = -2$

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

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

$\Rightarrow r = \sqrt{9 + 4 + 1 + 2} = 4$ unit

Hence diameter $= 2r = 2\times 4 = 8$ unit

65. (B) $\Delta_1 = \begin{vmatrix} x & a & a \\ b & x & a \\ b & b & x \end{vmatrix}$

$\Delta_1 = x(x^2 - ab) - a(bx - ab) + a(b^2 - bx)$

$\Delta_1 = x^3 - abx - abx + a^2b + ab^2 - abx$

$\frac{d}{dx}(\Delta_1) = 3x^2 - ab - ab + 0 + 0 - ab$

$\frac{d}{dx}(\Delta_1) = 3x^2 - 3ab = 3(x^2 - ab)$ ...(i)

$\Delta_2 = \begin{vmatrix} x & b \\ a & x \end{vmatrix} = x^2 - ab$ ...(ii)

from eq(i) and eq(ii)

$\frac{d}{dx}(\Delta_1) = 3\Delta_2$

66. (C) Equation

$5x^2 + 7x + 2 = 0$

$\alpha + \beta = \frac{-7}{5}$ and $\alpha.\beta = \frac{2}{5}$

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

$\Rightarrow \frac{\alpha^2+\beta^2}{\alpha+\beta} = \frac{\left(\frac{-7}{5}\right)^2 - 2\times\frac{2}{5}}{\frac{-7}{5}}$

$\Rightarrow \frac{\alpha^2+\beta^2}{\alpha+\beta} = \frac{\frac{49}{25} - \frac{4}{5}}{\frac{-7}{5}}$

$\Rightarrow \frac{\alpha^2+\beta^2}{\alpha+\beta} = \frac{\frac{29}{25}}{\frac{-7}{5}} = \frac{-29}{35}$

67. (D) Let angles of a triangle = $3x$, $2x$, x

$3x + 2x + x = 180$

$\Rightarrow 6x = 180 \Rightarrow x = 30$

Angles are 90, 60, 30.

Now, sin90 + sin60 + sin30

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

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

68. (B) Given that A =[4 3 2 1], B = $\begin{bmatrix} -1 \\ 2 \\ 3 \\ -1 \end{bmatrix}$ and c = $\begin{bmatrix} 6 \\ -2 \\ 3 \\ -4 \end{bmatrix}$

Now, A(B – C) = $[4\ 3\ 2\ 1]\left[\begin{bmatrix} -1 \\ 2 \\ 3 \\ -1 \end{bmatrix} - \begin{bmatrix} 6 \\ -2 \\ 3 \\ -4 \end{bmatrix}\right]$

$= [4\ 3\ 2\ 1]\begin{bmatrix} -7 \\ 4 \\ 0 \\ 3 \end{bmatrix}$

$= [4\times(-7) + 3\times4 + 2\times0 + 1\times3]$

$= [-28 + 12 + 0 + 3] = [-13]$

69. (C) $I = \int e^{\frac{x^2-1}{x}} dx + \int \frac{e^{\frac{x^2-1}{x}}}{x^2} dx$

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

Let $\frac{x^2-1}{x} = t$

$\Rightarrow x - \frac{1}{x} = t \Rightarrow \left(1+\frac{1}{x^2}\right) dx = dt$

$I = \int e^t\, dt$

$I = e^t + c$

$I = e^{\frac{x^2-1}{x}} + c$

70. (A) $\frac{1}{2\cos 80°} - 2\cos 20°$

$\Rightarrow \frac{1 - 4\cos 20°.\cos 80°}{2\cos 80°}$

$\Rightarrow \frac{1 - 2\times 2\cos 20°.\cos 80°}{2\cos 80°}$

$\Rightarrow \frac{1 - 2[\cos(20+80) + \cos(80-20)]}{2\cos 80°}$

$\Rightarrow \frac{1 - 2[\cos 100 + \cos 60]}{2\cos 80°}$

$\Rightarrow \frac{1 - 2\left[\cos(90+10) + \frac{1}{2}\right]}{2\cos(90-10)}$

$\Rightarrow \frac{1 - 2\left[-\sin 10 + \frac{1}{2}\right]}{2\cos 10}$

$\Rightarrow \frac{1 + 2\sin 10 - 1}{2\sin 10}$

$\Rightarrow \frac{2\sin 10}{2\sin 10} = 1$

71. (B) $\frac{\sin 2x + \sin 4x}{\sin 2x - \sin 4x}$

$\Rightarrow \frac{2\sin\frac{2x+4x}{2}.\cos\frac{2x-4x}{2}}{2\cos\frac{2x+4x}{2}.\sin\frac{2x-4x}{2}}$

