(197) $\frac{dy}{dx}=\left(\frac{y}{x}\right)^{1/3}$

$\frac{dy}{y^{1/3}}=\frac{dx}{x^{1/3}}$

$\int y^{-1/3}dy=\int x^{-1/3}dx$

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

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

$y^{2/3}-x^{2/3}=c$ Ans(c)

(198) $\frac{dy}{dx}+\frac{y}{x}=x^3-3$

$P=\frac{1}{x}\quad Q=x^3-3$

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

$=e^{\log x}=x$

Ans(3) =

(199) $\begin{vmatrix}1 & 3 & -2\\ 2 & -1 & 4\\ 3 & 2 & x\end{vmatrix}=0$

$1(-x-8)-3(2x-12)-2(4+3)$

$-x-8-6x+36-14=0$

$-7x+14=0$

$\boxed{x=2}$ Ans(4)

(200) $\vec{p}\cdot\vec{q}=0$

$(3\vec{a}-5\vec{b})\cdot(\vec{a}+\vec{b})=0$

$3|a|^2-5\vec{a}\cdot\vec{b}+3\vec{a}\cdot\vec{b}-5|b|^2=0$

$-2-2\vec{a}\cdot\vec{b}=0$

$\vec{a}\cdot\vec{b}=-1$

$\vec{a}$ and $\vec{b}$ are opposite side weight.

Ans(2)

(116)

PROBABILITY

Total no = 11

2B I - 2

= 9

$S(A)=9_{C_1}$

$4=a,9,e,o$

$F(A)=3_{C_1}$

$P(A)=\frac{F(A)}{S(A)}=\frac{3}{9}$

$=\frac{1}{3}$ Ans(1)

Ans(1)

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

$= -\frac{2}{3} \log\left\{\frac{1-\sqrt{1-x^3}}{1+\sqrt{1-x^3}}\right\}$

$= \frac{2}{3} \log\left\{\frac{\sqrt{1+x^3}-1}{\sqrt{1-x^3}+1}\right\}$

$= \frac{2}{3} \log\left\{\frac{\sqrt{1+x^3}-1}{\sqrt{1+x^3}+1}\right\}$ Ans

(192) $\int_2^3 \frac{dx}{x^2-x} = \int_2^3 \frac{dx}{x(x-1)}$

$\left[-\log x + \log(x-1)\right]_2^3$

$\left[\log\left(\frac{x-1}{x}\right)\right]_2^3$

$\log\left(\frac{3-1}{3}\right) - \log\frac{1}{2}$

$\log\frac{2}{3} - \log 1/2$

$\Rightarrow \log\frac{\frac{2}{3}}{\frac{1}{2}} = \log\frac{4}{3}$

Ans(c)

(193) $\int e^x [f(x) + f'(x)] dx$

$= e^x \sin x + c$

$f(x) = \sin x$

Ans(2)

(194) $2x\frac{dy}{dx} = y+3$

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

$\log(y+3) = \frac{1}{2}\log x + c$

$\log(y+3) = \log\sqrt{x} + c$

$\log\frac{y+3}{\sqrt{x}} = \log c$

$y+3 = c\sqrt{x}$

$\boxed{(y+3)^2 = xc^2}$ Ans(3)

parabola.

(195) $y = A\cos\alpha x + B\sin\alpha x$

$\frac{dy}{dx} = A\alpha\, \cancel{-\sin\alpha x} + B\alpha\cos\alpha x$

$\frac{dy}{dx} = \alpha(-A\sin\alpha x + B\cos\alpha x$

$\frac{d^2y}{dx^2} = -\alpha^2 y$

$\frac{d^2y}{dx^2} + \alpha^2 y = 0$ Ans(2)

(196) $y^2 = x \qquad 4a = 1$

$\boxed{a = 1/4}$

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

$m = 1/2$

Area of bounded region

$= \frac{8a^2}{3m^3}$

$= \frac{\cancel{8}^{4}}{3} \times \frac{1}{\cancel{16}\cancel{2}}\cancel{8}^{} = \frac{4}{3}$ Ans

(186)

$$F(x) = \frac{x}{4+x+x^2}$$

$$F'(x) = \frac{(x^2+x+4) - x(2x+1)}{(x^2+x+4)^2}$$

$$= \frac{x^2+\cancel{x}+4-2x^2-\cancel{x}}{(x^2+x+4)^2}$$

$$F'(x) = \frac{4-x^2}{(x^2+x+4)^2}$$

$$F''(x) = \frac{(x^2+x+4)^2 \times -2x - (4-x^2) \times 2(x^2+x+4) \times (2x+1)}{(x^2+x+4)^4}$$

