NDA MATHS MOCK TEST - 184 (SOLUTION)

1. (A) Let $y = f(x) = 2^{x(x-1)}$
taking log both sides
$\Rightarrow \log y = x(x-1)\log 2$
$\Rightarrow x^2 - x = \log_2 y$
$\Rightarrow x^2 - x - \log_2 y = 0$
$\Rightarrow x = \frac{+1 \pm \sqrt{1+4\log_2 y}}{2\times 1}$
$\Rightarrow x = \frac{1+\sqrt{1+4\log_2 y}}{2}$
$\Rightarrow f^{-1}(y) = \frac{1+\sqrt{1+4\log_2 y}}{2}$
$\Rightarrow f^{-1}(x) = \frac{1+\sqrt{1+4\log_2 x}}{2}$

2. (D) $f(x) = \log\left(\frac{1-x}{1+x}\right)$
Now, $f\left(\frac{1}{2}\right) + f\left(\frac{1}{3}\right)$
$\Rightarrow \log\left(\frac{1-\frac{1}{2}}{1+\frac{1}{2}}\right) + \log\left(\frac{1-\frac{1}{3}}{1+\frac{1}{3}}\right)$
$\Rightarrow \log\left(\frac{\frac{1}{2}}{\frac{3}{2}}\right) + \log\left(\frac{\frac{2}{3}}{\frac{4}{3}}\right) \Rightarrow \log\left(\frac{1}{3}\right) + \log\left(\frac{1}{2}\right)$
$\Rightarrow \log\left(\frac{1}{6}\right) = -\log 6$

3. (C) $x^4 + \frac{1}{x^4} = 1154$
$\Rightarrow x^4 + \frac{1}{x^4} + 2 = 1156$
$\Rightarrow \left(x^2+\frac{1}{x^2}\right)^2 = (34)^2 \Rightarrow x^2 + \frac{1}{x^2} = 34$
$\Rightarrow \left(x+\frac{1}{x}\right)^2 = 36 \Rightarrow x + \frac{1}{x} = 6$
Now, $x^3 + \frac{1}{x^3} = \left(x+\frac{1}{x}\right)^3 - 3\left(x+\frac{1}{x}\right)$
$\Rightarrow x^3 + \frac{1}{x^3} = (6)^3 - 3\times 6$
$\Rightarrow x^3 + \frac{1}{x^3} = 216 - 18 = 198$

4. (B) Equation $3x^2 + 5x + 7 = 0$
$\alpha + \beta = -\frac{5}{3}$ and $\alpha.\beta = \frac{7}{3}$
Now, $\frac{1}{\alpha^3} + \frac{1}{\beta^3} \Rightarrow \frac{\beta^3+\alpha^3}{(\alpha\beta)^3}$
$\Rightarrow \frac{(\alpha+\beta)^3 - 3\alpha\beta(\alpha+\beta)}{(\alpha\beta)^3}$
$\Rightarrow \frac{\left(\frac{-5}{3}\right)^3 - 3\times\frac{7}{3}\times\left(\frac{-5}{3}\right)}{\left(\frac{7}{3}\right)^3}$
$\Rightarrow \frac{\frac{-125}{27}+\frac{35}{3}}{\frac{343}{27}} = \frac{190}{343}$

5. (B) $\frac{{}^nC_1}{{}^nC_0} + \frac{2\,{}^nC_2}{{}^nC_1} + \frac{3\,{}^nC_2}{{}^nC_1} + \ldots\ldots + \frac{n\,{}^nC_n}{{}^nC_{n-1}}$
$\Rightarrow \frac{n}{1} + \frac{2.\frac{n(n-1)}{2}}{n} + \frac{3.\frac{n(n-1)(n-2)}{6}}{\frac{n(n-1)}{2}} + \ldots + \frac{n.1}{n}$
$\Rightarrow n + (n-1) + (n-2) + \ldots\ldots + 1$
$\Rightarrow 1 + 2 + 3 + \ldots\ldots + n = \frac{n(n+1)}{2}$

6. (C) $\begin{vmatrix} 1 & a^2-bc & a \\ 1 & b^2-ca & b \\ 1 & c^2-ab & c \end{vmatrix}$
$\Rightarrow \begin{vmatrix} 1 & a^2 & a \\ 1 & b^2 & b \\ 1 & c^2 & c \end{vmatrix} - \begin{vmatrix} 1 & bc & a \\ 1 & ca & b \\ 1 & ab & c \end{vmatrix}$
$\Rightarrow \begin{vmatrix} 1 & a^2 & a \\ 1 & b^2 & b \\ 1 & c^2 & c \end{vmatrix} - \frac{1}{abc}\begin{vmatrix} 1 & abc & a \\ 1 & abc & b \\ 1 & abc & c \end{vmatrix}$
$\Rightarrow \begin{vmatrix} 1 & a^2 & a \\ 1 & b^2 & b \\ 1 & c^2 & c \end{vmatrix} - \frac{abc}{abc}\begin{vmatrix} a & 1 & a^2 \\ b & 1 & b^2 \\ c & 1 & c^2 \end{vmatrix}$
$\Rightarrow -\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} + \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = 0$

7. (C) Let point P divided AB is the ratio of $\lambda : 1$

$$P\left(\frac{6\lambda-3}{\lambda+1}, \frac{-5\lambda+2}{\lambda+1}\right)$$

Point P lies on the line $y + 2x = 4$

$$\frac{-5\lambda+2}{\lambda+1} + 2 \times \frac{6\lambda-3}{\lambda+1} = 4$$

$\Rightarrow -5\lambda + 2 + 12\lambda - 6 = 4\lambda + 4$

$\Rightarrow 7\lambda - 4\lambda - 4 = 4$

$\Rightarrow 3\lambda = 8 \Rightarrow \lambda = \frac{8}{3}$

The required ratio = 8 : 3

8. (B) The requation of circle passing through the intersection of two given circles

$x^2 + y^2 + 2x + 4y + 5 + \lambda(x^2 + y^2 + 4x + 2y + 6) = 0$

$\Rightarrow (1 + \lambda)x^2 + (1 + \lambda)y^2 + 2x(1 + 2\lambda) + 2y(2 + \lambda) + 5 + 6\lambda = 0$

$$\Rightarrow x^2 + y^2 + 2x\left(\frac{1+2\lambda}{1+\lambda}\right) + 2y\left(\frac{2+\lambda}{1+\lambda}\right) + \frac{5+6\lambda}{1+\lambda} = 0 \quad \text{...(i)}$$

Centre of circle = $\left(-\frac{1+2\lambda}{1+\lambda}, -\frac{2+\lambda}{1+\lambda}\right)$

Centre lies on the line $2x + y = 4$

$$-2\left(\frac{1+2\lambda}{1+\lambda}\right) - \frac{2+\lambda}{1+\lambda} = 4$$

$\Rightarrow -2 - 4\lambda - 2 - \lambda = 4 + 4\lambda$

$\Rightarrow 9\lambda = -8 \Rightarrow \lambda = \frac{-8}{9}$

On putting in eq(i)

$$\Rightarrow x^2 + y^2 + 2x\left(\frac{1+2\left(\frac{-8}{9}\right)}{1-\frac{8}{9}}\right) + 2y\left(\frac{2-\frac{8}{9}}{1-\frac{8}{9}}\right) + \frac{5-\frac{6\times 8}{9}}{1-\frac{8}{9}} = 0$$

$\Rightarrow x^2 + y^2 - 14x + 20y - 3 = 0$

9. (C) lines $12x + 5y = 15$ and $24x + 10y + 23 = 0$

$$\Rightarrow 12x + 15y + \frac{23}{2} = 0$$

$$\Rightarrow 12x + 5y = -\frac{23}{2}$$

The required distance = $\dfrac{15+\frac{23}{2}}{\sqrt{12^2+5^2}}$

$$= \frac{53}{2\times 13} = \frac{53}{26}$$

10. (D) $\tan\left[\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}\right]$

$$\Rightarrow \tan\left[\tan^{-1}\frac{3}{4} + \tan^{-1}\frac{2}{3}\right]$$

$$\Rightarrow \tan\left[\tan^{-1}\left(\frac{\frac{3}{4}+\frac{2}{3}}{1-\frac{3}{4}\times\frac{2}{3}}\right)\right]$$

$$\Rightarrow \tan\left[\tan^{-1}\left(\frac{\frac{9+8}{12}}{\frac{12-6}{12}}\right)\right]$$

$$\Rightarrow \tan\left[\tan^{-1}\left(\frac{17}{6}\right)\right] = \frac{17}{6}$$

11. (B)