$\Rightarrow \frac{\sin 3x.\cos x}{\cos 3x(-\sin x)} = \frac{-\cos x}{\cot 3x}$

72. (C) $\lim_{x\to 4} \frac{\sqrt{x}-2}{x^2-16}$ $\left[\frac{0}{0}\right]$ Form

by L-Hospital's Rule

$\Rightarrow \lim_{x\to 4} \frac{\frac{1}{2\sqrt{x}}}{2x}$

$\Rightarrow \lim_{x\to 4} \frac{1}{4(x)^{3/2}}$

$\Rightarrow \frac{1}{4(4)^{3/2}} = \frac{1}{32}$

73. (C) $f(x) = \begin{cases} \frac{x-\sin x}{x^2}, & x \neq 0 \\ \lambda, & x = 0 \end{cases}$ is continuous

at $x = 0$, then

$\Rightarrow \lim_{x\to 0^-} f(x) = f(0)$

$\Rightarrow \lim_{x\to 0} \frac{x-\sin x}{x^2} = \lambda$

by L-Hospital's Rule

$\Rightarrow \lim_{x\to 0} \frac{1-\cos x}{2x} = \lambda$

by L-Hospital's Rule

$\Rightarrow \lim_{x\to 0} \frac{\sin x}{2} = \lambda$

$\Rightarrow \frac{\sin 0}{2} = \lambda \Rightarrow \lambda = 0$

74. (C) $\lim_{x\to 0} \frac{a^{\sin x} - a^{\tan x}}{\tan x - \sin x}$ $\left[\frac{0}{0}\right]$ Form

$\Rightarrow \lim_{x\to 0} \frac{a^{\tan x}(a^{\sin x - \tan x} - 1)}{-(\sin x - \tan x)}$

$\Rightarrow \lim_{x\to 0} -a^{\tan x} \times \log a \left[\because \lim_{x\to 0}\left(\frac{a^x-1}{x}\right) = \log a\right]$

$\Rightarrow -\log a$

75. (D) $f(x) = \sin x - \sin^2 x + \sin^3 x - \ldots\ldots \infty$

$f(x) = \frac{\sin x}{1+\sin x}$

$\int f(x)\,dx = \int \frac{\sin x}{1+\sin x}\,dx$

$= \int \frac{1+\sin x - 1}{1+\sin x}\,dx$

$= \int \left(1 - \frac{1}{1+\sin x}\right) dx$

$= \int 1.dx - \int \frac{1}{1+\cos\left(\frac{\pi}{2} - x\right)}\,dx$

$= x - \int \frac{1}{2\cos^2\left(\frac{\pi}{4} - \frac{\pi}{2}\right)}\,dx$

$= x - \frac{1}{2}\int \sec^2\left(\frac{\pi}{4} - \frac{\pi}{2}\right) dx$

$= x - \frac{1}{2} \times \frac{\tan\left(\frac{\pi}{4} - \frac{\pi}{2}\right)}{\frac{-1}{2}} + c$

$= x + \tan\left(\frac{\pi}{4} - \frac{x}{2}\right) + c$

76. (C) Differential equation

$\sin x \frac{dy}{dx} + y.\cos x = \text{cosec} x$

$\Rightarrow \frac{dy}{dx} + y.\cot x = \text{cosec}^2 x$

On comparing with the general equation

P = cot$x$ and Q = cosec^2x

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

I.F. = $e^{\int \cot x}$

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

Solution of the differential equation

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

$y \times \sin x = \int \text{cosec}^2 x \times \sin x$

$y \sin x = \int \text{cosec} x\, dx$

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

77. (B) $x\,dy - y\,dx = x^2 y\,dy$

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

$\Rightarrow d\left(\frac{y}{x}\right) = y\,dy$

On integrating

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

$\Rightarrow 2y = xy^2 + cx$

78. (A)

$$\begin{array}{r} 1111001 \\ +\quad 1101 \\ \hline 10000110 \end{array} \qquad \begin{array}{r} 10000110 \\ -\quad 110001 \\ \hline 1010101 \end{array}$$

$(1111001)_2+(1101)_2-(110001)_2=(1010101)_2$

79. (B) Table is round, so one seat is fixed.
The number of ways = (7 −1)!
= 6! = 720

80. (C) The number of ways = 6 × 5 = 30

81. (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)

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

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

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

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

82. (A) Equation $5x - 3y = 7$
and $3x + 5y = 8$

$\frac{5}{3} \neq \frac{-3}{5} \neq \frac{7}{8}$

Equations have a unique solutions.

