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NDA MATHS MOCK TEST - 180 (SOLUTION)

1. (D) $y = \dfrac{\sin x + \cos x}{\sin x - \cos x}$

diff. w.r.t. x

$$\frac{dy}{dx} = \frac{(\sin x - \cos x)\frac{d}{dx}(\sin x + \cos x) - (\sin x + \cos x)\frac{d}{dx}(\sin x - \cos x)}{(\sin x - \cos x)^2}$$

$$\frac{dy}{dx} = \frac{(\sin x - \cos x)(\cos x - \sin x) - (\sin x + \cos x)(\cos x + \sin x)}{(\sin x - \cos x)^2}$$

$$\frac{dy}{dx} = \frac{-[\sin^2 x + \cos^2 x - 2\sin x \cos x] - [\sin^2 x + \cos^2 x + 2\sin x \cos x]}{(\sin x - \cos x)^2}$$

$$\frac{dy}{dx} = \frac{-2}{(\sin x - \cos x)^2}$$

$$\left(\frac{dy}{dx}\right)_{[\text{at } x=0]} = \frac{-2}{(0-1)^2} = -2$$

2. (B) We know that
then If Points are collinear
Area of $\Delta = 0$

$$\frac{1}{2}\,[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)] = 0$$

$k(3k - 1) + 3k(1 - 2k) + 3(2k - 3k) = 0$
$3k^2 - k + 3k - 6k^2 + 6k - 9k = 0$
$-3k^2 - k = 0$
$-k(3k + 1) = 0$

$\Rightarrow k = 0,\ k = -\dfrac{1}{3}$

3. (D) Let root 2α, 3α

$2\alpha + 3\alpha = \dfrac{-2b}{3a}$

$5\alpha = \dfrac{-2(b)}{3(a)}$

$\alpha = \dfrac{-2b}{15a}$

Now,

$2\alpha.3\alpha = \dfrac{c}{3a}$

$6\alpha^2 = \dfrac{c}{3a}$

$6\left(\dfrac{-2b}{15a}\right)^2 = \dfrac{c}{3a}$

$6 \times \dfrac{4b^2}{15 \times 15 \times a^2} = \dfrac{c}{3a}$

$8b^2 = 25ac$

4. (A) $|z + 4| \le 3$
$-(z + 4) \le 3$
$z + 4 \ge -3$
$z + 1 \le -6$
$-(z + 1) \le 6$
$|z + 1| \le 6$

5. (C) We have,

$-3 \le 4 - \dfrac{7x}{2} \le 18$

$\Rightarrow -3 - 4 \le -\dfrac{7x}{2} \le 18 - 4$

$\Rightarrow -7 \le -\dfrac{7x}{2} \le 14$

$\Rightarrow 7 \ge \dfrac{7x}{2} \ge -14$

$\Rightarrow 2 \ge x \ge -4$

6. (B) We know that $f(-x) = -f^n(x) \rightarrow f_n$ is odd
$f(-x) = f(x) \rightarrow f^n$ is even

$f(x) = x\dfrac{a^x + 1}{a^x - 1}$

$f(-x) = (-x)\dfrac{a^{(-x)} + 1}{a^{(-x)} - 1}$

$f(-x) = (-x)\dfrac{1 + a^x}{1 - a^x}$

$f(-x) = x\dfrac{1 + a^x}{a^x - 1}$

$\Rightarrow f(-x) = f(x)$
$\Rightarrow f(x)$ is even f^n

7. (C) Number of reflexive relation $= 2^{n^2 - n}$
$= 2^{4^2 - 4}$
$= 2^{16 - 4}$
$= 2^{12}$

8. (A) $\left(\dfrac{1+i}{1-i}\right)^{398} = x + iy$

$\Rightarrow \left[\dfrac{(1+i)(1+i)}{(1^2 - i^2)}\right]^{398} = x + iy$

$\Rightarrow \left[\dfrac{(1+i)^2}{1+1}\right]^{398} = x + iy$

$\Rightarrow \left[\dfrac{1 + i^2 + 2i}{2}\right]^{398} = x + iy$

$\Rightarrow [\,i\,]^{398} = x + iy$
$\Rightarrow [i^2]^{199} = x + iy$
$\Rightarrow (-1)^{199} = x + iy$
$\Rightarrow -1 + 0i = x + iy$
$\Rightarrow x = -1,\ y = 0$

9. (D)

10. (A) Let point $\left(\frac{y^2}{4}, y\right)$

Distance (D) = $\sqrt{(x-2)^2+(y-1)^2}$

D = $\sqrt{\left(\frac{y^2}{4}-2\right)^2+(y-1)^2}$

D = $\sqrt{\frac{y^4}{16}+16-y^2+y^2+1-2y}$

D = $\sqrt{\frac{y^4}{16}+5-2y}$

$D^2 = \frac{y^4}{16} + 5 - 2y$ = (let A)

A = $\frac{y^4}{16} + 5 - 2y$

diff. w.r.t. y

$\frac{dA}{dy} = \frac{d}{dy}\left(\frac{y^4}{16}-2y+5\right)$

$= \frac{4y^3}{16} - 2 = \frac{y^3}{4} - 2$

again diff. w.r. to y

$\frac{d^2y}{dy^2} = \frac{3y^2}{4} > 0$

$\Rightarrow \frac{y^3}{4} - 2 = 0$

$\Rightarrow y^3 = 8$

$\Rightarrow y = 2$

Now,

$y^2 = 4x$

$(2)^2 = 4x \Rightarrow x = 1$

11. (A) $S = y^2 - 8x$

$S_{(2,\,1)} = (1)^2 - 8\times 2$

$S_{(2,\,1)} = -15 < 0$

$\Rightarrow$ Point is inside parabola

$\Rightarrow$ There is no tangent on parabola by point (2, 1)

12. (B) Latus rectum $l = \frac{2b^2}{a}$

major axis = $2a$

$\Rightarrow l = \frac{1}{2} \times 2a = a$

Now,

$\Rightarrow l = \frac{2b^2}{a} = a$

$\Rightarrow 2b^2 = a^2$

[since, we know that $b^2 = a^2(1 - e^2)$]

$\Rightarrow 2[a^2(1 - e^2)] = a^2$

$\Rightarrow 1 - e^2 = \frac{1}{2}$

$\Rightarrow e^2 = \frac{1}{2}$

$\Rightarrow e = \frac{1}{\sqrt{2}}$

13. (B) We have $\int \frac{dx}{\sqrt{5x^2-2x}} = \int \frac{dx}{\sqrt{5\left(x^2-\frac{2x}{5}\right)}}$

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

Put $x - \frac{1}{5} = t$. Then $dx = dt$

Therefore, $\int \frac{dx}{\sqrt{5x^2-2x}} = \frac{1}{\sqrt{5}} \int \frac{dt}{\sqrt{t^2-\left(\frac{1}{5}\right)^2}}$

$= \frac{1}{\sqrt{5}} \log\left|t+\sqrt{t^2-\left(\frac{1}{5}\right)^2}\right| + C$

$= \frac{1}{\sqrt{5}} \log\left|x-\frac{1}{5}+\sqrt{x^2-\frac{2x}{5}}\right| + C$

14. (D) Consider $\frac{x^2}{(x^2+1)(x^2+4)}$ and Put $x^2 = y$.

Then $\frac{x^2}{(x^2+1)(x^2+4)} = \frac{y}{(y+1)(y+4)}$

Write $\frac{y}{(y+1)(y+4)} = \frac{A}{y+1} + \frac{B}{y+4}$

So that $y = A(y + 4) + B(y + 1)$

Comparing coefficients of y and constant terms on both sides, we get A + B = 1 and 4A + B = 0, which give

$A = -\frac{1}{3}$ and $B = \frac{4}{3}$

Thus, $\frac{x^2}{(x^2+1)(x^2+4)} = -\frac{1}{3(x^2+1)} + \frac{4}{3(x^2+4)}$

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

$+ \frac{4}{3}\int \frac{dx}{x^2+4}$

$= -\frac{1}{3} \tan^{-1}x + \frac{4}{3}\times\frac{1}{2}\tan^{-1}\frac{x}{2} + C$