12. (D) Coordinate of incentre

$$P\left(\frac{ax_1+bx_2+cx_3}{a+b+c}, \frac{ay_1+by_2+cy_3}{a+b+c}\right)$$

vertices are A(0, 0), B(2, $\sqrt{5}$), C(–10, 0)

$a = \sqrt{12^2 + (\sqrt{5})^2} = 13$

$b = \sqrt{(-10)^2 + 0^2} = 10$

$c = \sqrt{(2)^2 + (\sqrt{5})^2} = 3$

incentre P = $\left(\frac{13\times 0+10\times 2+3\times(-10)}{13+10+3}, \frac{13\times 0+10\times\sqrt{5}+3\times 0}{13+10+3}\right)$

$$= \left(\frac{-10}{26}, \frac{10\sqrt{5}}{26}\right) = \left(\frac{-5}{13}, \frac{5\sqrt{5}}{13}\right)$$

13. (B) We know that

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

Now, $\lim_{x\to\infty}\left(\frac{x^2+2x+5}{x^2-3x+6}\right)^x$

$$\Rightarrow e^{\lim_{x\to\infty} x\left[\frac{x^2+2x+5-x^2+3x-6}{x^2-3x+6}\right]} \Rightarrow e^{\lim_{x\to\infty} x\left[\frac{5x-1}{x^2-3x+6}\right]}$$

$$\Rightarrow e^{\lim_{x\to\infty}\left[\frac{5x^2-x}{x^2-3x+6}\right]} \Rightarrow e^{\lim_{x\to\infty}\left[\frac{5-\frac{1}{x}}{1-\frac{3}{x}+\frac{6}{x^2}}\right]}$$

$$\Rightarrow e^{\left(\frac{5-0}{1-0}\right)} = e^5$$

14. (A) $3f(x) - 2f\left(\frac{1}{x}\right) = 4x^2$ ...(i)

$x \to \frac{1}{x}$

$\Rightarrow 3f\left(\frac{1}{x}\right) - 2f(x) = \frac{4}{x^2}$ ...(ii)

On solving eq(i) and eq(ii)

$\Rightarrow 5f(x) = 12x^2 + \frac{8}{x^2}$

$\Rightarrow 5f(-2) = 12\times(-2)^2 + \frac{8}{(-2)^2}$

$\Rightarrow 5f(-2) = 48 + 2$

$\Rightarrow 5f(-2) = 50$

$\Rightarrow f(-2) = 10$

15. (C) Parabola $y^2 + 5x + 3y + 8 = 0$

$\Rightarrow y^2 + 3y + \frac{9}{4} - \frac{9}{4} + 5x + 8 = 0$

$\Rightarrow \left(y + \frac{3}{2}\right)^2 = -5x + \frac{9}{4} - 8$

$\Rightarrow \left(y + \frac{3}{2}\right)^2 = -5x - \frac{23}{4}$

axis of parabola

$y + \frac{3}{2} = 0$

$\Rightarrow 2y + 3 = 0$

16. (B) $I = \int_4^5 \frac{x^2}{x^2 - 9}\, dx$

$I = \int_4^5 \frac{x^2 - 9 + 9}{x^2 - 9}\, dx$

$I = \int_4^5 \left(1 + \frac{9}{x^2 - 9}\right) dx$

$I = \int_4^5 1.dx + 9\int_4^5 \frac{1}{x^2 - 9} dx$

$I = [x]_4^5 + 9 \times \frac{1}{2\times 3}\left[\log\frac{x-3}{x+3}\right]_4^5$

$I = 5 - 4 + \frac{3}{2}\left[\log\left(\frac{5-3}{5+3}\right) - \log\left(\frac{4-3}{4+3}\right)\right]$

$I = 1 + \frac{3}{2}\left[\log\left(\frac{2}{8}\right) - \log\left(\frac{1}{7}\right)\right]$

$I = 1 + \frac{3}{2}\left[\log\frac{1}{4} + \log 7\right]$

$I = 1 + \frac{3}{2}\log\left(\frac{7}{4}\right)$

17. (A) $I = \int \frac{x + \sin x}{1 + \cos x} dx$

$I = \int \frac{x + \sin x}{2\cos^2\frac{x}{2}} dx$

$I = \frac{1}{2}\int x.\sec^2\frac{x}{2} dx + \frac{1}{2}\int \sin x.\operatorname{cosec}^2\frac{x}{2} dx$

$I = \frac{1}{2}\left[x\int \sec^2\frac{x}{2}dx - \int\left(\frac{d}{dx}(x).\int\sec^2\frac{x}{2}dx\right)dx\right]$

$+ \frac{1}{2}\int 2\sin\frac{x}{2}.\cos\frac{x}{2}.\sec^2\frac{x}{2} dx + c$

$I = \frac{1}{2}\left[2x.\tan\frac{x}{2} - \int 1.2\tan\frac{x}{2}dx\right]$

$+ \int \tan\frac{x}{2} dx + c$

$I = x.\tan\frac{x}{2} - \int\tan\frac{x}{2}dx + \int\tan\frac{x}{2}dx + c$

$I = x.\tan\frac{x}{2} + c$

18. (B) Differential equation

$x\frac{dy}{dx} + y = x^3y^6$

$\frac{1}{y^6}\frac{dy}{dx} + \frac{1}{xy^5} = x^2$

Let $\frac{1}{y^5} = v$

$\frac{-5}{y^6}\frac{dy}{dx} = \frac{dv}{dx}$

$\frac{1}{y^6}\frac{dy}{dx} = \frac{-1}{5}\frac{dv}{dx}$

$\frac{-1}{5}\frac{dv}{dx} + \frac{v}{x} = x^2$

$\frac{dv}{dx} - \frac{5}{x}v = -5x^2$

It is a linear equation

Here $P = \frac{-5}{x}$, $Q = -5x^2$

$I.F = e^{\int\frac{-5}{4}dx}$

$I.F = e^{-5\log x} = \frac{1}{x^5}$

Solution of differential equation

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

$v \times \frac{1}{x^5} = \int (-5x^2) \times \frac{1}{x^5} dx$

$\frac{1}{x^5 y^5} = -5 \int \frac{1}{x^3} dx$

$x^{-5}.y^{-5} = -5.\frac{x^{-3+1}}{-3+1} + c$

$x^{-5}.y^{-5} = \frac{-5}{-2} \times \frac{1}{x^2} + c$

$x^{-5}.y^{-5} = \frac{5}{2} x^{-2} + c$

19. (C)

2	37	1
2	18	0
2	9	1
2	4	0
2	2	0
2	1	1
	0	

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

20. (B) $I = \int \frac{dx}{x(x^4+1)}$

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

Let $x^4 = t$

$4x^3 dx = dt$

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

$I = \frac{1}{4} \int \frac{dt}{t(t+1)}$

$I = \frac{1}{4} \int \left(\frac{1}{t} - \frac{1}{t+1} \right) dt$

$I = \frac{1}{4} [\log t - \log(t+1)] + c$

$I = \frac{1}{4} \left[\log \frac{t}{t+1} \right] + c$

$I = \frac{1}{4} \log \left(\frac{x^4}{x^4+1} \right) + c$

21. (C) $I = \int_0^{\pi/2} \frac{dx}{1+\cot x}$

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

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

Using property IV

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

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

On adding eq(i) and eq(ii)

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

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

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

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

22. (D) Let $y = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ and $z = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$

On Putting $x = \tan\theta$

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

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

$y = 2\theta,\ z = 2\theta$

$\frac{dy}{d\theta} = 2,\ \frac{dz}{d\theta} = 2$

Now, $\frac{dy}{dz} = \frac{dy}{d\theta} \times \frac{d\theta}{dz}$

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

23. (D) Let $f(x) = \frac{x-4}{|x-4|}$

L.H.L. $= \lim_{x \to 4^-} f(x)$

$= \lim_{h \to 0} f(4-h)$

$= \lim_{h \to 0} \frac{4-h-4}{|4-h-4|}$

$= \lim_{h \to 0} \frac{-h}{|0-h|}$

$= \lim_{h \to 0} \frac{-h}{-1} = 0$

R.H.L. $= \lim_{x \to 4^+} f(x)$

$= \lim_{h \to 0} f(4+h)$

$= \lim_{h \to 0} \frac{4+h-4}{|4+h-4|}$

$= \lim_{h \to 0} \frac{h}{|0+h|} = \lim_{h \to 0} \frac{h}{0} = \infty$

Hence Limits does not exist.