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

On squaring both side

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

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)

$2a^2 = 18$ and $2b^2 = 10$

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

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

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

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

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

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

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

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

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

85. (A) The required Probability $= \frac{1}{2}\left[\frac{2}{5}\times\frac{2}{6}+\frac{3}{5}\times\frac{4}{6}\right]$

$= \frac{1}{2}\times\frac{16}{30} = \frac{4}{15}$

86. (B) The required Probability

$= \frac{1}{2}\left[\frac{3}{5}\times\frac{2}{6}+\frac{2}{5}\times\frac{4}{6}+\frac{3}{5}\times\frac{4}{6}\right]$

$= \frac{1}{2}\left[\frac{6}{30}+\frac{8}{30}+\frac{12}{30}\right]$

$= \frac{1}{2}\times\frac{26}{30} = \frac{13}{30}$

87. (A) $y = a^{\frac{1}{1-\log_a z}} \Rightarrow a = y^{1-\log_a z}$

$\Rightarrow \log_a a = (1-\log_a z)\log_a y$

$\Rightarrow \log_a y = \frac{1}{1-\log_a z}$

and $x = a^{\frac{1}{1-\log_a y}} \Rightarrow a = x^{1-\log_a y}$

$\Rightarrow \log_a a = (1-\log_a y)\log_a x$

$\Rightarrow \log_a x = \frac{1}{1-\log_a y}$

$\Rightarrow \log_a x = \frac{1}{1-\frac{1}{\log_a z}}$

$\Rightarrow \log_a x = \frac{1-\log_a z}{-\log_a z}$

Now, $\frac{1}{1-\log_a x} = \frac{1}{1+\frac{1-\log_a z}{\log_a z}}$

$\Rightarrow \frac{1}{1-\log_a x} = \frac{\log_a z}{1}$

$\Rightarrow \log_a z = \frac{1}{1-\log_a x} \Rightarrow z = a^{\frac{1}{1-\log_a x}}$

88. (C) Let $y = 3^{92}$
taking log both side
$\Rightarrow \log y = 92 \log_{10} 3$
$\Rightarrow \log_{10} y = 92\times0.4771$
$\Rightarrow \log_{10} y = 43.8932$
The number of digits = 43 + 1 = 44

89. (D) $\cos\theta = \frac{1}{2}\left(x+\frac{1}{x}\right)$

$\Rightarrow x+\frac{1}{x} = 2\cos\theta$

$\Rightarrow x^3+\frac{1}{x^3} = (2\cos\theta)^3 - 3\times(2\cos\theta)$

$\Rightarrow x^3+\frac{1}{x^3} = 8\cos^3\theta - 6\cos\theta$

$\Rightarrow x^3+\frac{1}{x^3} = 2(4\cos^3\theta - 3\cos\theta)$

$\Rightarrow x^3+\frac{1}{x^3} = 2\cos3\theta$

$\Rightarrow \frac{1}{2}\left(x^3+\frac{1}{x^3}\right) = \cos3\theta$

90. (A) $\sin\frac{\pi}{3}+\sin\frac{5\pi}{9} - \sin\frac{7\pi}{9} - \sin\frac{8\pi}{9}$

$\Rightarrow \sin60 + \sin100 - \sin140 - \sin160$

$\Rightarrow \sin60 + \sin(90+10) - 2\sin\frac{140+160}{2}.\cos\frac{160-140}{2}$

$\Rightarrow \frac{\sqrt{3}}{2} + \cos10 - 2\sin150.\cos10$

$\Rightarrow \frac{\sqrt{3}}{2} + \cos10 - 2\times\frac{1}{2}\cos10 \Rightarrow \frac{\sqrt{3}}{2}$