$= -\frac{1}{3} \tan^{-1}x + \frac{2}{3}\tan^{-1}\frac{x}{2} + C$

15. (A) The A.M. = $\frac{(2+4+8+.....+2^n)}{n}$

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

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

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

A.M. = $\frac{2(2^n-1)}{n}$

16. (C) We are given that : A.M. = 10, G.M. = 8. Also we know that (A.M.)(H.M.) = (G.M.)^2

or (10)(H.M.) = 8^2 = 64 or H.M. = $\frac{64}{10}$ = 6.4

17. (D) Coefficient of variation = $\frac{\sigma}{\overline{X}} \times 100$

$= \frac{120}{800} \times 100 = 15\%$

18. (B) P(A) $= 1 - P(\overline{A}) = 1 - \frac{2}{3} = \frac{1}{3}$

Since, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow \frac{3}{4} = \frac{1}{3} + P(B) - \frac{1}{4}$

$\Rightarrow P(B) = \frac{2}{3}$

19. () Let us arrange the items in ascending order :
3, 4, 6, 9, 10, 11, 18, 22
Median : M = average of $\left\{\left(\frac{n}{2}\right)^{th} \text{and} \left(\frac{n}{2}+1\right)^{th}\right\}$ terms

= Average of $\left(\frac{8}{2}\right)$th and $\left(\frac{8}{2}+1\right)$th terms

= Average of 4th and 5th terms = $\frac{9+10}{2}$

$= \frac{19}{2} = 9.5$

20. (C) Possibilities of sum of the dice is more than 10(5, 6) (6, 5) (6, 6) = 3
Possibilities of sum of the dice is divisible by 3(1, 2) (1, 5) (2, 1) (2, 4) (3, 3) (3, 6) (4, 2) (4, 5) (5, 1) (5, 4) (6, 3) (6, 6) = 12

Required ratio = $\frac{3}{36} : \frac{12}{36}$ = 1 : 4

21. (D) Required probability = $\frac{4}{52} \times \frac{5}{51} = \frac{5}{663}$

22. (C) $P(E) = \frac{n(E)}{n(S)}$

$n(S) = 14C_3$
$n(E) = 5C_1$ and $3C_1$ and $6C_1$

$P(E) = \frac{5C_1 \text{ and } 3C_1 \text{ and } 6C_1}{14C_3}$

$= \frac{45}{182}$

23. (A) Total probability $n(S) = 12C_2$
Required probability = 1 – P(none is pink)
Probability of getting none is pink balls,

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

$P(E) = \frac{8C_2}{12C_2} = \frac{14}{33}$

Required probability = 1 – P(None is pink)

$= 1 - \left(\frac{14}{33}\right)$

$= \frac{19}{33}$

24. (B) Let the number of balls transferred = x
Now,

$\frac{{}^xC_2}{(4+x)_{C_2}} = \frac{3}{14}$

$\Rightarrow \frac{x(x-1)}{(4+x)(3+x)} = \frac{3}{14}$

$\Rightarrow 14x^2 - 14x = 3x(12 + 4x + 3x + x^2)$

$\Rightarrow 14x^2 - 14x = 36 + 21x + 3x^2$

$\Rightarrow 11x^2 - 35x - 36 = 0$

$\Rightarrow (x-4)(11x+9) = 0$

$\Rightarrow x = 4, \frac{-9}{11}$ (rejected)

25. (A) Let $u = \ln(x + \sin x)$ and $v = x + \cos x$

Now, $\frac{du}{dx} = \frac{1}{(x+\sin x)}(1 + \cos x)$

and $\frac{dt}{dx} = 1 - \sin x$

Now, we can find derivative of u w.r.t.v,

$\frac{\frac{du}{dx}}{\frac{dv}{dx}} = \frac{\frac{(1+\cos x)}{(x+\sin x)}}{1-\sin x}$

$\Rightarrow \frac{du}{dv} = \frac{(1+\cos x)}{(x+\sin x)(1-\sin x)}$

26. (C) S = $\sqrt{t^2+1}$ Differentiating on both sides w.r.t.t, we get

$$\frac{ds}{dt} = \frac{1}{2\sqrt{t^2+1}} \times 2t = \frac{t}{\sqrt{t^2+1}}$$

Differentiating again both sides w.r.t.t, we get

$$\frac{d^2s}{dt^2} = \frac{\sqrt{t^2+1}(1) - t \times \frac{1}{2\sqrt{t^2+1}}(2t)}{\left(\sqrt{t^2+1}\right)^2}$$

$$= \frac{t^2+1-t^2}{\left(\sqrt{t^2+1}\right)^2\sqrt{t^2+1}} = \frac{1}{\left(\sqrt{t^2+1}\right)^3} = \frac{1}{S^3}$$

27. (D) Given that, $y = \cos t$ and $x = \sin t$

Then, $\frac{dy}{dt} = -\sin t$

and $\frac{dx}{dt} = \cos t$

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

$$= \frac{-\sin t}{\cos t} = \frac{-x}{y}$$

28. (A) $\because x = k(\theta + \sin\theta)$ and $y = k(1 + \cos\theta)$,

$\frac{dx}{d\theta} = k(1 + \cos\theta)$

and $\frac{dx}{d\theta} = -k\sin\theta$

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

$$= \frac{-2\sin\frac{\theta}{2}\cos\frac{\theta}{2}}{2\cos^2\frac{\theta}{2}} = -\tan\frac{\theta}{2}$$

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

29. (D) Let $y = \log x$
On diff. w.r.t. x
from 1 to n times, we get

$$y_1 = \frac{1}{x},\ y_2 = \frac{-1}{x^2},\ y_3 = \frac{2}{x^3} \ldots.$$

$$y_n = \frac{(-1)^{n-1}(n-1)!}{x^n}$$

30. (A) Given curve,
$y = \sin^{-1}(\sin^2 x)$
On differentiating w.r.t.x, we get

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-(\sin^2 x)^2}} \cdot \frac{d}{dx}(\sin^2 x)$$

$$\Rightarrow \frac{dy}{dx} = \frac{2\sin x.\cos x}{\sqrt{1-\sin^4 x}}$$

$$\Rightarrow \frac{dy}{dx} = \frac{\sin 2x}{\sqrt{1-\sin^4 x}}$$

$$\left(\frac{dy}{dx}\right)_{x=0} = \frac{\sin 0}{\sqrt{1-\sin 0}} = \frac{0}{\sqrt{1-0}} = 0$$

$\therefore$ Slope of the curve = 0
Hence, slope of the tangent to the given curve = Slope of that curve = 0

31. (C) Equation of tangent to the curve $y = e^{2x}$ at (0, 1) is

$$(y-1) = \left(\frac{dy}{dx}\right)_{(0,1)}(x-0)$$

$\Rightarrow (y-1) = 2(x-0)$
$\Rightarrow y - 1 = 2x$
$\therefore\ y = 2x + 1$
Since, the tangent meets X-axis.
So, put $y = 0$ in equation of tangent, we get

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

Hence, at $\left(-\frac{1}{2}, 0\right)$, the tangent to the curve at (0, 1) meet the X-axis.

32. (A) Consider,

$$\int\left(\frac{1}{\cos^2 x} - \frac{1}{\sin^2 x}\right)dx = \int(\sec^2 x - \text{cosec}^2 x)\,dx$$

$= \tan x - (-\cot x) + C$
$= \tan x + \cot x + C$

$$= \left(\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}\right) + C$$

$$= \left(\frac{1}{\sin x.\cos x}\right) + C$$

$= 2\,\text{cosec}2x + C$

33. (C) Consider, $\int \frac{1}{1+e^x}dx = \int \frac{e^{-x}}{e^{-x}+1}dx$

$= -\log(1+e^{-x}) + C = -\log\left(\frac{1+e^x}{e^x}\right) + C$

$\left[\because \int \frac{f'(x)}{f(x)}dx = \log f(x) + C\right]$

$= -\{\log(1+e^x) - \log e^x\} + C$

$= x - \log(1+e^x) + C$

34. (B) I = $\int \sec^2 x(\sec^2 x)\tan x\, dx$

$= \int \sec^2 x(1+\tan^2 x)\tan x\, dx$

$= \int (1+t^2)t\, dt$

where $\tan x = t$

$\Rightarrow \sec^2 x dx = dt$

$= \int (t+t^3)dt = \frac{1}{2}t^2 \frac{1}{4}t^4 + C$

$= \frac{1}{2}\tan^2 x + \frac{1}{4}\tan^4 x + C$

35. (B) I = $\int \sqrt{e^x - 1}\, dx$

Putting $e^2 - 1$ and $e^x\, dx = 2t\, dt$

i.e. $dx = \frac{2t}{(t^2+1)}dt$, we get

$I = \int \frac{2t^2}{(t^2+1)}dt = \int \left(2 - \frac{2}{t^2+1}\right)dt$

$= 2t - 2\tan^{-1}t + C$

$= 2\sqrt{e^x-1} - 2\tan^{-1}\sqrt{e^x-1} + C$

36. (C) Let I = $\int_0^{\pi/2} \frac{dx}{a^2\cos^2 x + b^2\sin^2 x}$

$= \int_0^{\pi/2} \frac{\sec^2 x\, dx}{a^2 + b^2\tan^2 x}$

[$\therefore$ divide numerator and denominator $\cos^2 x$]