24. (C) Curve $y = 2x^2 + 5$

$$\frac{dy}{dx} = 2\times 2x$$

$$\frac{dy}{dx} = 4x$$

$$\left(\frac{dy}{dx}\right)_{at(-1,2)} = 4\times(1) = -4$$

Equation of tangent at point(–1,2)

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

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

$\Rightarrow 4x + y = -2 = 4x + y + 2 = 0$

25. (D) $\begin{vmatrix} y+z & x & x \\ y & x+z & y \\ z & z & x+y \end{vmatrix}$

$R_1 \to R_1 - (R_2 + R_3)$

$$\Rightarrow \begin{vmatrix} 0 & -2z & -2y \\ y & x+z & y \\ z & z & x+y \end{vmatrix}$$

$$\Rightarrow -2\begin{vmatrix} 0 & z & y \\ y & x+z & y \\ z & z & x+y \end{vmatrix}$$

$C_2 \to C_2 - C_1,\ C_3 \to C_3 - C_1$

$$\Rightarrow -2\begin{vmatrix} 0 & z & y \\ y & x+z-y & 0 \\ z & 0 & x+y-z \end{vmatrix}$$

$\Rightarrow -2[0 - z[y(x+y-z) + y(0 - z(x+z-y)]$

$\Rightarrow -2[-zyx - y^2z + yz^2 - xyz - yz^2 + y^2z]$

$\Rightarrow -2(-2xyz) = 4xyz$

26. (B) $z = \dfrac{-2(1+2i)}{3+i} = \dfrac{-2-4i}{3+i}$

$$z = \frac{-2-4i}{3+i}\times\frac{3-i}{3-i}$$

(Rationalizing Numerator and denominator)

$$z = \frac{-6+2i-12i+4i^2}{10}$$

$$z = \frac{-6-10i-4}{10} = \frac{-10-10i}{10}$$

$\therefore\ z = -1 - i$

$\therefore\ \theta = \dfrac{\pi}{4}$

27. (C) A = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

Number of subset of A containing two elelment

= 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1

= 45

28. (D) 1 1 1 0 1 . 0 1

$1\times 2^0 = 1$

$0\times 2^1 = 0$

$1\times 2^2 = 4$

$1\times 2^3 = 8$

$1\times 2^4 = 16$

$\overline{29}$

$0 = 0\times 2^{-1}$

$\frac{1}{4} = 1\times 2^{-2}$

$\overline{0.25}$

Hence $(11101.01)_2 = (29.25)_{10}$

29. (D) $\displaystyle\sum_{r=0}^{1} {}^{n+r}C_n = {}^{n}C_n + {}^{n+1}C_n$

$$= 1 + \frac{(n+1)!}{(n+1-n)!\,n!}$$

$$= 1 + \frac{(n+1)(n!)}{n!}$$

$= 1 + n + 1 = n + 2$

From option (D)

$${}^{n+2}C_{n+1} = \frac{(n+2)!}{(n+2-n-1)!(n+1)!}$$

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

30. (B) $(\sin x + i\cos x)^3$

$\Rightarrow \sin^3x + i^3\cos^3x + 3i.\sin x.\cos x\ (\sin x + i\cos x)$

$\Rightarrow \sin^3x - i\cos^3x + 3i\sin^2x.\cos x - 3\sin x\cos^2x$

$\Rightarrow \sin^3x - 3\sin x\cos^2x + i\cos x(\cos^2x + \sin^2x)$

$\Rightarrow \sin x(\sin^2x - 3\cos^2x) + i\cos x$

Real part of $(\sin x + i\cos x)^3$

$\Rightarrow \sin x(\sin^2x - 3\cos^2x)$

$\Rightarrow \sin x[\sin^2x - 3(1 - \sin^2x)]$

$\Rightarrow \sin x[4\sin^2x - 3]$

$\Rightarrow -(3\sin x - 4\sin^3x) \Rightarrow -\sin 3x$

31. (C) Given that A = $[x : x^2 = 1\}$, B = $\{x : x^4 = 1\}$

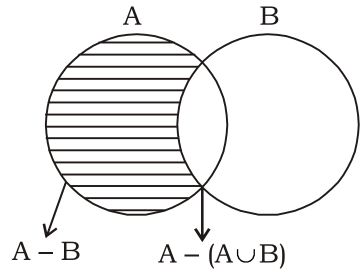
$\Rightarrow$ A = {–1, 1}, B = {–1, 1, –i, i}

Now, $(A\cup B) = \{1, -1, -i, i\}$

Hence $n(A\cup B) = 4$

32. (D) 1. $A - B = A - (A\cap B)$ is correct

2. $A = (A\cap B)\cup(A - B)$ is correct.



$\therefore$ Statements (1) and (2) are correct.

33. (C) $f(x) = 2x + 7$ and $g(x) = x^2 + 7$

$\therefore fog(x) = f\{g(x)\} = 2(x^2 + 7) + 7$

$= 2x^2 + 14 + 7 = 2x^2 + 21$

But $fog(x) = 25$

$\Rightarrow 2x^2 + 21 = 25$

$\Rightarrow x^2 = 2$

$\Rightarrow x = \pm\sqrt{2}$

34. (C) $f(x) = \frac{2}{3}x + \frac{3}{2} = y$(say)

$\Rightarrow 4x + 9 = 6y \Rightarrow x = \frac{6y-9}{4}$

$\Rightarrow f^{-1}(y) = \frac{6y-9}{4}$

$\Rightarrow f^{-1}(x) = \frac{6x-9}{4} = \frac{3x}{2} - \frac{9}{4}$

35. (D) We know that $\omega = \frac{-1+i\sqrt{3}}{2}$

Now, $(-1 + i\sqrt{3})^{48} = (2\omega)^{48}$

$\Rightarrow (-1 + i\sqrt{3})^{48} = 2^{48}(\omega^3)^{16}$

$\Rightarrow (-1 + i\sqrt{3})^{48} = 2^{48} \times 1 = 2^{48} (\because \omega^3 = 1)$

36. (B) $1 + i^2 + i^4 + i^6 + \ldots\ldots + i^{100}$

$= 1 - 1 + 1 - 1 + \ldots\ldots + 1$

$= 1$

37. (B) Let $a - ib = \sqrt{\frac{1}{2} - \frac{i\sqrt{3}}{2}}$

On squaring

$(a^2 - b^2) - 2abi = \frac{1}{2} - \frac{\sqrt{3}i}{2}$

On comparing

$a^2 - b^2 = \frac{1}{2}$ and $2ab = \frac{\sqrt{3}}{2}$ ...(i)

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

$\Rightarrow (a^2 + b^2)^2 = \frac{1}{4} + \frac{3}{4}$

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

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

from eq(i) and eq(ii)

$2a^2 = \frac{3}{2} \Rightarrow a = \pm\frac{\sqrt{3}}{2}$

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

Hence square root of $\left(\frac{1}{2} - \frac{\sqrt{3}i}{2}\right)$

$= \pm\left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)$

38. (B) Let $x = 2 + \cfrac{1}{2 + \cfrac{1}{2 + \ldots.\infty}}$

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

$\Rightarrow x = \frac{2 \pm \sqrt{4+4}}{2} \Rightarrow x = 1 \pm \sqrt{2}$

But the value of given expression can not be negative or less then 2, therefore $(1+\sqrt{2})$ is required answer.

39. (A) The given equations are

$\Rightarrow qx^2 + px + q = 0$

and $x^2 - 4qx + p^2 = 0$

Since, root of the equation (i) are complex, therefore $p^2 - 4q^2 < 0$.

Now, discriminant or equation (ii) is $16q^2 - 4p^2 = 4(p^2 - 4q^2) > 0$

Hence, roots are real and unequal.

40. (B) Given equation is $x^2 - 3|x| + 2 = 0$

If $x > 0$ then $|x| = x$

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

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

$\Rightarrow x(x - 2) - 1(x - 2) = 0$

$\Rightarrow (x - 1)(x - 2) = 0$

$\Rightarrow x = 1, 2$

If $x < 0$, then $|x| = -x$

$\Rightarrow x^2 + 3x + 2 = 0$

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

$\Rightarrow x(x + 2) + 1(x + 2) = 0$

$\Rightarrow (x + 1)(x + 2) = 0$

$\Rightarrow x = -1, -2$

Hence four solutions are possible.