91. (B) $\cot x = \frac{a}{b}$

then $\sqrt{\frac{a-b}{a+b}}+\sqrt{\frac{a+b}{a-b}}$

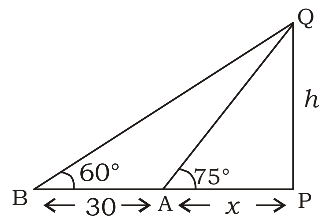
$\Rightarrow \sqrt{\frac{\frac{a}{b}-1}{\frac{a}{b}+1}}+\sqrt{\frac{\frac{a}{b}+1}{\frac{a}{b}-1}}$

$\Rightarrow \frac{\sqrt{\cot x-1}}{\sqrt{\cot x+1}}+\frac{\sqrt{\cot x+1}}{\sqrt{\cot x-1}}$

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

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

92. (D)



Let breadth of a river (AP) = x m
PQ = h m
In ΔAPQ :-

$\tan75 = \frac{PQ}{AP}$

$2+\sqrt{3} = \frac{h}{x}$ ...(i)

In ΔPQB :-

$\tan60° = \frac{PQ}{PB}$

$\Rightarrow \sqrt{3} = \frac{h}{x+30}$ ...(iii)

form eq(i) and eq(ii)

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

$\Rightarrow 2x+\sqrt{3}x = \sqrt{3}x + 30\sqrt{3} \Rightarrow x = 15\sqrt{3}$

Hence the breadth of a river = $15\sqrt{3}$ m

93. (C) $A = \begin{bmatrix} 1 & 0 & 2 \\ 3 & -1 & 4 \\ 0 & 2 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3 & 0 \\ -1 & 2 & 3 \\ 0 & -1 & 5 \end{bmatrix}$

$AB = \begin{bmatrix} 1 & 0 & 2 \\ 3 & -1 & 4 \\ 0 & 2 & -1 \end{bmatrix}\begin{bmatrix} 4 & 3 & 0 \\ -1 & 2 & 3 \\ 0 & -1 & 5 \end{bmatrix}$

$AB = \begin{bmatrix} 4 & 1 & 10 \\ 13 & 3 & 17 \\ -2 & 5 & 1 \end{bmatrix}$

Now, det (AB) = 4(3 – 85) –1(13 + 34) +10(65 + 6)
= –328 – 47 + 710 = 335

94. (A) $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$

Now, $A^2 + 7I_2 - 5A = 0$
multiply by A^{-1} both sides
$\Rightarrow A^{-1}A^2 + 7A^{-1} I_2 - 5 A^{-1} A = 0$
$\Rightarrow A + 7A^{-1} - 5I_2 = 0$
$\Rightarrow 7A^{-1} = 5I_2 - A$

$\Rightarrow 7A^{-1} = 5\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$

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

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

95. (C) $I = \int_{-\pi/2}^{\pi/2} \frac{\sin^2 x}{x}\, dx$

$I = 0$ [$\because$ function is odd.]

96. (D) $I = \int_0^1 x(1-x)^7\, dx$

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

$I = \int_0^1 (1-x)x^7\, dx$

$I = \int_0^1 (x^7 - x^8)\, dx$

$I = \left[\frac{x^8}{8} - \frac{x^9}{9}\right]_0^1$

$I = \frac{1}{8} - \frac{1}{9} - 0$

$I = \frac{1}{72}$

97. (C) $(\log_3 x)(\log_x 2x)(\log_{2x} y) = \log_x x^2$
$\Rightarrow (\log_3 2x)(\log_{2x} y) = 2\log_x x$
$\Rightarrow \log_3 y = 2 \Rightarrow y = 3^2 = 9$

98. (A) $\sum_{n=0}^{10} (i^{n+1} + i^n)$

$\Rightarrow (i + i^0) + (i^2 + i) + (i^3 + i^2) + (i^4 + i^3) + (i^5 + i^4) + (i^6 + i^5) + (i^7 + i^6) + (i^8 + i^7) + (i^9 + i^8) + (i^{10} + i^9) + (i^{11} + i^{10})$
$\Rightarrow i + 1 - 1 + i - i - 1 + 1 - i + i + 1 - 1 + i - i - 1 + 1 - i + i + 1 + i - i - 1$
$\Rightarrow i - 1$

99. (B) $\cos 15 = \cos(45 - 30)$
$\cos 15 = \cos 45.\cos 30 + \sin 45.\sin 30$

$\cos 15 = \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times \frac{1}{\sqrt{2}} = \frac{\sqrt{3}+1}{2\sqrt{2}}$