Let $\tan x = t \Rightarrow \sec^2 x\, dx = dt$

When $x = 0$, then $t = 0$

and when $x = \frac{\pi}{2}$, then $t = \infty$

$I = \frac{1}{b^2}\int_0^{\infty} \frac{dt}{\left(\frac{a}{b}\right)^2 + t^2}$

$= \frac{1}{b^2}\frac{1}{\left(\frac{a}{b}\right)}\left[\tan^{-1}\left(\frac{bt}{a}\right)\right]_0^{\infty}$

$\left[\because \int \frac{dx}{a^2+x^2} = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + C\right]$

$= \frac{1}{ab}[\tan^{-1}(\infty) - \tan^{-1}(0)]$

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

37. (D) $\frac{1}{e} \le x \le 1 \Rightarrow \log x \le 0$

$\Rightarrow |\log x| = -\log x$

$1 < x \le e \Rightarrow \log x \ge 0$

$\Rightarrow |\log x| = \log x$

$I = \int_{1/e}^{1} |\log x|\, dx + \int_1^e |\log x|\, dx$

$= \int_{1/e}^{1} -\log x dx + \int_1^e \log x dx$

$= \left[-(x\log x - x)\right]_{1/e}^{1} + \left[(x\log x - x)\right]_1^e$

$= \left[x(1-\log x)\right]_{1/e}^{1} + \left[x(\log x - 1)\right]_1^e$

$= \left[1 - \frac{1}{e}(1+1) + 1\right] = 2\left(1 - \frac{1}{e}\right)$

38. (C) I = $\int_{\alpha}^{\left(\frac{\pi}{2}-\alpha\right)} \frac{1}{1+\sqrt{\cot x}}dx$

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

Using prop. V with $a + b = \frac{\pi}{2}$, we get:

$I = \int_{\alpha}^{\left(\frac{\pi}{2}-\alpha\right)} \frac{\sqrt{\cos x}}{(\sqrt{\cos x}+\sqrt{\sin x})}dx$ ...(ii)

$\therefore 2I = \int_{\alpha}^{\left(\frac{\pi}{2}-\alpha\right)} dx = [x]_{\alpha}^{\left(\frac{\pi}{2}-\alpha\right)}$

$\Rightarrow 2I = \left(\frac{\pi}{2} - \alpha - \alpha\right)$

$\Rightarrow 2I = \left(\frac{\pi}{2} - 2\alpha\right)$

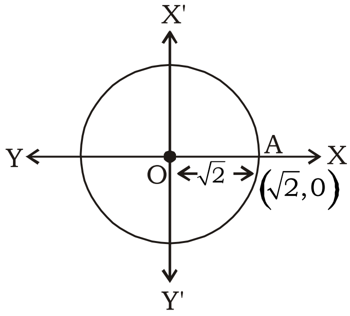
$\Rightarrow I = \left(\frac{\pi}{4} - \alpha\right)$

Remember

If $f(-x) = -f(x)$, then $\int_a^a f(x)dx = 0$

40. (B) Given curve is the equation of circle,

$x^2 + y^2 = (\sqrt{2})^2$



$\therefore$ Required area

$= 4 \times \int_{x=0}^{x=\sqrt{2}} y\,dx$

$= 4\int_0^{\sqrt{2}} \sqrt{2 - x^2}\,dx$

$= 4\left[\frac{x}{2}\sqrt{2 - x^2} + \frac{2}{2}\sin^{-1}\frac{1}{\sqrt{2}}\right]_0^{\sqrt{2}}$

$= 4\left(\frac{\pi}{2} - 0\right) = 2\pi$ sq units

41. (C) $y\frac{dy}{dx} + x = a \Rightarrow ydy + xdx = adx$

On integrating both sides, we get

$\int ydy + \int xdx = \int adx$

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

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

which represents a set of circles

42. (A) The given differential equation is

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

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

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

43. (A) The given differential equation is

$(1+ e^x)y\,dy = e^x\,dx$

On integrating both sides, we get

$\int y\,dy = \int\left(\frac{e^x}{1 + e^x}\right)dx$

$\Rightarrow \frac{y^2}{2} = \log(1 + e^x) + \log C$

$\Rightarrow y^2 = 2\log[C(1 + e^x)]$

$\Rightarrow y^2 = \log[C^2(1 + e^x)^2]$

44. (A) (A) $|-x| = |x|$.The inequality $|x| \le x$ is correct for $x \ge 0$

(B) The inequality is not fulfilled for $x < 0$. For $x \ge 0$, $|x| = x$, and the slack inequality $x^2 \ge x^2$ is correct.

(C) $\sqrt{x^2} = |x|; |x| \le -x$ for $x \le 0$.

(D) $\sqrt{2x^2} = |x|\sqrt{2}$; $x\sqrt{2} > |x|\sqrt{2}$ or $x > |x|$ is incorrect for any x.

45. (A) Let $P(a, b, c) = a^3 + b^3 + c^3 - 3abc$

and $Q(a, b, c) = (a + b + c)^3$

We know that

$a^3 + b^3 + c^3 - 3abc = (a + b + c)[(a + b + c)^2 - 3(ab + bc + ca)]$

We are given that $ab + bc + ca = 0$

$\therefore a^3 + b^3 + c^3 - 3abc = (a + b + c)(a + b + c)^2$

$= (a + b + c)^3$

$P = (a, b, c) = (a + b + c)^3$

Thus, from (i) and (ii), required H.C.F. is $(a + b + c)^3$

46. (B) Given, $1 + \sin x + \sin^2 x + \sin^3 x + \ldots\ldots \infty = 4 + 2\sqrt{3}$

$\Rightarrow 1 - \sin x = \frac{1}{4 + 2\sqrt{3}}$

$\left[\because S_\infty = \frac{a}{1-r}.\text{Here } a = 1, r = \sin x\right.$
Also $|\sin x| < 1$ as $|\sin x| = 1$ will make the sum of infinte G.P. infinite $\left.\right]$

$\Rightarrow \sin x = 1 - \frac{1}{4 + 2\sqrt{3}} = \frac{4 + 2\sqrt{3} - 1}{4 + 2\sqrt{3}}$

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

$= \frac{12 + 8\sqrt{3} - 6\sqrt{3} - 12}{16 - 12} = \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$

$\Rightarrow x = \frac{\pi}{3}$ or $\frac{2\pi}{3}$ as $0 < x < \pi$

47. (C) We have,

$\vec{a} = \hat{i} - 7\hat{j} + 7\hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{j} + 2\hat{k}$

$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \vec{k} \\ 1 & -7 & 7 \\ 3 & -2 & 2 \end{vmatrix}$

$= \hat{i}(-14 + 14) - \hat{j}(2 - 21) + \hat{k}(-2 + 21) = 19\hat{j} + 19\hat{k}$

$\therefore |\vec{a} \times \vec{b}| = \sqrt{(19)^2 + (19)^2} = \sqrt{2 \times (19)^2} = 19\sqrt{2}$

48. (D) The repeated guessing of correct from multiple choice question are Bernoulli trials.
Let X represent the number of correct answers by guessing in the set of 5 multiple choice questions.
Probability of getting a correct answer is, $p = \frac{1}{3}$

$\therefore q = 1 - p = 1 - \frac{1}{3} = \frac{2}{3}$

Clearly, X has a binomial distribution with $n = 5$ and $p = \frac{1}{3}$

$\therefore P(X = x) = {}^nC_x q^{n-x} p^x$

$= {}^5C_x \left(\frac{2}{3}\right)^{5-x} \cdot \left(\frac{1}{3}\right)^x$

p(guessing more than 4 correct answers)
$= p(X \geq 4)$
$= p(X = 4) + p(X = 5)$

$= {}^5C_4 \left(\frac{2}{3}\right) \cdot \left(\frac{1}{3}\right)^4 + {}^5C_5 \left(\frac{1}{3}\right)^5$

$= 5 \cdot \frac{2}{3} \cdot \frac{1}{81} + 1 \cdot \frac{1}{243}$

$= \frac{10}{243} + \frac{1}{243}$

$= \frac{11}{243}$

49. (A) $S_1 = \frac{n(n+1)}{2}$, $S_2 = \frac{n(n+1)(2n+1)}{6}$,

$S_3 = \frac{n^2(n+1)^2}{4}$

$9S_2 2 = 9\left\{\frac{1}{6}n(n+1)(2n+1)\right\}^2$

$= 9\left\{\frac{1}{36}n^2(n+1)^2(2n+1)^2\right\}$

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

$= \frac{1}{4}n^2(n+1)^2\left(1 + 8\left(\frac{1}{2}n(n+1)\right)\right) = S_3(1 + 8S_1)$