41. (A) If α and β are the roots of $ax^2 + bx + b = 0$

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

$\therefore \frac{\sqrt{\alpha}}{\sqrt{\beta}} + \frac{\sqrt{\beta}}{\sqrt{\alpha}} + \frac{\sqrt{b}}{\sqrt{a}} \Rightarrow \frac{\alpha+\beta}{\sqrt{\alpha\beta}} + \frac{\sqrt{b}}{\sqrt{a}}$

$\Rightarrow \frac{\frac{-b}{a}}{\sqrt{\frac{b}{a}}} + \sqrt{\frac{b}{a}} \Rightarrow -\sqrt{\frac{b}{a}} + \sqrt{\frac{b}{a}} = 0$

42. (B) $1 - \frac{1}{(1+\omega)} - \frac{1}{(1+\omega^2)}$

$\Rightarrow \frac{(1+\omega)(1+\omega^2) - (1+\omega^2) - (1+\omega)}{(1+\omega)(1+\omega^2)}$

$\Rightarrow \frac{1+\omega+\omega^2+\omega^2-1-\omega^2-1-\omega}{(1+\omega)(1+\omega^2)}$

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

43. (A) Equation $x^2 - bx + c = 0$
Let roots are α, α + 1
A.T.Q
$\alpha + \alpha + 1 = b \Rightarrow 2\alpha + 1 = b$
$\alpha(\alpha + 1) = c \Rightarrow \alpha^2 + \alpha = c$
Now, $b^2 - 4c$
$\Rightarrow (2\alpha + 1)^2 - 4(\alpha^2 + \alpha)$
$\Rightarrow 4\alpha^2 + 1 + 4\alpha - 4\alpha^2 - 4\alpha = 1$

44. (C) Since, $-3 < x + \frac{2}{x} < 3$
$\Rightarrow -3 < \frac{(x^2+2)x}{x^2} < 3$
$\Rightarrow -3x^2 < (x^2 + 2)x < 3x^2 \quad (x \neq 0)$
$\Rightarrow x(x^2 + 3x + 2) > 0$
$\Rightarrow x(x + 1)(x + 2) > 0$
$\Rightarrow x \in (-2, -1) \cup (0, \infty) \quad ...(i)$
and $x(x^2 - 3x + 2) < 0 \quad (x \neq 0)$
$\Rightarrow x(x + 1)(x + 2) < 0$
$\Rightarrow x \in (-\infty, 0) \cup (1, 2) \quad ...(ii)$
From (i) and (ii) $x \in (-2, 1) \cup (1, 2)$

45. (C) Given $T_m = n$, $T_n = m$ in HP, therefore the corresponding AP of mth term is $\frac{1}{n}$, nth term is $\frac{1}{m}$
Let a and d be the first term and common difference of an AP, then
$a + (m-1)d = \frac{1}{n} \quad ...(i)$
$a + (n-1)d = \frac{1}{m} \quad ...(ii)$
On solving eqs. (i) and (ii) we get
$a = \frac{1}{mn}$, $d = \frac{1}{mn}$
Now rth term of AP = $a + (r-1)d$
$\frac{1}{mn} + (r-1)\frac{1}{mn} = \frac{1+r-1}{mn} = \frac{r}{mn}$
$\therefore$ rth term of HP is $\frac{mn}{r}$.

46. (A) The given series is $1.3^2 + 2.5^2 + 3.7^2 + ...$
Here $T_n = n(2n+1)^2 = 4n^3 + 4n^2 + n$
Now, $S = \sum_1^{20} T_n = 4\sum_1^{20} n^3 + 4\sum_1^{20} n^2 + \sum_1^{20} n$
$\Rightarrow S = 4 \times \frac{n^2(n+1)^2}{4} + 4 \times \frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2}$
$= 4.\frac{1}{4}20^2.\ 21^2 + 4.\frac{1}{6}20.21.41 + \frac{1}{2}20.21$
$= 176400 + 11480 + 210 = 188090$

47. (B) We know that
$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + ...\infty$
$e^{-1} = 1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - .....\infty$
On adding eqs. (i) and (ii), we get
$e + e^{-1} = 2 + \frac{2}{2!} + \frac{2}{4!} + ...\infty$
$\frac{e^2+1}{e} - 2 = \frac{2}{2!} + \frac{2}{4!} + ...\infty$
$\frac{e^2+1-2e}{e} = 2\left[\frac{1}{2!} + \frac{1}{4!} + ...\infty\right]$
$\frac{(e-1)^2}{2e} = \frac{1}{2!} + \frac{1}{4!} + ...\infty$

48. (D) Two digit numbers formed from the given digits = 9 × 9 = 81
Three digit numbers formed from the given digits = 9 × 9 × 9 = 729
The required no. = 81 + 729 = 810

49. (B) There are 4 prizes and three students since each prizes cna be given to any persons
$\therefore$ Required no. of ways = 3 × 3 × 3 × 3 = 3^4.

50. (C) Let A = $\begin{bmatrix} 0 & -4 & 1 \\ 4 & 0 & -5 \\ -1 & 5 & 0 \end{bmatrix}$
$\Rightarrow A' = \begin{bmatrix} 0 & 4 & -1 \\ -4 & 0 & 5 \\ 1 & -5 & 0 \end{bmatrix}$
$\Rightarrow A' = -\begin{bmatrix} 0 & -4 & 1 \\ 4 & 0 & -5 \\ -1 & 5 & 0 \end{bmatrix} \Rightarrow A' = -A$
$\therefore$ It is skew-symmetric matrix.

51. (B) A = $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 2 \\ 2 & 0 & 1 \end{bmatrix}$
$A_{11} = 1$, $A_{21} = -2$, $A_{31} = 4$
$A_{12} = 4$, $A_{22} = 1$, $A_{32} = -2$
$A_{13} = -2$, $A_{23} = 4$, $A_{33} = 1$
Adj(A) = $\begin{bmatrix} 1 & -2 & 4 \\ 4 & 1 & -2 \\ -2 & 4 & 1 \end{bmatrix}$

52. (D) Let A = $\begin{bmatrix} 1 & 2 & -3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix} \Rightarrow |A| = 1$

adj (A) = $\begin{bmatrix} 1 & -2 & 7 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{bmatrix}$

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

Hence, element $A_{13} = 7$

53. (D) Since, adjoint of square matrix A is B and value determinant of A is α.
then AB = $|A|I = \alpha I$

54. (B) $\because$ Order of A and B are 3 × 2 and 2 × 3 respectively.
$\therefore |kAB| = k^3|AB|$

55. (C) We know that

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

multiply by x^2

$\Rightarrow x^2(1+x)^n = {}^nC_0 x^2 + {}^nC_1 x^3 + {}^nC_2 x^4 + ...$

$.... + {}^nC_n x^{n+2}$

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

$\Rightarrow x^2.n(1+x)^{n-1} + (1+x)^n.2x = 2\,{}^nC_0 x + 3\,{}^nC_1 x^2 + ... + (n+2)\,{}^nC_n x^{n+1}$

On putting $x = 1$

$\Rightarrow n.2^{n-1} + 2^n.2 = 2\,{}^nC_0 + 3\,{}^nC_1 + ... + (n+2)\,{}^nC_n$

$\Rightarrow 2^{n-1}(n+4) = 2C_0 + 3C_1 + ... + (n+2)\,C_n$

56. (A) Let $y = 3^x$

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

$\frac{dy}{dx} = 3^x \log 3$

and $z = x^3$

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

$\Rightarrow \frac{dz}{dx} = 3x^2$

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

$\Rightarrow \frac{dy}{dz} = 3^x \log 3 \times \frac{1}{3x^2}$

$\Rightarrow \frac{dy}{dz} = \frac{3^{x-1}\log 3}{x^2}$

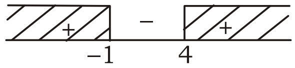
57. (C) $f(x) = \frac{1}{\sqrt{\log_3(x^2-3x-3)}}$

Now, $\log_3(x^2 - 3x - 3) > 0$

$\Rightarrow x^2 - 3x - 3 > 3^0$

$\Rightarrow x^2 - 3x - 4 > 0$

$\Rightarrow (x-4)(x+1) > 0$

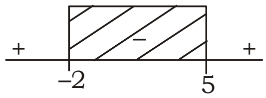


Domain = $(-\infty, -1) \cup (4, \infty)$

58. (B) $f(x) = \begin{cases} x^2 - 3x - 10, & -1 \le x < 3 \\ -13 + x, & 3 \le x \le 5 \end{cases}$

Statement I

$f(x) = x^2 - 3x - 10 = (x+2)(x-5)$



Function $f(x)$ is decreasing in interval (–2,5).
Hence function $f(x)$ will be decreasing in interval (–1, 3).
Statement I is incorrect.

Statement II

$f(x) = -13 + x$
$f(x) = -13 + 3 = -10$
$f(x) = -13 + 5 = -8$
$f(x)$ is increasing in interval [3, 5].
Statement II is correct.