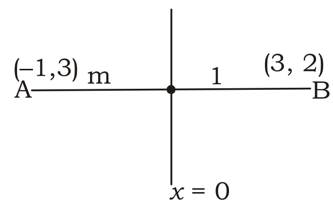
100. (B) Given that S = 2 cm and r = 4 cm

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

$\Rightarrow \theta = \frac{2}{4}$ radian

$\Rightarrow \theta = \frac{1}{2} \times \frac{180}{\pi} = \left(\frac{90}{\pi}\right)^\circ$

101. (B)



Let ratio = m : 1

Now, $\frac{m \times 3 + 1 \times (-1)}{m+1} = 0$

$\Rightarrow 3m - 1 = 0 \Rightarrow m = \frac{1}{3}$

The required ratio = 1 : 3

102. (C) $I = \int \frac{e^{\sqrt{x}}}{\sqrt{x}}\, dx$

Let $\sqrt{x} = t \Rightarrow \frac{1}{2\sqrt{x}}\, dx = dt \Rightarrow \frac{1}{\sqrt{x}}\, dx = 2dt$

$I = \int 2e^t\, dt$
$I = 2e^t + c$
$I = 2\, e^{\sqrt{x}} + c$

103. (D) The new mean = 4(7 + 3)
= 40

104. (A) $f(x) = 4x^3 + 2ax^2 - 3bx$
$f'(x) = 12x^2 + 4ax - 3b$
by Rolle's theorem
(i) function is continuous on a interval [–2, 2].
(ii) Function is differentiable on a interval (–2,2).
(iii) $f(-2) = f(2)$
$\Rightarrow 4(-2)^3 + 2a(-2)^2 - 3b(-2) = 4(2)^3 + 2a(2)^2 - 3b \times 2$
$\Rightarrow -32 + 8a + 6b = 32 + 8a - 6b$

$\Rightarrow 12b = 64 \Rightarrow b = \frac{16}{3}$ ...(i)

(iv) $f'(c) = 0$
$\Rightarrow f'(1) = 0$
$\Rightarrow 12(1)^2 + 4a \times 1 - 3b = 0$
$\Rightarrow 12 + 4a - 16 = 0$ [from eq(i)]
$\Rightarrow 4a = 4 \Rightarrow a = 1$
Now, $3b + 2a = 16 + 2 = 18$

105. (A) 6, 7, 16, 17, 26, 28, 37, 38, 47, 48

Mean = $\frac{6+7+16+17+26+28+37+38+47+48}{10}$

$\bar{x} = \frac{270}{10} = 27$

$\sum(x_i - \bar{x})^2 = (6-27)^2 + (7-27)^2 + (16-27)^2 + (17-27)^2 + (26-27)^2 + (28-27)^2 + (37-27)^2 + (38-27)^2 + (47-27)^2 + (48-27)^2$

$\sum(x_i - \bar{x})^2 = 441 + 400 + 121 + 100 + 1 + 1 + 100 + 121 + 400 + 441$

$\sum(x_i - \bar{x})^2 = 2126$

Standard Deviation = $\sqrt{\frac{\sum(x_i - \bar{x})^2}{n}}$

$= \sqrt{\frac{2126}{10}} = 14.58$

106. (C) Given that $T_n = 6n - 21$

$S_n = \sum T_n$

$S_n = \sum(6n - 21)$

$S_n = 6\sum n - 21\sum 1$

$S_n = 6\times\frac{n(n+1)}{2} - 21\times n$

$S_n = 3n(n+1) - 21n$

$S_n = 3n^2 - 18n$

Now, S25 = 3×(25)2 – 18×25

$\Rightarrow S_{25} = 1875 - 450 = 1425$

107. (C) $\frac{n-r}{r+1}\,{}^nC_r$

$\Rightarrow \frac{n-r}{r+1}\times\frac{n!}{(n-r)!r!}$

$\Rightarrow \frac{n!(n-r)}{(r+1)!(n-r)(n-r-1)!}$

$\Rightarrow \frac{n!}{(n-r-1)!(r+1)!} = {}^nC_{r+1}$

108. (B) Parabola $y^2 = 4ax$ and focal cord $3x + y = 6$ focus = $(a, 0)$

focus satisfy the focal cord, then

$3a + 0 = 6 \Rightarrow a = 2$

equation of directrix

$x = -a$

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

109. (A) Line $3x + 14y = 7$

Slope of line m = $\frac{-3}{14}$

Slope of perpendicular line m' = $\frac{-1}{m}$

$= \frac{-1\times 14}{-3} = \frac{14}{3}$

equation of perpendicular line which passes through the point (–7, 6)