50. (B) $f(a) = \log\left(\frac{1-a}{1+a}\right)$, $f(b) = \log\left(\frac{1-b}{1+b}\right)$

$$f\left(\frac{a+b}{1+ab}\right) = \log\left(\frac{1-\frac{a+b}{1+ab}}{1+\frac{a+b}{1+ab}}\right)$$

$$\Rightarrow f\left(\frac{a+b}{1+ab}\right) = \log\left(\frac{\frac{1-ab-a-b}{1+ab}}{\frac{1+ab+a+b}{1+ab}}\right)$$

$$= \log\left(\frac{(1-a)+b(a-1)}{(1+a)+b(a+1)}\right) = \log\left(\frac{(1-a)(1-b)}{(1+a)(1+b)}\right)$$

$$= \log\left(\frac{1-a}{1+a}\right) + \log\left(\frac{1-b}{1+b}\right)$$

$(\because \log ab = \log a + \log b)$

$= f(a) + f(b)$

51. (C) $f(f(x)) = f\left(\frac{\alpha x}{x+1}\right) = \frac{\alpha \cdot \left(\frac{\alpha x}{x+1}\right)}{\left(\frac{\alpha x}{x+1}\right)+1}$

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

Given, $f(f(x)) = x \Rightarrow \frac{\alpha^2 x}{\alpha x + x + 1} = x$

$\Rightarrow \alpha^2 x = \alpha x^2 + x^2 + x$
$\Rightarrow \alpha^2 - 1 = (\alpha + 1)x$
$\Rightarrow (\alpha - 1)(\alpha + 1) - (\alpha + 1)x = 0$
$\Rightarrow (\alpha + 1)(\alpha - 1 - x) = 0$
$\Rightarrow \alpha + 1 = 0 \Rightarrow \alpha = -1$ $[\because \alpha - 1 - x \neq 0]$

52. (A) $0.2\overline{34} = 0.2343434.......$
$= 0.2 + 0.034 + 0.00034 + 0.0000034 + ... + \infty$

$$= \frac{2}{10} + \frac{34}{1000} + \frac{34}{100000} + \frac{34}{10000000} + \ldots + \infty$$

$$= \frac{2}{10} + \frac{34}{10^3}\left[1 + \frac{1}{10^2} + \ldots.\infty\right]$$

$$= \frac{2}{10} + \frac{34}{10^3}\left(\frac{1}{1-\frac{1}{10^2}}\right)$$

$$= \frac{2}{10} + \frac{34}{1000} \times \frac{100}{99} = \frac{198+34}{990} = \frac{232}{990} = \frac{116}{495}$$

53. (D) a, b, c are in A.P.

$\Rightarrow 2b = a + c$ ...(i)

x, y, z are in G.P.

$\Rightarrow y = xr, z = xr^2$, where r is the common ratio

$\therefore x^{b-c}.y^{c-a}.z^{a-b}$

$= x^{b-c}.(xr)^{c-a}.(xr^2)^{a-b}$

$= x^{b-c}. x^{c-a}. r^{c-a}. x^{a-b}. r^{2a-2b}$

$= x^{b-c+c-a+a-b}. r^{c-a+2a-2b}$

$= x^0.r^{c+a-2b} = x^0.r^{2b-2b} = x^0.r^0 = 1$

54. (C) The area of the parallelogram whose adjacent sides are $\vec{a}$ and $\vec{b}$ is $|\vec{a}\times\vec{b}|$

Adjacent sides are given as:

$\vec{a} = \hat{i}-\hat{j}+3\hat{k}$ and $\vec{b} = 2\hat{i}-7\hat{j}+\hat{k}$

$\therefore \vec{a}\times\vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -1 & 3 \\ 2 & -7 & 1 \end{vmatrix} = \hat{i}(1+21) - \hat{j}(1-6)$

$+\hat{k}(-7+2)$j $= 20\hat{i}+5\hat{j}-5\hat{k}$

$|\vec{a}\times\vec{b}| = \sqrt{20^2+5^2+5^2} = \sqrt{400+25+25}$

$= 15\sqrt{2}$

Hence, the area of the given parallelogram is $15\sqrt{2}$ square units

55. (A) Here a = 19, d = $18\frac{1}{5} - 19 = -\frac{4}{5}$

Let the nth term be the first negative term. Then,

$T_n < 0 \Rightarrow a + (n-1)d < 0$

$\Rightarrow 19 + (n-1)\left(\frac{-4}{5}\right) < 0$

$\Rightarrow 19 - \frac{4}{5}n + \frac{4}{5} < 0$

$\Rightarrow \frac{99}{5} - \frac{4}{5}n < 0 \Rightarrow n > \frac{99}{5}\times\frac{5}{4} n > \frac{99}{4}$

$= 24\frac{3}{4} \Rightarrow n = 25$

56. (A) The given vectors are $\vec{a} = 2\hat{i}-\hat{j}+2\hat{k}$ and $\vec{b} = -\hat{i}+\hat{j}-\hat{k}$

$\vec{a} = 2\hat{i}-\hat{j}+2\hat{k}$

$\vec{b} = -\hat{i}+\hat{j}-\hat{k}$

$\therefore \vec{a}+\vec{b} = (2-1)\hat{i} + (-1+1)\hat{j} + (2-1)\hat{k} =$

$1\hat{i}+0\hat{j}+1\hat{k} = \hat{i}+\hat{k}$

$|\vec{a}+\vec{b}| = \sqrt{1^2+1^2} = \sqrt{2}$

Hence, the unit vector in the direction of $(\vec{a}+\vec{b})$ is

$$\frac{(\vec{a}+\vec{b})}{|\vec{a}+\vec{b}|} = \frac{(\hat{i}+\hat{k})}{\sqrt{2}} = \frac{1}{2}\hat{i}+\frac{1}{\sqrt{2}}\hat{k}$$

57. (C) $f(x) = \frac{1}{\log_{10}(1-x)} + \sqrt{x+2} = \log_{(1-x)}10$

$+\sqrt{x+2}$

Let $F(x) = \log_{(1-x)}10$ and $g(x) = \sqrt{x+2}$

$F(x)$ is defined when $(1-x) > 0$ and $1-x \neq 1$

$\Rightarrow x < 1$ and $x \neq 0$

$\Rightarrow x \in (-\infty, 1) - \{0\}$

$g(x)$ is defined when $x + 2 \geq 0$

$\Rightarrow x \geq -2$

$\Rightarrow x \in [-2, \infty)$

From (i) and (ii), the domain of $f(x) = F(x) + g(x)$ is common domain of $F(x)$ and $g(x)$, i.e., $(-\infty, 1) - \{0\} \cap [-2, \infty) = [-2, 1) - \{0\}$

58. (B) Let $\frac{a-x}{px} = \frac{a-y}{qy} = \frac{a-z}{rz} = k$

Then, $\frac{a-x}{px} = k \Rightarrow \frac{a-x}{kx} = p \Rightarrow p\ \frac{1}{k}\left(\frac{a}{x}-1\right)$

Similarly, $q = \frac{1}{k}\left(\frac{a}{y}-1\right)$, $r = \frac{1}{k}\left(\frac{a}{z}-1\right)$

Now, p, q, r are in A.P.

$\Rightarrow \frac{1}{k}\left(\frac{a}{x}-1\right), \frac{1}{k}\left(\frac{a}{y}-1\right), \frac{1}{k}\left(\frac{a}{z}-1\right)$ are in A.P.

$\Rightarrow \frac{a}{x}-1, \frac{a}{y}-1, \frac{a}{z}-1$ are in A.P.

$\Rightarrow \frac{a}{x}, \frac{a}{y}, \frac{a}{z}$ are in A.P.

$\Rightarrow \frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in A.P.

$\Rightarrow x, y, z$ are in H.P.