59. (A) $f(x) = \begin{cases} x^2 - 3x - 10, & -1 \le x < 3 \\ -13 + x, & 3 \le x \le 5 \end{cases}$

Statement I

L.H.L. = $\lim_{x \to 3^-} f(x) = \lim_{h \to 0} f(3-h)$

$= \lim_{h \to 0} (3-h)^2 - 3(3-h) - 10$

$= 9 - 9 - 10 = -10$

R.H.L. = $\lim_{x \to 3^+} f(x) = \lim_{h \to 0} f(3+h)$

$= \lim_{h \to 0} -13 + (3+h) = -10$

L.H.L. = R.H.L.
Hence $f(x)$ is continuous at $x = 3$.
Statement I is correct.

Statement II

L.H.D. = $\lim_{h \to 0} \frac{f(3-h) - f(3)}{-h}$

$= \lim_{h \to 0} \frac{(3-h)^2 - 3(3-h) - 10 + 10}{-h}$

$= \lim_{h \to 0} \frac{9 + h^2 - 6h - 9 + 3h}{-h}$

$= \lim_{h \to 0} \frac{h^2 - 3h}{-h} = \lim_{h \to 0} -h + 3 = 3$

R.H.D. = $\lim_{h \to 0} \frac{f(3+h) - f(3)}{h}$

$= \lim_{h \to 0} \frac{-13 + (3+h) + 10}{h}$

$= \lim_{h \to 0} \frac{h}{h} = 1$

L.H.D. ≠ R.H.D.
$f(x)$ is not differentiable at $x = 3$.
Statement II is incorrect.

60. (B) $I = \int_2^4 x f(x)\, dx$

$I = \int_2^4 x[x]\, dx$

$I = \int_2^3 x[x]\, dx + \int_3^4 x[x]\, dx$

$I = \int_2^3 x \times 2\, dx + \int_3^4 x \times 3\, dx$

$I = 2\left[\frac{x^2}{2}\right]_2^3 + 3\left[\frac{x^2}{2}\right]_3^4$

$I = 2\left[\frac{9}{2} - \frac{4}{2}\right] + 3\left[\frac{16}{2} - \frac{9}{2}\right]$

$I = 5 + 3 \times \frac{7}{2} = \frac{31}{2}$

61. (B) The required probability = $\frac{1}{52}$

62. (C) Digits 0,1, 2, 3, 4, 5, 6, 7, 8, 9

| 4 | 9 | 8 | = 4 × 9 × 8 = 288

(1, 2, 3, 4)

63. (B) $5^{2 - 2\log_5 4 + 3\log_5 2}$

$\Rightarrow 5^2 \times 5^{-2\log_5 4} \times 5^{3\log_5 2}$

$\Rightarrow 25 \times 5^{\log_5 (4)^{-2}} \times 5^{\log_5 (2)^3}$

$\Rightarrow 25 \times (4)^{-2} \times (2)^3$

$\Rightarrow 25 \times \frac{1}{16} \times 8 = \frac{25}{2}$

64. (D) $4f(x-2) + f\left(\frac{1}{x-2}\right) = x^2$ ...(i)

On putting $x = 4$

$4f(2) + f\left(\frac{1}{2}\right) = 16$ ...(ii)

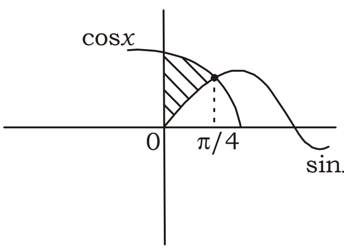
On putting $x = \frac{5}{2}$ in eq(i)

$4f\left(\frac{1}{2}\right) + f(2) = \frac{25}{4}$

On solving eq(i) and eq(ii)

$f(2) = \frac{77}{20}$

65. (C)



Area = $\int_0^{\pi/4} (\cos x - \sin x)\, dx$

Area = $[\sin x + \cos x]_0^{\pi/4}$

Area = $\left(\sin\frac{\pi}{4} + \cos\frac{\pi}{4}\right) - (\sin 0 + \cos 0)$

Area = $\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} - (0 + 1)$

Area = $(\sqrt{2} - 1)$ square unit

66. (C) Differential equation

$\Rightarrow y - x\frac{dy}{dx} = b\left(y^2 + \frac{dy}{dx}\right)$

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

$\Rightarrow y(1 - by) = (x + b)\frac{dy}{dx}$

$\Rightarrow \frac{dx}{x+b} = \frac{dy}{y(1-by)}$

$\Rightarrow \frac{dx}{x+b} = \left[\frac{1}{y} + \frac{b}{1-by}\right]dy$

On integrating

$\Rightarrow \log(x+b) = \log y + \frac{b\log(1-by)}{-b} + \log c$

$\Rightarrow \log(x+b) = \log y - \log(1-by) + \log c$

$\Rightarrow \log(x+b)(1-by) = \log cy$

$\Rightarrow (x+b)(1-by) = cy$

67. (B) $x = \sin t - t\cos t$

$\Rightarrow \frac{dx}{dt} = \cos t + t\sin t - \cos t$

$\Rightarrow \frac{dx}{dt} = t\sin t$

and $y = \cos t + t\sin t$

$\Rightarrow \frac{dy}{dt} = -\sin t + t\cos t + \sin t$

$\Rightarrow \frac{dy}{dt} = t\cos t$

Now, $\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx}$

$\Rightarrow \frac{dy}{dx} = t\cos t \times \frac{1}{t\sin t}$

$\Rightarrow \frac{dy}{dx} = \cot t$

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

$\Rightarrow \frac{d^2y}{dx^2} = -\text{cosec}^2 t \times \frac{dt}{dx}$

$\Rightarrow \frac{d^2y}{dx^2} = \frac{-\text{cosec}^2 t}{t \times \sin t}$

$\Rightarrow \frac{d^2y}{dx^2} = \frac{-\text{cosec}^3 t}{t}$

68. (B) Let $f(x) = \dfrac{e^{1/x}+1}{e^{1/x}-1}$

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

$$= \lim_{h\to 0} \frac{e^{1/0-h}+1}{e^{1/0-h}-1}$$

$$= \lim_{h\to 0} \frac{e^{\frac{1}{-h}}+1}{e^{\frac{1}{-h}}-1}$$

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

69. (B) $I = \displaystyle\int_0^{\infty} \frac{x}{(1+x)(1+x^2)}\,dx$

Let $x = \tan\theta$ $\quad x\to 0,\ \theta\to 0$

$dx = \sec^2\theta\, d\theta$ $\quad x\to\infty,\ \theta = \dfrac{\pi}{2}$

$$I = \int_0^{\pi/2} \frac{\tan\theta.\sec^2\theta.d\theta}{(1+\tan\theta)(1+\tan^2\theta)}$$

$$I = \int_0^{\pi/2} \frac{\tan\theta}{1+\tan\theta}\,d\theta$$

$$I = \int_0^{\pi/2} \frac{\frac{\sin\theta}{\cos\theta}}{1+\frac{\sin\theta}{\cos\theta}}\,d\theta$$

$$I = \int_0^{\pi/2} \frac{\sin\theta}{\cos\theta+\sin\theta}\,d\theta \quad \ldots(i)$$

$$I = \int_0^{\pi/2} \frac{\sin\left(\frac{\pi}{2}-\theta\right)}{\cos\left(\frac{\pi}{2}-\theta\right)+\sin\left(\frac{\pi}{2}-\theta\right)}\,d\theta$$

[Prop.IV]

$$I = \int_0^{\pi/2} \frac{\cos\theta}{\sin\theta+\cos\theta}\,d\theta \quad \ldots(ii)$$

from eq(i) and eq(ii)

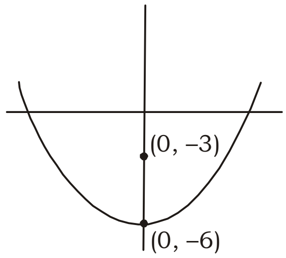
$$2I = \int_0^{\pi/2} \frac{\sin\theta + \cos\theta}{\sin\theta+\cos\theta}\,d\theta$$

$$2I = \int_0^{\pi/2} 1.d\theta$$

$$2I = [0]_0^{\pi/2}$$

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

70. (D)



focus is (0, –3) and vertex is (0, – 6)