$y - 6 = m'(x + 7)$

$\Rightarrow y - 6 = \frac{14}{3}(x + 7)$

$\Rightarrow 3y - 18 = 14x + 98$

$\Rightarrow 14x - 3y + 116 = 0$

110. (C) Let $a + ib = \sqrt{-3+4i}$

On squaring both side

$\Rightarrow (a^2 - b^2) + 2abi = -3 + 4i$

On comparing

$\Rightarrow a^2 - b^2 = -3$ and $2ab = 4$ ...(i)

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

$\Rightarrow (a^2 - b^2)^2 = 9 + 16$

$\Rightarrow (a^2 - b^2)^2 = 25 \Rightarrow a^2 - b^2 = 5$ ...(ii)

from eq(i) and eq(ii)

$\Rightarrow 2a^2 = 2 \Rightarrow a = \pm 1$ and $2b^2 = 8 \Rightarrow b = \pm 2$

Hence $\sqrt{-3+4i} = \pm(1 + 2i)$

111. (D) $a = \frac{\sqrt{3}i - 1}{2} = -\omega^2$

Now, $1 + a^2 + a^4 + a^6$

$\Rightarrow 1 + (-\omega^2)^2 + (-\omega^2)^4 + (-\omega^2)^6$

$\Rightarrow 1 + \omega^4 + \omega^8 + \omega^{12}$

$\Rightarrow 1 + \omega + \omega^2 + 1$

$\Rightarrow 0 + 1 = 1$ $[\because 1 + \omega + \omega^2 = 0]$

112. (B) We know that

$(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots + C_nx^n$ ...(i)

x replace by $\frac{1}{x}$

$\left(1+\frac{1}{x}\right)^n = C_0 + \frac{C_1}{x} + \frac{C_2}{x^2} + \frac{C_3}{x^3} + \ldots \frac{C_n}{x^n}$ ...(ii)

from eq(i) and eq(ii)

coefficient of x^0 in $(1+x)^n\left(1+\frac{1}{x}\right)^n$

$= C_0^2 + C_1^2 + C_2^2 + \ldots + C_n^2$

$\Rightarrow C_0^2 + C_1^2 + C_2^2 + \ldots + C_n^2 =$ coeff. of x^n in $(1+x)^{2n}$

$\Rightarrow C_0^2 + C_1^2 + C_2^2 + \ldots + C_n^2 = {}^{2n}C_n$

$\Rightarrow C_0^2 + C_1^2 + C_2^2 + \ldots + C_n^2 = \frac{2n!}{n!n!}$

113. (A) $\cos\alpha . \cos 2\alpha . \cos 4\alpha - \frac{1}{2}\cos\alpha$

$\alpha = 10°$

$\cos 10.\cos 20.\cos 40 - \frac{1}{2}\cos 10$

$\Rightarrow \frac{1}{2}\cos 10(2\cos 20.\cos 40) - \frac{1}{2}\cos 10$

$\Rightarrow \frac{1}{2}\cos 10[\cos(20+40)+\cos(20-40)]$

$-\frac{1}{2}\cos 10$

$\Rightarrow \frac{1}{2}\cos 10\left[\frac{1}{2}+\cos 20\right]-\frac{1}{2}\cos 10$

$\Rightarrow \frac{1}{4}\cos 10 + \frac{1}{2}\cos 10.\cos 20 - \frac{1}{2}\cos 10$

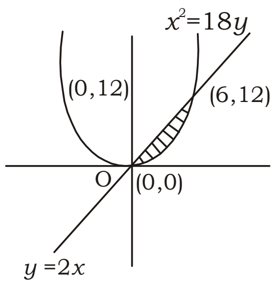
$\Rightarrow \frac{1}{4}\cos 10 \times \frac{1}{4} \times 2\cos 10.\cos 20 - \frac{1}{2}\cos 10$

$\Rightarrow \frac{1}{4}\cos 10 + [\cos 30 + \cos 10] - \frac{1}{2}\cos 10$

$\Rightarrow \frac{1}{4}\cos 10 + \frac{1}{4}\left[\frac{\sqrt{3}}{2}+\cos 10\right] - \frac{1}{2}\cos 10$

$\Rightarrow \frac{1}{2}\cos 10 + \frac{\sqrt{3}}{8} - \frac{1}{2}\cos 10 = \frac{\sqrt{3}}{8}$