59. (A) It is given that,

$|\vec{a}| = \sqrt{3}, |\vec{b}| = 2$ and, $\vec{a}.\vec{b} = \sqrt{6}$

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

Now, we know that

$\therefore \sqrt{6} = \sqrt{3}\times 2\times\cos\theta$

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

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

Hence, the angle between the given vectors and is $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{4}$

60. (A) $\left(\vec{x}-\vec{a}\right).\left(\vec{x}+\vec{a}\right) = 12$

$\vec{x}\cdot\vec{x}+\vec{x}\cdot\vec{a}\cdot\vec{x}-\vec{a}\cdot\vec{a} = 12$

$\Rightarrow |\vec{x}|^2 - |\vec{a}|^2 = 12$

$\Rightarrow |\vec{x}|^2 - 1 = 12$

$[|\vec{a}| = 1$ as $\vec{a}$ is unit vector$]$

$\Rightarrow |\vec{x}|^2 = 13$

$\Rightarrow |\vec{x}| = \sqrt{13}$

61. (D) Let d be the common difference for the A.P. ; $a_1, a_2, a_3, ...$

Then, $\frac{S_p}{S_q} = \frac{\frac{p}{2}[2a_1+(p-1)d]}{\frac{p}{2}[2a_1+(q-1)d]} = \frac{p^2}{q^2}$

$\Rightarrow \frac{2a_1+(p-1)d}{2a_1+(q-1)d} = \frac{p}{q}$

$\Rightarrow q[2a_1+(p-1)d] = p[2a_1+(q-1)d]$

$\Rightarrow 2a_1q + pqd - qd = 2a_1p + pqd - pd$

$\Rightarrow pd - qd = 2a_1p - 2a_1q$

$\Rightarrow d(p-q) = 2a_1(p-q)$

$\Rightarrow d = 2a_1$

Now,

$\frac{\text{Term6}}{\text{Terms21}} = \frac{a_6}{a_{21}} = \frac{a_1+(6-1)d}{a_1+(21-1)d} = \frac{a_1+5\times 2a_1}{a_1+20\times 2a_1}$

$= \frac{11a_1}{41a_1} = \frac{11}{41}$

62. (D) $A = \frac{1}{2}\begin{vmatrix} h & h & 1 \\ 1 & 1 & 1 \\ 2 & 3 & 1 \end{vmatrix}$

$= \frac{1}{2}[h(1-3) - h(1-2) + 1(3+2)]$

$= \frac{1}{2}[-2h + h + 1] = \frac{1-h}{2}$

Area $= |A| = \left|\frac{1-h}{2}\right| = 2$

$\Rightarrow h - 1 = \pm 4$

$\Rightarrow h = 5, -3$

63. (C) Let point (h, k)

According to question

$\frac{3h+4k-11}{\sqrt{3^2+4^2}} = \frac{20h-21k-15}{\sqrt{20^2+(-21)^2}}$

$\Rightarrow \frac{3h+4k-11}{5} = \frac{20h-21k-15}{29}$

On solving

$43h - 221k + 244 = 0$

Hence locus of point

$43x - 221y + 244 = 0$

64. (C) Word "INTEGRATION"

The required Permutation

$= \frac{11!}{2!2!2!} = \frac{39916800}{8} = 4989600$

65. (C) We know that

$\frac{{}^nC_r}{{}^nC_{r-1}} = \frac{n-r+1}{r}$

$\frac{r.{}^nC_r}{{}^nC_{r-1}} = n-r+1$

Now, $\frac{C_1}{C_0}+\frac{2C_2}{C_1}+\frac{3C_3}{C_2}+ .... +\frac{nC_n}{C_{n-1}}$

$\Rightarrow (n-1+1)+(n-2+1)+(n-3+1)+...+(n-n+1)$

$\Rightarrow n + (n-1) + (n-2) + ... + 1$

$\Rightarrow \frac{n(n+1)}{2}$

66. (A) 1 1 0 0

$0\times 2^0 = 0$

$0\times 2^1 = 0$

$1\times 2^2 = 4$

$1\times 2^3 = 8$

12

0.101

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

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

$\frac{1}{8} = 0\times 2^{-2}$

$\frac{5}{8} = 0.625$

67. (B) $\lim_{x\to\infty}\frac{2x^3+5x^2-7}{3x^2-5x^3+3x-2}$

$\Rightarrow \lim_{x\to\infty}\frac{x^3\left(2+\frac{5}{x}-\frac{7}{x^3}\right)}{x^3\left(-5+\frac{3}{x}+\frac{3}{x^2}-\frac{2}{x^3}\right)}$

$\Rightarrow \frac{2+0+0}{-5+0+0} = \frac{-2}{5}$

68. (C) $z = \frac{3+4i}{(1+i)^2}$

Conjugate of $z = \frac{3-4i}{(1-i)^2}$

$= \frac{3-4i}{1+i^2-2i}$

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

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

69. (A) $f(x) = \begin{cases} 2x^2 - 5, & -1 < x \le 3 \\ x - \lambda, & 3 < x \le 7 \end{cases}$ is

continuous at $x = 3$, then

$\lim_{x \to 3^-} f(x) = \lim_{x \to 3^+} f(x)$

$\Rightarrow 2 \times 3^2 - 5 = 3 - \lambda \Rightarrow \lambda = -10$

70. (A) $A = \{ x \in R, x^2 + 3x - 28 \le 0 \}$

$x^2 + 3x - 28 \le 0$

$(x + 7)(x - 4) \le 0$

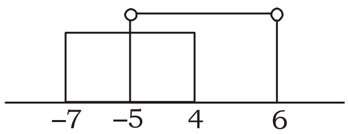
$-7 \le x \le 4$

and $B = \{x \in R, x^2 - x - 30 < 0\}$

$x^2 - x - 30 < 0$

$(x - 6)(x + 5) < 0$

$-5 < x < 6$



Statement I

$(A \cup B) = \{ x \in R, -7 \le x < 6 \}$

Statement I is correct.

Statement II

$(A \cup B) = \{ x \in R, -5 < x \le 4 \}$

Statement II is incorrect.

71. (B) $f(x) = \begin{cases} \dfrac{1 - \cos 6x}{x^2}, & x < 0 \\ a, & x = 0 \\ \dfrac{3\sqrt{x}}{\sqrt{9 + \sqrt{x}} - 3}, & x > 0 \end{cases}$ is continuous

at $x = 0$, then

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

$\Rightarrow \lim_{x \to 0} \dfrac{1 - \cos 6x}{x^2} = \lim_{x \to 0} \dfrac{3\sqrt{x}}{\sqrt{9 + \sqrt{x}} - 3} = a$

$\Rightarrow \lim_{x \to 0} \dfrac{2\sin^2 3x}{9x^2} \times 9 = \lim_{x \to 0} \dfrac{3\sqrt{x}\left(\sqrt{9 + \sqrt{x}} + 3\right)}{9 + \sqrt{x} - 9} = a$

$\Rightarrow \lim_{x \to 0} 18 \times \left(\dfrac{\sin 3x}{3x}\right)^2 = \lim_{x \to 0} \dfrac{3\sqrt{x}\left(\sqrt{9 + \sqrt{x}} + 3\right)}{\sqrt{x}} = a$

$\Rightarrow 18 = 3 \times (3 + 3) = a$

$\Rightarrow a = 18$

72. (B) Conic

$9x^2 - 16y^2 + 12x - 24y + 59 = 0$

$\Rightarrow (9x^2 + 12x + 4) - (16y^2 + 24y + 9) + 64 = 0$

$\Rightarrow (3x + 2)^2 - (4y + 3)^2 + 64 = 0$

$\Rightarrow 9\left(x + \dfrac{2}{3}\right)^2 - 16\left(y + \dfrac{3}{4}\right)^2 = -64$

$\dfrac{\left(x + \frac{2}{3}\right)^2}{\frac{64}{9}} - \dfrac{\left(y + \frac{3}{4}\right)^2}{4} = -1$

let $x + \dfrac{2}{3} = X,\ y + \dfrac{3}{4} = Y$

$\Rightarrow \dfrac{X^2}{\frac{64}{9}} - \dfrac{Y^2}{4} = -1$

$a^2 = \dfrac{64}{9}$, $b^2 = 4$

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

$e = \sqrt{1 + \dfrac{64}{9 \times 4}} \Rightarrow e = \dfrac{5}{3}$

foci(X,Y) = $(0, \pm be)$

X = 0, Y = $\pm be$

$x + \dfrac{2}{3} = 0$, $y + \dfrac{3}{4} = \pm 2 \times \dfrac{5}{3}$

$x = -\dfrac{2}{3}$, $y + \dfrac{3}{4} = \dfrac{10}{3}$ and $y + \dfrac{3}{4} = -\dfrac{10}{3}$

$y = \dfrac{31}{12}$ and $y = -\dfrac{49}{12}$

foci are $\left(\dfrac{-2}{3}, \dfrac{31}{12}\right)$ and $\left(\dfrac{-2}{3}, \dfrac{-49}{12}\right)$