$a = -3 - (-6) = 3$

The eqution of parabola

$x^2 = -12(y + 6)$

$x^2 + 12y + 72 = 0$

71. (C) Given that $x + 3y = 12$

Let $A = xy$

$\Rightarrow A = (2 - 3y)y$

$\Rightarrow A = 12y - 3y^2$

$$\Rightarrow \frac{dA}{dy} = 12 - 6y$$

for maxima and minima

$$\Rightarrow \frac{dA}{dy} = 0$$

$\Rightarrow 12 - 6y = 0 \Rightarrow y = 2$

and $x = 6$

Hence maximum value = 6 × 2 = 12

72. (C) $x = a\cos\theta,\ y = a(\theta - \sin\theta)$

$$\frac{dx}{d\theta} = -\,a\sin\theta,\ \frac{dy}{d\theta} = a(1-\cos\theta)$$

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

$$\frac{dy}{dx} = \frac{a(1-\cos\theta)}{-a\sin\theta}$$

$$\frac{dy}{dx} = \frac{a\times 2\sin^2\frac{\theta}{2}}{-2a\sin\frac{\theta}{2}.\cos\frac{\theta}{2}}$$

$$\frac{dy}{dx} = -\tan\frac{\theta}{2}$$

$$\left(\frac{dy}{dx}\right)_{\text{at }\theta\,\frac{\pi}{2}} = -\tan\frac{\theta}{4} = -1$$

Point $[(a\cos\theta,\ a(\theta - \sin\theta)]_{\text{at}\theta\ =\pi/2} = \left[0, \left(\frac{\pi}{2}-1\right)\right]$

equation of tangent at point $\left[0, a\left(\frac{\pi}{2}-1\right)\right]$

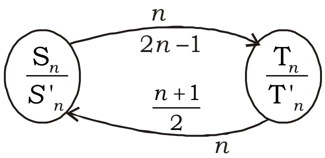
$$y - a\left(\frac{\pi}{2}-1\right) = -1(x-0)$$

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

73. (D) H.M. < G.M.< A.M.

74. (A) $n(S) = 7$
Total days in a leap year = 366 days
= 52 weeks and 2 days
$n(E) = 2$
The required Probability $P(E) = \frac{n(E)}{n(S)} = \frac{2}{7}$

75. (B) We know that

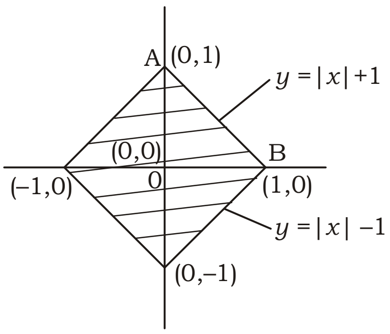


Now, given that $\frac{S_n}{S'_n} = \frac{4n-1}{5n+3}$
then n replace by $2n - 1$
$\frac{T_n}{T'_n} = \frac{4(2n-1)-1}{5(2n-1)+3}$
$\frac{T_n}{T'_n} = \frac{8n-5}{10n-2}$
$\frac{T_{17}}{T'_{17}} = \frac{8\times17-5}{10\times17-2} = \frac{131}{168}$

76. (C) $(A + B)' = A' + B'$

77. (A) Given that $P(A) = \frac{1}{4}$, $P(A\cap B) = \frac{2}{3}$ and
$P(A\cup B) = \frac{1}{3}$
We know that
$P(A\cup B) = P(A) + P(B) - P(A\cap B)$
$\Rightarrow \frac{1}{3} = \frac{1}{4} + P(B) - \frac{2}{3}$
$\Rightarrow \frac{1}{3} - \frac{1}{4} + \frac{2}{3} = P(B) \Rightarrow P(B) = \frac{3}{4}$
Now, $P(A/B) = \frac{P(A\cap B)}{P(B)} = \frac{2/3}{3/4} = \frac{8}{9}$

78. (B)



Curve $y = |x| + 1$ and $y = |x| - 1$
Total Area = 4 × Area of ΔAOB
$= 4 \times \frac{1}{2} \times 1 \times 1 = 2$ sq. unit

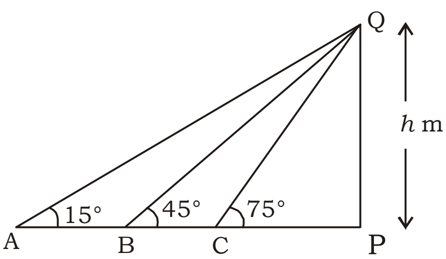
79. (C) Let $z = x + iy$
Now, $\left|\frac{z-3}{z+3}\right| = 2$
$\Rightarrow \left|\frac{x+iy-3}{x+iy+3}\right| = 2$
$\Rightarrow \frac{\sqrt{(x-3)^2+y^2}}{\sqrt{(x+3)^2+y^2}} = 2$
$\Rightarrow (x-3)^2 + y^2 = 4[(x+3)^2 + y^2]$
On solving
$x^2 + y^2 + 10x + 9 = 0$
Hence it is circle.

80. (B) The required number of hand shakes in party $= {}^{17}C_2 = \frac{17\times16}{2} = 136$

81. (C) $n(S) = 6 \times 6 \times 6 = 216$
$E = \left\{\begin{matrix}(6,6,2),(6,2,6),(6,5,3),(6,3,5),(6,4,4),(5,6,3),\\(5,3,6),(5,5,4),(5,4,5),(4,6,4),(4,4,6),(4,5,5)\\(3,6,5),(3,5,6),(2,6,6)\end{matrix}\right\}$
$n(E) = 15$
The required Probability $P(E) = \frac{n(E)}{n(S)}$
$= \frac{15}{216} = \frac{5}{72}$

82. (C) Given that $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}$, $\vec{b} = 4\hat{i} + 7\hat{j} - 4\hat{k}$
Projection of $\vec{a}$ on $\vec{b} = \frac{\vec{a}.\vec{b}}{|\vec{b}|}$
$= \frac{2\times4+3\times7+(-1)\times(-4)}{\sqrt{4^2+7^2+(-4)^2}}$
$= \frac{33}{9} = \frac{11}{3}$

83. (C)



Let height of the tower PQ = h m
In ΔCPQ :-
$\tan75° = \frac{PQ}{CP}$
$\Rightarrow \frac{\sqrt{3}+1}{\sqrt{3}-1} = \frac{h}{CP} \Rightarrow CP = h(2-\sqrt{3})$

In ΔBPQ :-

$\tan 45° = \frac{PQ}{BP}$

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

$\Rightarrow BP = h$

$\Rightarrow BC + CP = h$

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

In ΔAPQ:-

$\tan 15° = \frac{PQ}{AP}$

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

$\Rightarrow AB + BP = h(2+\sqrt{3})$

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

Now, $AB : BC = h(\sqrt{3}+1) : h(\sqrt{3}-1)$

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

84. (D) $\tan^{-1}y = \tan^{-1}x + \tan^{-1}\frac{2x}{1-x^2}$

Let $x = \tan\theta$

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

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

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

$\Rightarrow \tan^{-1}y = 3\theta$

$\Rightarrow y = \tan 3\theta$

$\Rightarrow y = \tan 3\theta$

$\Rightarrow y = \frac{3\tan\theta - \tan^3\theta}{1-3\tan^2\theta} = \frac{3x - x^3}{1-3x^2}$

85. (D) Given that $A = \begin{bmatrix} 2a+b & 4 \\ a+b & -1 \end{bmatrix}$

$A^T = \begin{bmatrix} 2a+b & a+b \\ 4 & -1 \end{bmatrix}$

Co-factors of A-

$C = \begin{bmatrix} -1 & -(a+b) \\ -4 & 2a+b \end{bmatrix}$

$\text{Adj } A = C^T = \begin{bmatrix} -1 & -4 \\ -(a+b) & 2a+b \end{bmatrix}$

Now, Adj A = A^T

$\begin{bmatrix} -1 & -4 \\ -(a+b) & 2a+b \end{bmatrix} = \begin{bmatrix} 2a+b & a+b \\ 4 & -1 \end{bmatrix}$

On comparing

$2a + b = -1,\ a + b = -4$

$-(a + b) = 4,\ 2a + b = -1$

On solving

$a = 3,\ b = -7$

Then $4a - b = 4 \times 3 - (-7)$

$= 12 + 7 = 19$

86. (B) Let $z = \frac{1-2i\sin\theta}{1+2i\sin\theta}$

$\Rightarrow z = \frac{(1-2i\sin\theta)(1-2i\sin\theta)}{(1+2i\sin\theta)(1-2i\sin\theta)}$

$\Rightarrow z = \frac{1+4i^2\sin^2\theta - 4i\sin\theta}{1-4i^2\sin^2\theta}$

$\Rightarrow z = \frac{1-4\sin^2\theta - 4i\sin\theta}{1+4\sin^2\theta}$

$\Rightarrow z = \frac{1-4\sin^2\theta}{1+4\sin^2\theta} - \frac{4i\sin\theta}{1+4\sin^2\theta}$

z will be purely imaginary, when

$\frac{1-4\sin^2\theta}{1+4\sin^2\theta} = 0$

$\Rightarrow 1 - 4\sin^2\theta = 0$

$\Rightarrow \sin^2\theta = \frac{1}{4}$

$\Rightarrow \sin\theta = \frac{1}{2} \Rightarrow \theta = \frac{\pi}{6}$

87. (B) $\lim_{x\to\infty} \frac{x^3 - x - 1}{4x^2 - 2x^3 + 6}$

$\Rightarrow \lim_{x\to\infty} \frac{x^3 - x - 1}{-2x^3 + 4x^2 + 6}$

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

$\Rightarrow \lim_{x\to\infty} \frac{1 - \frac{1}{x^2} - \frac{1}{x^3}}{-2 + \frac{4}{x} + \frac{6}{x^3}}$