114. (B)



$x_1 \Rightarrow x = \sqrt{18y}$

and $x_2 \Rightarrow x = \frac{y}{2}$

Area $= \int_0^{12}(x_1 - x_2)\,dx$

$= \int_0^{12}\left(\sqrt{18y} - \frac{y}{2}\right)dx$

$= \left[\sqrt{18} \times \frac{y^{3/2}}{3/2} - \frac{1}{2} \times \frac{y^2}{2}\right]_0^{12}$

$\Rightarrow 3\sqrt{2} \times \frac{2}{3} \times (12)^{3/2} - \frac{1}{4} \times (12)^2 - 0$

$\Rightarrow 2\sqrt{2} \times 12 \times 2\sqrt{3} - \frac{1}{4} \times 144$

$\Rightarrow (48\sqrt{6} - 36)$ sq.unit

115. (A) $\frac{\sin 420.\cos 750.\sec 1140}{\tan 1020.\text{cosec} 240.\sin 135}$

$\Rightarrow \frac{\sin(360+60).\cos(720+30).\sec(360\times 3+60)}{\tan(360\times 3-60).\text{cosec}(180+60).\sin(90+45)}$

$\Rightarrow \frac{\sin 60.\cos 30.\sec 60}{-\tan 60.(-\text{cosec} 60).\cos 45}$

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

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

116. (B) Given that A = $\begin{bmatrix} -1 & 2 \\ 4 & -5 \end{bmatrix}$

$|A| = -1\times(-5) - 4\times 2 = -3$

We know that

$A(\text{Adj } A) = |A|^{n-1} I_n$

here $n = 2$

$A(\text{Adj } A) = (-3)^{2-1}\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$

$A(\text{Adj } A) = -3\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix}$

117. (C) We know that

$\sin A.\sin(60-A).\sin(60+A) = \frac{1}{4}\sin 3A$

Now, 4 sin5.sin55.sin65

$\Rightarrow 4\sin 5.\sin(60-5).\sin(60+5)$

$\Rightarrow 4\times\frac{1}{4}\sin(5\times 3)$

$\Rightarrow \sin 15 = \frac{\sqrt{3}-1}{2\sqrt{2}}$

118. (B) Differential equation

$\cot x\, dx = 2y\, dy$

On integrating

$\Rightarrow \int \cot x.dx = 2\int y\, dy$

$\Rightarrow \log \sin x = 2\times\frac{y^2}{2} + \log c$

$\Rightarrow \log \sin x - \log c = y^2$

$\Rightarrow \log \frac{\sin x}{c} = y^2$

$\Rightarrow \frac{\sin x}{c} = e^{y^2} \Rightarrow \sin x = c.\,e^{y^2}$

119. (A) Line $\frac{2x-1}{3} = \frac{1-y}{3} = \frac{z+1}{1}$

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

Direction cosine

$$= \left\langle \frac{3/2}{\sqrt{\left(\frac{3}{2}\right)^2+(-3)^2+1^2}}, \frac{-3}{\sqrt{\left(\frac{3}{2}\right)^2+(-3)^2+1^2}}, \frac{1}{\sqrt{\left(\frac{3}{2}\right)^2+(-3)^2+1^2}} \right\rangle$$

$$= \left\langle \frac{3/2}{7/2}, \frac{-3}{7/2}, \frac{1}{7/2} \right\rangle = \left\langle \frac{3}{7}, \frac{-6}{7}, \frac{2}{7} \right\rangle$$

120. (D) Given that $e = \frac{1}{\sqrt{3}}$

and $2ae = \sqrt{6}$

$$\Rightarrow 2a \times \frac{1}{\sqrt{3}} = \sqrt{6} \Rightarrow a = \frac{3}{\sqrt{2}}$$

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

$$\Rightarrow \frac{1}{3} = 1 - \frac{b^2}{9/2}$$

$$\Rightarrow \frac{2b^2}{9} = \frac{2}{3} \Rightarrow b^2 = 3$$

Equation of ellipse

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

$$\Rightarrow \frac{x^2}{9/2} + \frac{y^2}{9} = 1$$

$$\Rightarrow \frac{2y^2}{9} + \frac{y^2}{9} = 1 \Rightarrow 2x^2 + y^2 = 9$$

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NDA (MATHS) MOCK TEST - 140 (Answer Key)

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