73. (B) Equation $x^2 + ax + b = 0$

let roots α, $k\alpha$

$\alpha + k\alpha = -a \Rightarrow \alpha(1 + k) = -a$ ...(i)

$\alpha . k\alpha = b \Rightarrow \alpha^2 k = b$ ...(ii)

and equation

$x^2 + mx + n = 0$

let roots β, $k\beta$

$\beta + k\beta = -a \Rightarrow \beta(1 + k) = -m$ ...(iii)

$\beta . k\beta = h \Rightarrow \beta^2 k = n$ ...(iv)

from eq(i) and eq(ii)

$\dfrac{\alpha}{\beta} = \dfrac{a}{m}$ ...(v)

from eq(ii) and eq(iv)

$\dfrac{\alpha^2}{\beta^2} = \dfrac{b}{n}$

$\left(\dfrac{a}{m}\right)^2 = \dfrac{b}{n}$ [from eq (v)]

$a^2 n = m^2 b$

74. (B) $S = 7 \times 7^{\frac{1}{2}} \times 7^{\frac{1}{4}} \times 7^{\frac{1}{8}} \times ....\infty$

$S = 7^{\left(1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+.............\infty\right)}$

$S = 7^{\frac{1}{1-\frac{1}{2}}} \Rightarrow S = 7^2 = 49$

75. (A) Given that $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{4}$

$P(A \cup B) = \frac{4}{9}$

$P(A \cap B) = P(A) + P(B) - P(A \cup B)$

$P(A \cap B) = \frac{1}{3} + \frac{1}{4} - \frac{4}{9} = \frac{5}{36}$

Now, $P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{5}{36}}{\frac{1}{4}} = \frac{5}{9}$

76. (A) $S = \{1, 2, 3, ..., 29, 30\}$; $n(S) = 30$
$X = \{4, 8, 12, 16, 20, 24, 28\}$; $n(X) = 7$
$Y = \{2, 4, 6, 8, ..., 28, 30\}$; $n(Y) = 15$

1. $P(X) = \frac{n(X)}{n(S)} = \frac{7}{30}$

Statement 1 is correct.

2. $P(Y) = \frac{n(Y)}{n(S)} = \frac{15}{30} = \frac{1}{2}$

Statement 2 is incorrect.

77. (B) Let $z = x + iy$
Now, $Re(z^2 - 2i) = 4$
$\Rightarrow Re[(x+iy)^2 - 2i] = 4$
$\Rightarrow Re[x^2 - y^2 + 2xyi - 2i] = 4$
$\Rightarrow x^2 - y^2 = 4$
It is a rectangular hyperbola.

78. (C) $\lim_{x\to\infty} \frac{\sin x}{x} = \frac{1}{\infty} \times (-1 \text{ to } 1) = 0$

$[\because -1 \le \sin x \le 1]$

79. (C) $y = e^x (b \sin x + a \cos x)$ ...(i)
On differentiating both side w. r. t. 'x'

$\Rightarrow \frac{dy}{dx} = e^x(b\cos x - a \sin x) + e^x(b \sin x + a \cos x)$

$\Rightarrow \frac{dy}{dx} = e^x(b\cos x - a \sin x) + y$ ...(ii)

Again, differentiating

$\Rightarrow \frac{d^2y}{dx^2} = e^x(-b \sin x - a \cos x) + e^x(b\cos x - a \sin x) + \frac{dy}{dx}$

$\Rightarrow \frac{d^2y}{dx^2} = -e^x(b \sin x + a \cos x) + \frac{dy}{dx} - y + \frac{dy}{dx}$

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

$\Rightarrow \frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$

80. (B) $z = \frac{1+i}{1+2i} + \frac{2-2i}{3-i}$

$z = \frac{(1+i)(1-2i)}{(1+2i)(1-2i)} + \frac{(2-2i)(3+i)}{(3-i)(3+i)}$

$z = \frac{3-i}{5} + \frac{8-4i}{10} = \frac{7-3i}{5}$

$\bar{z} = \frac{7+3i}{5}$

Now, $(z^2 - z\bar{z}) = z(z - \bar{z})$

$\Rightarrow (z^2 - z\bar{z}) = \frac{7-3i}{5}\left(\frac{7-3i}{5} - \frac{7+3i}{5}\right)$

$\Rightarrow (z^2 - z\bar{z}) = \frac{7-3i}{5}\left(\frac{-6i}{5}\right)$

$\Rightarrow (z^2 - z\bar{z}) = \frac{-42i + 18i^2}{25}$

$\Rightarrow (z^2 - z\bar{z}) = \frac{-42i - 18}{25} = -\frac{18+42i}{25}$

81. (B) Given that $\vec{a} = 2\hat{i} + 6\hat{j} - 3\hat{k}$ and

$\vec{b} = 8\hat{i} - 12\hat{j} + 9\hat{k}$

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

$= \left|\frac{2\times 8 + 6\times(-12) - 3\times 9}{\sqrt{8^2 + (-12)^2 + 9^2}}\right|$

$= \left|\frac{16 - 72 - 27}{17}\right| = \frac{83}{17}$

82. (C)

83. (B) $\begin{bmatrix} 1 & 2 & -4 \\ 2 & -1 & 0 \\ -3 & -4 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 16 \\ 7 \\ 16 \end{bmatrix}$

Using elementary method

$$[A/B] = \left[\begin{array}{ccc|c} 1 & 2 & -4 & 16 \\ 2 & -1 & 0 & 7 \\ -3 & -4 & -2 & 16 \end{array}\right]$$

$R_2 \to R_2 - 2R_1$, R_3 R_3 + $3R_1$

$$[A/B] = \left[\begin{array}{ccc|c} 1 & 2 & -4 & 16 \\ 0 & -5 & 8 & -25 \\ 0 & 2 & -14 & 64 \end{array}\right]$$

$R_3 \to R_3 + \frac{2}{5} R_2$

$$[A/B] = \left[\begin{array}{ccc|c} 1 & 2 & -4 & 16 \\ 0 & -5 & 8 & -25 \\ 0 & 0 & \frac{-54}{5} & 54 \end{array}\right]$$

Now, $x + 2y - 4z = 16$ .....(i)

$5y + 8z = 25$ ....(ii)

$-\frac{54}{5}z = 54$ ...(iii)

On solving

$x = 2, y = -3, z = -5$

Hence $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ -3 \\ -5 \end{bmatrix}$

84. (C) $(\log_2 x)(\log_3 9) = \log_5 y$

$(\log_2 x)(\log_3 3^2) = \log_5 y$

$2(\log_2 x)(\log_3 3) = \log_5 y$

$(\log_2 x^2) = \log_5 y$ or $(\log_2 x)(\log_3 3) = \frac{1}{2}\log_5 y$

$x^2 = 2$ and $y = 5$ or $(\log_2 x) = \log_5 \sqrt{y}$

$x = \sqrt{2}$ and $y = 5$ or $x = 2$ and $\sqrt{y} = 5$

$x = \sqrt{2}$ and $y = 5$ or $x = 2$ and $y = 25$

85. (A) $x = a\sec\alpha.\cos\beta$, $y = b\tan\alpha$, $z = c\sec\alpha.\sin\beta$

Now, $\frac{x^2}{a^2} - \frac{y^2}{b^2} + \frac{z^2}{c^2}$

$\Rightarrow \frac{a^2\sec^2\alpha - \cos^2\beta}{a^2} - \frac{b^2\tan^2\alpha}{b^2} + \frac{c^2\sec^2\alpha.\sin^2\beta}{c^2}$

$\Rightarrow \sec^2\alpha.\cos^2\beta - \tan^2\alpha + \sec^2\alpha.\sin^2\beta$

$\Rightarrow \sec^2\alpha.\cos^2\beta + \sec^2\alpha.\sin^2\beta - \tan^2\alpha$

$\Rightarrow \sec^2\alpha(\cos^2\beta + \sin^2\beta) - \tan^2\alpha$ $[\because \sin^2 A + \cos^2 A = 1]$

$\Rightarrow \sec^2\alpha - \tan^2\alpha$ $[\because \sec^2 A - \tan^2 A = 1]$

86. (B) $\frac{1+\cos(B-C)\cos A}{1+\cos(B-A)\cos C}$

$\Rightarrow \frac{1+\cos(B-C).\cos[180-(B+C)]}{1+\cos(B-A).\cos[180-(B+A)]}$

$\Rightarrow \frac{1-\cos(B-C).\cos(B+C)}{1-\cos(B-A).\cos(B+A)}$

We know that

$\cos(\alpha+\beta).\cos(\alpha-\beta) = \cos^2\alpha - \sin^2\beta$

$\Rightarrow \frac{1-\cos^2 B+\sin^2 C}{1-\cos^2 B+\sin^2 A}$

$\Rightarrow \frac{\sin^2 B+\sin^2 C}{\sin^2 B+\sin^2 A}$

$\Rightarrow \frac{b^2+c^2}{b^2+a^2}$ [by Sine Rule]