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

88. (B) $I = \int \frac{\cos x}{\sin(x-a)}\, dx$

Let $x - a = t \Rightarrow x = a + t$

$dx = dt$

$I = \int \frac{\cos(a+t)}{\sin t}\, dt$

$I = \int \frac{\cos a.\cos t - \sin a.\sin t}{\sin t}\, dt$

$I = \cos a \int \cot t\, dt - \sin a \int 1.\, dt$

$I = \cos a.\log\sin t - \sin a.\ (t) + C$

$I = \cos a.\log\sin(x-a) - (x-a)\sin a + C$

$I = \cos a.\log\sin(x-a) - x\sin a + a\sin a + C$

$I = \cos a.\ \log\sin(x-a) - x\sin a + c$

89. (C) Let $y = e^{\cos x}$ and $z = \sin x$

$\frac{dy}{dx} = e^{\cos x}(-\sin x)$, $\frac{dz}{dx} = \cos x$

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

$\Rightarrow \frac{dy}{dz} = e^{\cos x}(-\sin x) \times \frac{1}{\cos x}$

$\Rightarrow \frac{dy}{dz} = -\tan x.e^{\cos x}$

90. (B) $I = \int_{ln2}^{ln3} \frac{\sin x}{\sin x + \sin(ln 6 - x)}\, dx$ ...(i)

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

$I = \int_{ln2}^{ln3} \frac{\sin(ln2 + ln3 - x)}{\sin(ln2 + ln3 - x) + \sin(ln6 - ln2 - ln3 + x)}$

$I = \int_{ln2}^{ln3} \frac{\sin(ln6 - x)}{\sin(ln6 - x) + \sin x}\, dx$ ...(ii)

from eq(i) and eq(ii)

$2I = \int_{ln2}^{ln3} \frac{\sin x + \sin(ln6 - x)}{\sin x + \sin(ln6 - x)}\, dx$

$2I = \int_{ln2}^{ln3} 1.dx$

$2I = [x]_{ln2}^{ln3}$

$2I = ln3 - ln2$

$2I = ln\frac{3}{2} \Rightarrow I = \frac{1}{2} ln\frac{3}{2}$

91. (A) Vectors $\hat{i} + \hat{j} + \lambda\,\hat{k}$ and $(2\lambda - 3)\,\hat{i} + 3\,\hat{j} - 4\,\hat{k}$ are perpendicular,

then $1 \times (2\lambda - 3) + 1 \times 3 + \lambda(-4) = 0$

$\Rightarrow 2\lambda - 3 + 3 - 4\lambda = 0$

$\Rightarrow -2\lambda = 0 \Rightarrow \lambda = 0$

92. (B) $y = \sin x$ ...(i)

$x = \sin^{-1} y$

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

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

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

$\frac{d^2x}{dy^2} = \frac{\sin x}{(1-\sin^2 x)^{3/2}}$

$\frac{d^2x}{dy^2} = \frac{\sin x}{(\cos^2 x)^{3/2}}$

$\frac{d^2x}{dy^2} = \frac{\sin x}{\cos^3 x}$

$\frac{d^2x}{dy^2} = \tan x.\sec^2 x$

93. (A) Given that $S_{13} = 533$

$\Rightarrow \frac{13}{2}[2a + 12d] = 533$

$\Rightarrow 13[a + 6d] = 533$

$\Rightarrow a + 6d = 41$

Hence $T_7 = 41$

94. (B) A line makes the angles α, β and γ with the axes, then

$\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

$\Rightarrow \frac{1+\cos 2\alpha}{2} + \frac{1+\cos 2\beta}{2} + \frac{1+\cos 2\gamma}{2} = 1$

$\Rightarrow \cos 2\alpha + \cos 2\beta + \cos 2\gamma = 2 - 3$

$\Rightarrow \cos 2\alpha + \cos 2\beta + \cos 2\gamma = -1$

95. (B) $\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\pi}}}}}$

$\Rightarrow \sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2(1+\cos 8\pi)}}}}}$

$\Rightarrow \sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2\times 2\cos^2 4\pi}}}}}$

$\Rightarrow \sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4\pi}}}}$

$\Rightarrow \sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2\times 2\cos^2 2\pi}}}}$

$\Rightarrow \sqrt{2+\sqrt{2+\sqrt{2+2\cos 2\pi}}}$

$\Rightarrow \sqrt{2+\sqrt{2+\sqrt{2\times 2\cos^2 \pi}}}$

$\Rightarrow \sqrt{2+\sqrt{2+2\cos \pi}}$

$\Rightarrow \sqrt{2+\sqrt{2\times 2\cos^2 \frac{\pi}{2}}}$

$\Rightarrow \sqrt{2+2\cos \frac{\pi}{2}}$

$\Rightarrow \sqrt{2\times 2\cos^2 \frac{\pi}{4}}$

$\Rightarrow 2\cos\frac{\pi}{4} = 2\times\frac{1}{\sqrt{2}} = \sqrt{2}$

96. (C) An angles of a triangle are in 3 : 2 : 1
Let Angles = $3x$, $2x$, x
$3x + 2x + x = 180$
$\Rightarrow 6x = 180 \Rightarrow x = 30$
Angles = 90, 60, 30
Sine Rule

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

$\Rightarrow \frac{a}{\sin 90} = \frac{b}{\sin 60} = \frac{c}{\sin 30}$

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

$\frac{a}{2} = \frac{b}{\sqrt{3}} = \frac{c}{1}$

Hence $a : b : c = 2 : \sqrt{3} : 1$

97. (B) The required no. of triangles = ${}^{14}C_3 - {}^{8}C_3$
= 364 – 56
= 308

98. (C) Given that $\tan\theta = \frac{a}{b}$

Now, $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta}$

$\Rightarrow \frac{a\tan\theta - b}{a\tan\theta + b}$

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

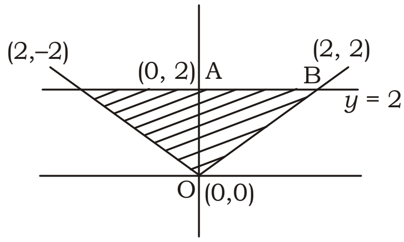
99. (B) $\lim_{x\to 0}\frac{\sin 2x - \tan x}{x}$ $\left[\frac{0}{0}\right]$Form

by L-Hospital Rule

$\Rightarrow \lim_{x\to 0}\frac{2\cos 2x - \sec^2 x}{1}$

$\Rightarrow$ 2 cos0 – $\sec^2 0$
$\Rightarrow$ 2 – 1 = 1

100. (A)



Lines $y = |x|$ and $y = 2$
Area = 2 × Area of ΔOAB

$= 2\times\frac{1}{2}\times OA\times AB$

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

101. (C) $x^x = e^{x+y}$
taking log both side
$\Rightarrow x\log x = x + y$
On differentiating both side w.r.t.'x'

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

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

102. (A) Let $y = 5^{x\sin x}$
On differentiating both side w.r.t 'x'

$\Rightarrow \frac{dy}{dx} = 5^{x\sin x}.\ln 5\ [x.\cos x + \sin x.1]$

$\Rightarrow \frac{dy}{dx} = 5^{x\sin x}.\ln 5\ [x.\cos x + \sin x]$

103. (B) $2^{x+3} + 3.2^{y-2} = 16$ and $2^{x+1} + 2^{y-1} = 9$

$2^x.8 + \frac{3}{4}.2^y = 16$ and $2.2^x + \frac{2^y}{2} = 9$

Let 2^x = X and 2^y = Y

$8X + \frac{3}{4}Y = 16$ ...(i)

and $2X + \frac{Y}{2} = 9$ ...(ii)

from eq(i) and eq(ii)

$X = \frac{1}{2}$, Y = 16

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

104. (C) $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{2}$ and $P\left(\frac{B}{A}\right) = \frac{3}{8}$

We know that $P\left(\frac{B}{A}\right) = \frac{P(A\cap B)}{P(A)}$

$\Rightarrow \frac{3}{8} = \frac{P(A\cap B)}{\frac{1}{3}} \Rightarrow P(A\cap B) = \frac{1}{8}$

Now, $P\left(\frac{A}{B}\right) = \frac{P(A\cap B)}{P(B)}$

$\Rightarrow P\left(\frac{A}{B}\right) = \frac{1/8}{1/2} = \frac{1}{4}$

105. (B) $\begin{vmatrix} x-2 & x-3 & x-a \\ x-4 & x-5 & x-b \\ x-6 & x-7 & x-c \end{vmatrix}$

$C_2 \to C_2 - C_1$ and $C_3 \to C_3 - C_1$

$\Rightarrow \begin{vmatrix} x-2 & -1 & -a+2 \\ x-4 & -1 & -b+4 \\ x-6 & -1 & -c+6 \end{vmatrix}$

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

$\Rightarrow \begin{vmatrix} x+2 & -1 & -a+2 \\ -2 & 0 & -b+a+2 \\ -4 & 0 & -c+a+4 \end{vmatrix}$

$\Rightarrow (x-2)\times 0 + 1(2c - 2a - 8 - 4b + 4a + 8) + (-a+2)\times 0$

$\Rightarrow 2c + 2a - 4b$

$\Rightarrow 2(c + a - 2b)$

a, b and c are in A.P. i.e $= 2b + c = a$

$\Rightarrow 2(c + a - c - a) = 0$

106. (B) word 'STATUS'

Total arrangement $= \frac{6!}{2!2!} = 180$

Arrangement when T's appear together

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

The required arrangement = 180 – 60 = 120

107. (C) Total students = 8

The table is round. One student is fixed.

Hence the no. of ways = (8 –1)! = 7! = 5040

108. (B) Differential equation

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

On comparing with general linear equation

$P = \frac{1}{\sqrt{x^2-1}}$, $Q = \frac{x}{x+\sqrt{x^2-1}}$

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

I.F. $= e^{\int \frac{1}{\sqrt{x^2-1}}dx}$

$= e^{\ln\left(x+\sqrt{x^2-1}\right)} = x + \sqrt{x^2-1}$

Solution of differential equation

$y \times$ I.F. $= \int Q \times$ I.F. dx

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

$\Rightarrow y\left(x+\sqrt{x^2-1}\right) = \int x\,dx$

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

$\Rightarrow 2y\left(x+\sqrt{x^2-1}\right) = x^2 + c$

109. (C) $I = \int \frac{1+\ln x}{\cos(x\ln x)}dx$

Let $x\ln x = t$

$(1+\ln x)\,dx = dt$

$I = \int \frac{dt}{\cos t}$

$I = \int \sec t\;dt$

$I = \log|\sec t + \tan t| + c$

$I = \log|\sec(x\ln x) + \tan(x\ln x)| + c$

110. (A) Required probability $= {}^6C_3\left(\frac{1}{7}\right)^3\left(\frac{6}{7}\right)^3$

$= \frac{20\times 6^3}{7^6}$

111. (C) $\left|z - \frac{1}{z}\right| = 6$

$\Rightarrow z - \frac{1}{z} = \pm 6$

$\Rightarrow z^2 - 1 = \pm 6z$

$\Rightarrow z^2 - 6z - 1 = 0$ or $z^2 + 6z - 1 = 0$

$\Rightarrow z = \frac{6\pm\sqrt{36-4\times 1(-1)}}{2\times 1}$ or $z = \frac{-6\pm\sqrt{36-4\times 1(-1)}}{2\times 1}$

$\Rightarrow z = \frac{6\pm 2\sqrt{10}}{2}$ or $z = \frac{-6\pm 2\sqrt{10}}{2}$

$\Rightarrow z = 3 \pm\sqrt{10}$ or $z = -3 \pm\sqrt{10}$

$\Rightarrow z = 3-\sqrt{10}$, $3+\sqrt{10}$

or $z = -3-\sqrt{10}$, $-3+\sqrt{10}$

Hence smallest value of $|z| = -3-\sqrt{10}$

112. (C) $v = 3s^2 + 5s + 9$

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

$\Rightarrow \frac{dv}{ds} = 6s + 5$

Hence $\left(\frac{dy}{ds}\right)_{\text{at } s = 6} = 6 \times 6 + 5 = 41$

113. (B) $\cos 2A = \lambda \cos 2B$

$\Rightarrow \frac{\cos 2A}{\cos 2B} = \frac{\lambda}{1}$

by componendo and Dividendo Rule

$\Rightarrow \frac{\cos 2A + \cos 2B}{\cos 2A - \cos 2B} = \frac{\lambda + 1}{\lambda - 1}$

$\Rightarrow \frac{2\cos(A+B).\cos(A-B)}{2\sin(A+B).\sin(B-A)} = \frac{\lambda+1}{\lambda-1}$

$\Rightarrow \frac{\cos(A+B).\cos(A-B)}{-\sin(A+B).\sin(A-B)} = -\frac{1+\lambda}{1-\lambda}$

$\Rightarrow \frac{\cot(A+B)}{\tan(A-B)} = \frac{1+\lambda}{1-\lambda}$

114. (D) Differential equation

$\sqrt{1-y^2}\, dx + \sqrt{1-x^2}\, dy = 0$

$\Rightarrow \sqrt{1-y^2}\, dx = -\sqrt{1-x^2}\, dy$

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

On intergrating

$\Rightarrow \sin^{-1}x = -\sin^{-1}y + \sin^{-1}c$

$\Rightarrow \sin^{-1}x + \sin^{-1}y = \sin^{-1}c$

$\Rightarrow \sin^{-1}\left(x\sqrt{1-y^2} + y\sqrt{1-x^2}\right) = \sin^{-1}c$

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

115. (B) $(1 - \omega^2 + \omega)^4 + (1 - \omega + \omega^2)^4 + 32$

$\Rightarrow (-\omega^2 - \omega^2)^4 + (-\omega - \omega)^4 + 32$ $[\because 1+\omega+\omega^2=0]$

$\Rightarrow (-2\omega^2)^4 + (-2\omega)^4 + 32$

$\Rightarrow 16\omega^8 + 16\omega^4 + 32$

$\Rightarrow 16\omega^2 + 16\omega + 16 + 16$

$\Rightarrow 16(\omega^2 + \omega + 1) + 16 \Rightarrow 16 \times 0 + 16 = 16$

116. (A)

117. (C) Given that $x + 2y = 11$

Now, $A = xy$

$\Rightarrow A = (11 - 2y)y$

$\Rightarrow A = 11y - 2y^2$

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

$\Rightarrow \frac{dA}{dy} = 11 - 4y$

Again, differentiating

$\Rightarrow \frac{d^2A}{dy^2} = -4$

For maxima and minima

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

$\Rightarrow 11 - 4y = 0 \Rightarrow y = \frac{11}{4}$ and $x = \frac{11}{2}$

Hence maximum value of $xy = \frac{11}{2} \times \frac{11}{4} = \frac{121}{8}$

118. (B) $\begin{bmatrix} 2 & 4 \\ -1 & 2 \end{bmatrix} \times \begin{bmatrix} 2 & -3 \\ 0 & 6 \end{bmatrix} = \begin{bmatrix} 4 & k \\ -2 & 15 \end{bmatrix}$

$\Rightarrow \begin{bmatrix} 2\times2+4\times0 & 2\times(-3)+4\times6 \\ -1\times2+2\times0 & -1\times(-3)+2\times6 \end{bmatrix} = \begin{bmatrix} 4 & k \\ -2 & 15 \end{bmatrix}$

$\Rightarrow \begin{bmatrix} 4 & 18 \\ -2 & 15 \end{bmatrix} = \begin{bmatrix} 4 & k \\ -2 & 15 \end{bmatrix}$

On comparing

$k = 18$

119. (B) Given that $b_{yx} = \frac{-16}{3}$ and $b_{xy} = \frac{-1}{2}$

Now, $r = \sqrt{b_{yx} \times b_{xy}}$

$\Rightarrow r = \sqrt{\left(\frac{-16}{3}\right) \times \left(\frac{-1}{12}\right)}$

$\Rightarrow r = \sqrt{\frac{16}{36}}$

$\Rightarrow r = \sqrt{\frac{4}{9}}$

$\Rightarrow r = -\frac{2}{3}$

120. (C) $x = \sin\theta + \cos\theta$ and $y = \sin\theta.\cos\theta$

Now, $x^2 = (\sin\theta + \cos\theta)^2$

$\Rightarrow x^2 = 1 + 2\sin\theta.\cos\theta$

$\Rightarrow x^2 = 1 + 2\sin\theta.\cos\theta$

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

NDA (MATHS) MOCK TEST - 184 (Answer Key)

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

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