87. (C) Equations

$x - y + 2z = 4$

$2x + y - 3z = 5$

$x + y + z = 13$

$A = \begin{bmatrix} 1 & -1 & 2 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$, $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, $B = \begin{bmatrix} 4 \\ 5 \\ 13 \end{bmatrix}$

Using elementary method

$$[A/B] = \left[\begin{array}{ccc|c} 1 & -1 & 2 & 4 \\ 2 & 1 & -3 & 5 \\ 1 & 1 & -1 & 13 \end{array}\right]$$

$R_2 \to R_2 - 2R_1$, $R_3 \to R_3 - R_1$

$$[A/B] = \left[\begin{array}{ccc|c} 1 & -1 & 2 & 4 \\ 2 & 1 & -3 & 5 \\ 1 & 1 & -1 & 13 \end{array}\right]$$

$R_3 \to R_3 - \frac{2}{3} R_2$

$$[A/B] = \left[\begin{array}{ccc|c} 1 & -1 & 2 & 4 \\ 0 & 3 & -7 & -3 \\ 0 & 0 & \frac{11}{3} & 11 \end{array}\right]$$

$x - y + 2z = 4$ ....(i)

$3y - 7z = -3$ ...(ii)

$\frac{11}{3}z = 11$ ...(iii)

On solving

$x = 4, y = 6, z = 3$

88. (C) $f(x) = ax + \frac{\sqrt{a}}{x}$

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

$f'(x) = a - \frac{\sqrt{a}}{x^2}$

$f'(a) = a - \frac{\sqrt{a}}{a^2}$

$f(a) = a - \frac{1}{a^{3/2}} = \frac{a^{5/2}-1}{a^{3/2}}$

89. (C) $I = \int \frac{x^4-1}{x^2\sqrt{x^4+x^2+1}}dx$

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

$I = \int \frac{x - \frac{1}{x^3}}{\sqrt{x^2+\frac{1}{x^2}+1}}dx$

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

$\left(2x - \frac{2}{x^3}\right) dx = dt$

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

$I = \frac{1}{2}\int \frac{1}{\sqrt{t}} dt$

$I = \frac{1}{2} \frac{t^{1/2}}{1/2} + C$

$I = \sqrt{t} + C \Rightarrow I = \sqrt{x^2 + \frac{1}{x^2} + 1} + C$

90. (A) $I_n = \int_0^{\pi/4} \tan^n x\, dx$

$I_n = \int_0^{\pi/4} (\tan x)^{n-2} \tan^2 x\, dx$

$I_n = \int_0^{\pi/4} (\tan x)^{n-2} (\sec^2 x - 1) dx$

$I_n = \int_o^{\pi/4} (\tan x)^{n-2} \sec^2 x\, dx - \int_o^{\pi/4} (\tan x)^{n-2} dx$

$I_n = \left[\frac{(\tan x)^{n-2+1}}{n-2+1}\right]_0^{\pi/4} - I_{n-2}$

$I_n + I_{n-2} = \left[\frac{(1)^{n-1}}{n-1} - 0\right]$

$I_n + I_{n-2} = \frac{1}{n-1}$

91. (D) Given that

$|\vec{a}| = \frac{7}{4}$, $|\vec{b}| = 8$ and $\vec{a} \times \vec{b} = 5\hat{i} - 3\hat{j} + 8\hat{k}$

Now,

$|\vec{a} \times \vec{b}| = |\vec{a}|\ |\vec{b}| \sin\theta$

$\Rightarrow \sqrt{5^2 + (-3)^2 + 8^2} = \frac{7}{4} \times 8 \times \sin\theta$

$\Rightarrow \sqrt{98} = 7 \times 2 \sin\theta$

$\Rightarrow 7\sqrt{2} = 7 \times 2 \sin\theta$

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

92. (B)

age	x	f	$f \times x$
20 – 30	25	5	125
30 – 40	35	6	210
40 – 50	45	8	360
50 – 60	55	9	495
60 – 70	65	2	130
		$\sum f = 30$	1320

Mean age = $\frac{\sum f \times x}{\sum f}$

Mean age = $\frac{1320}{30} = 44$

93. (C) In the expansion of $\left(\frac{x}{5} - \frac{5}{x}\right)^{10}$

Middle term = $\left(\frac{10}{2}+1\right)^{th} = 6^{th}$

$T_6 = T_{5+1} = {}^{10}C_5 \left(\frac{x}{5}\right)^5 \left(-\frac{5}{x}\right)^5 = -252$

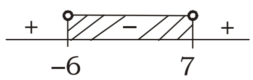
94. (A) Given that $f(x) = \frac{1}{\sqrt{\log_e(43 + x - x^2)}}$

$\log_e (43 + x - x^2) > 0$

$\Rightarrow 43 + x - x^2 > 1$

$\Rightarrow x^2 - x - 42 < 0$

$\Rightarrow (x - 7)(x + 6) < 0$



$x \in (-6, 7)$

95. (B) $y = x^y$

taking log both side

$\Rightarrow \log y = y \log x$

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

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

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

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

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

96. (A) We know that

$$\sinh A + \sinh B = 2\sinh\frac{A+B}{2} . \cosh\frac{A-B}{2}$$

and $\cosh A - \cosh B = 2\sinh\frac{A+B}{2} . \sinh\frac{A-B}{2}$

Now, $\frac{\sinh x + \sinh y}{\cosh x - \cosh y}$

$$\Rightarrow \frac{2\sinh\frac{x+y}{2}.\cosh\frac{x-y}{2}}{2\sinh\frac{x+y}{2}.\sinh\frac{x-y}{2}} = \coth\frac{x-y}{2}$$

97. (C) $\lim_{x\to\frac{\pi}{2}} (\sin x)^{\tan x}$

We know that

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

$$\Rightarrow e^{\lim_{x\to\pi/2} \tan x(\sin x - 1)}$$

$$\Rightarrow e^{\lim_{x\to\pi/2} \frac{\sin x(\sin x - 1)}{\cos x}} \qquad \left[\frac{0}{0}\right] \text{form}$$

by L - Hospital's Rule

$$\Rightarrow e^{\lim_{x\to\pi/2} \frac{\sin x.\cos x + (\sin x - 1)\cos x}{-\sin x}}$$

$$\Rightarrow e^{\frac{\sin\frac{\pi}{2}.\cos\frac{\pi}{2} + \left(\sin\frac{\pi}{2} - 1\right)\cos\frac{\pi}{2}}{\sin\frac{\pi}{2}}}$$

$\Rightarrow e^0 = 1$

98. (D) Three-digit odd numbers

101, 103, 105, 107............999

Now, $l = a + (n - 1)d$

$999 = 101 + (n - 1) \times 2$

$898 = (n - 1) \times 2 \Rightarrow n = 450$

$$\text{Sum} = \frac{n}{2}[2a + (n-1)d]$$

$$= \frac{450}{2}[2 \times 101 + (450-1) \times 2]$$

$= 450 [101 + 449]$

$= 450 \times 550 = 247500$

99. (D)

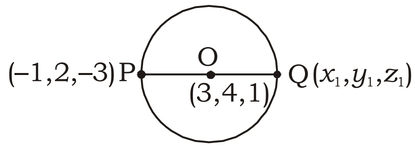
100. (D) equation of sphere

$x^2 + y^2 + z^2 - 6x - 8y - 2z + 6 = 0$

$u = -3,\ u = -4,\ w = -1$

centre = (3, 4, 1)

Let co-ordinate of Q = (x_1, y_1, z_1)



co-ordinate of mid-point of line PQ

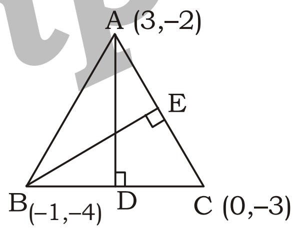
$3 = \frac{x_1 - 1}{2} \Rightarrow x_1 = 7$

$4 = \frac{y_1 + 2}{2} \Rightarrow y_1 = 6$

$1 = \frac{z_1 - 3}{2} \Rightarrow z_1 = 5$

Hence end point of its diameter = (7,6,5)

101. (C)



slope of line BC = $\frac{-3+4}{0+1} = 1$

slope of line AD = $\frac{-1}{1} = -1$

equation of line AD

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

$x + y = 1$ ...(i)

slope of line AC = $\frac{-3+2}{0-3} = \frac{-1}{-3} = \frac{1}{3}$

slope of line BE = $\frac{-1}{1/3} = -3$

equation of line BE

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

$3x + y = -7$ ...(ii)

from eq (i) and eq(ii)

$x = -4,\ y = 5$

Intersection point of line BE and AD is orthocenter.

Hence orthocentre = (–4, 5)

102. (A)

103. (B) Point $(2k-1,\ k^r)$

Now, $2k-1 = k^r)$

$\Rightarrow k = 1$ for $r \in R$

104. (B) $8\cos\frac{2\pi}{15}.\cos\frac{4\pi}{15}.\cos\frac{8\pi}{15}.\cos\frac{16\pi}{15}$

$\Rightarrow \frac{4\times 2\sin\frac{2\pi}{15}.\cos\frac{2\pi}{15}}{\sin\frac{2\pi}{15}}.\cos\frac{4\pi}{15}.\cos\frac{8\pi}{15}.\cos\frac{16\pi}{15}$

$\Rightarrow \frac{4\times\sin\frac{4\pi}{15}}{\sin\frac{2\pi}{15}}.\cos\frac{4\pi}{15}.\cos\frac{8\pi}{15}.\cos\frac{16\pi}{15}$

$\Rightarrow \frac{2}{\sin\frac{2\pi}{15}}\times 2\sin\frac{4\pi}{15}.\cos\frac{4\pi}{15}.\cos\frac{8\pi}{15}.\cos\frac{16\pi}{15}$

$\Rightarrow \frac{2}{\sin\frac{2\pi}{15}}\times\sin\frac{8\pi}{15}.\cos\frac{8\pi}{15}.\cos\frac{16\pi}{15}$

$\Rightarrow \frac{1}{\sin\frac{2\pi}{15}}\times\sin\frac{16\pi}{15}.\cos\frac{16\pi}{15}$

$\Rightarrow \frac{1}{2\sin\frac{2\pi}{15}}\times 2\sin\frac{16\pi}{15}.\cos\frac{16\pi}{15}$

$\Rightarrow \frac{1}{2\sin\frac{2\pi}{15}}.\sin\frac{32\pi}{15}$

$\Rightarrow \frac{1}{2\sin\frac{2\pi}{15}}.\sin\left(2\pi+\frac{2\pi}{15}\right)$

$\Rightarrow \frac{1}{2\sin\frac{2\pi}{15}}.\sin\frac{2\pi}{15}$

$= \frac{1}{2}$

105. (B) ${}^{23}C_4 + \sum_{r=1}^{4} {}^{22+r}C_3$

$\Rightarrow {}^{23}C_4 + {}^{23}C_3 + {}^{24}C_3 + {}^{25}C_3 + {}^{26}C_3$

We know that

${}^{n}C_r + {}^{n}C_{r-1} = {}^{n+1}C_r$

$\Rightarrow {}^{24}C_4 + {}^{24}C_3 + {}^{25}C_3 + {}^{26}C_3$

$\Rightarrow {}^{25}C_4 + {}^{25}C_3 + {}^{26}C_3$

$\Rightarrow {}^{26}C_4 + {}^{26}C_3 = {}^{27}C_4$

106. (B) $\cos(x - iy) = A + iB$

$\Rightarrow \cos x.\cos iy + \sin x.\sin iy = A + iB$

We know that

$\cos iA = \cosh A$ and $\sin iA = i\sinh A$

$\Rightarrow \cos x.\cosh y + i\sin x.\sinh y = A + iB$

On comparing

$A = \cos x.\cosh y,\ B = \sin x.\sinh y$

107. (A) line $6x - 8y = 4$ ...(i)

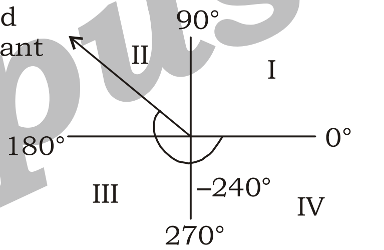
and $16y - 12x = 9$

$\Rightarrow 6x - 8y = \frac{-9}{2}$ ...(ii)

Distance $= \frac{4+\frac{9}{2}}{\sqrt{6^2+(-8)^2}} = \frac{17}{2\times 10}$

$= \frac{17}{20}$

108. (B) Second quadrant



109. (A)

110. (C) $A = \begin{bmatrix} 3 & 0 & 3 \\ 5 & -8 & 2 \\ -2 & 3 & -1 \end{bmatrix}$

$|A| = 3(8-6) + 3(15-16)$

$= 6 - 3 = 3$

Now, $(\text{Adj}A) = |A|^{n-2}A$ where n is order.

$\text{adj}(\text{adj } A) = |A|^{3-2}A$

$= |A|.A = 3A$

$\det(\text{adj}(\text{adj}A)) = |3A| = 3\,|A|$

$= 3 \times 3 = 9$

111. (B)

112. (B) We Know that

$\omega^2 = \frac{-1-i\sqrt{3}}{2}$

Now, $(-1-i\sqrt{3})^{51} = 2^{51}\left(\frac{-1-i\sqrt{3}}{2}\right)^{51}$

$= 2^{51}(\omega^2)^{51}$

$= 2^{51}\times\omega^{3\times 34}$

$= 2^{51}$ $\left[\because \omega^3 = 1\right]$

113. (C) equation $bx^2 + cx + a = 0$

$$\alpha + \beta = \frac{-c}{b}$$

$$\alpha.\beta = \frac{a}{b}$$

Now, $(b\alpha - a)(b\beta - a)$

$\Rightarrow b^2\alpha\beta - ab\beta - ab\alpha + a^2$

$\Rightarrow b^2 \times \alpha.\beta - ab(\alpha + \beta) + a^2$

$$\Rightarrow b^2 \times \frac{a}{b} - ab \times \left(\frac{-c}{b}\right) + a^2$$

$\Rightarrow ab + ac + a^2$

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

114. (B)

115. (B) $dy = y \tan x\, dx$

$$\Rightarrow \frac{dy}{y} = \tan x\, dx$$

On integrating both side

$\log y = \log\sec x + \log c$

$y = c.\sec x$ ...(i)

its passes through the point (0,1)

$1 = c.\sec 0$

$\Rightarrow c = 1$

from eq(i)

$y = \sec x$

116. (D) $\cot(-1740) = -\cot(1740)$

$= -\cot(360 \times 5 - 60)$

$$= \cot 60 = \frac{1}{\sqrt{3}}$$

117. (D) $\begin{vmatrix} a^2 & b+c & a \\ b^2 & c+a & b \\ c^2 & a+b & c \end{vmatrix}$

$C_2 \to C_2 + C_3$

$$\Rightarrow \begin{vmatrix} a^2 & a+b+c & a \\ b^2 & a+b+c & b \\ c^2 & a+b+c & c \end{vmatrix}$$

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

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

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

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

$R_3 \to R_3 - R_2$

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

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

$\Rightarrow (a+b+c)(a-b)(b-c)(c-a)[-1(-1)]$

$= (a+b+c)(a-b)(b-c)(c-a)$

118. (B) $\tan\theta = \frac{-4}{3}$

$\Rightarrow \theta \in$ II quad or IV quad

$\therefore 0 < \sin\theta < 1$ or $-1 < \sin\theta < 0$

$\therefore \sin\theta$ may be $\frac{4}{5}$ or $-\frac{4}{5}$

119. (B) The given equation is

$\sin x - 3\sin 2x + \sin 3x = \cos x - 3\cos 2x + \cos 3x$

$\Rightarrow 2\sin 2x\cos x - 3\sin 2x = 2\cos 2x\cos x - 3\cos 2x$

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

$\Rightarrow \sin 2x = \cos 2x \quad \left(as \cos x \neq \frac{3}{2}\right)$

$\Rightarrow \tan 2x = 1$

$$\Rightarrow 2x = n\pi + \frac{\pi}{4}$$

$$\Rightarrow x = \frac{n\pi}{2} + \frac{\pi}{8}$$

120. (B) $\frac{\cos^2 6A}{\cos^2 2A} - \frac{\sin^2 6A}{\sin^2 2A} = \left(\frac{\cos 6A}{\cos 2A}\right)^2 - \left(\frac{\sin 6A}{\sin 2A}\right)^2$

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

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

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

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

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

$\Rightarrow (\cos^2 2A - \sin^2 2A)(16 - 24) = -8\cos 4A$

NDA (MATHS) MOCK TEST - 180 (Answer Key)

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

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