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

at $x=1$ then

$F''(x) < 0$ maximum value

then

$F(x)$ is maximum

$= \frac{1}{6}$ Ans(3)

(187)

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

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

$$\frac{dy}{dx}_{(1,1/2)} = 1$$

equn of tangent

$$y - 1/2 = 1(x-1)$$

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

$$x - y - 1/2 = 0$$

$$\tan\theta = 1$$

$\theta = \pi/4 = 45^\circ$ Ans(2)

(188) equation of curve parallel to x-axis

$$y = c$$

$\frac{dy}{dx} = 0 \Rightarrow$ slope of tangent

slope of normal

$$\boxed{\frac{dx}{dy} = 0}$$ Ans(4)

(189)

$$\underbrace{x^{12} - x^9 + x^4 - x + 1}_{(+ve)} > 0$$

$$x^{12} + x^9 + x^4 + x + 1 > 0$$

no-roots

only real roots

then $-\infty < x < \infty$

Ans(4)

(190)

$$\int \frac{dx}{e^x - 1}$$

$$\int \frac{e^{-x}\,dx}{1-e^{-x}}$$

put $1 - e^{-x} = t$

$$e^{-x}\,dx = dt$$

$$\int \frac{dt}{t} = \log t + c$$

$= \log(1-e^{-x}) + C$ Ans(3)

(191)

$$\int \frac{x^2\,dx}{x^3\sqrt{1-x^3}}$$

put $1 - x^3 = t^2 \Rightarrow -3x^2\,dx = 2t\,dt$

$$x^2\,dx = \frac{-2}{3} t\,dt$$

$$\frac{-2}{3}\int \frac{\cancel{t}\,dt}{(1-t^2)\sqrt{\cancel{t^2}}} = \frac{-2}{3}\int \frac{dt}{1-t^2}$$

$\frac{3}{5} = 1 - 2\sin^2\theta/2$

$2\sin^2\theta = 1 - \frac{3}{5} = \frac{2}{5}$

$\sin^2\theta = \frac{1}{5}$

$\sin\theta = \pm\frac{1}{\sqrt{5}}$

जब $\cos\theta$ ऋ(-ve) होगा।

$\sin\theta = \frac{1}{\sqrt{5}}$ Ans(1)

(180) $y = \sqrt{y + \sin x}$

$y^2 = y + \sin x$

$2y\frac{dy}{dx} - \frac{dy}{dx} = \cos x$

$\boxed{\frac{dy}{dx} = \frac{\cos x}{2y-1}}$ Ans(3)

(181) $x = \sin^{-1}(3t - 4t^3)$

put $t = \sin\theta$

$x = \sin^{-1}(3\sin\theta - 4\sin^3\theta)$

$x = 3\theta$

$y = \cos^{-1}\sqrt{1-t^2}$

$= \cos^{-1}\sqrt{1-\sin^2\theta}$

$y = \theta$

$\frac{dy}{d\theta} = 1 \quad \frac{dx}{d\theta} = 3$

$\frac{dy}{dx} = \frac{dy/d\theta}{dx/d\theta} = \frac{1}{3}$

$\boxed{\frac{dy}{dx} = \frac{1}{3}}$ Ans(4)

(182) $\lim_{x\to\infty} \frac{\sqrt{x^2-1}}{2x+1}$

$\lim_{x\to\infty} \frac{\cancel{x}\sqrt{1-1/x^2}}{\cancel{x}(2+1/x)} = \frac{1}{2}$ Ans(4)

(183)

$\frac{d}{dx}\cos^{-1}x = -\frac{1}{\sqrt{1-x^2}}$

where $-1 \le x \le 1$ Ans(●)

(184)

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

put $x = \tan\theta$

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

$\tan^{-1}\left(\frac{1-\cos\theta}{\sin\theta}\right)$

$\tan^{-1}\left(\frac{\cancel{1}-\cancel{1}+\cancel{2}\sin^2\theta/2}{\cancel{2}\sin\theta/2\cos\theta/2}\right)$

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

$\frac{dy_1}{d\theta} = \theta/2 = \frac{1}{2}$

$\frac{dy_2}{d\theta} = 1$

$\frac{dy_1}{dy_2} = \frac{1}{2}$ Ans(3)

(185) $F(x) = \frac{1}{x+1} - \log(x+1)$

$F'(x) = -\frac{1}{(x+1)^2} - \frac{1}{(x+1)}$

$F'(x) = -\left[\frac{1+(x+1)}{(x+1)}\right]$

$F'(x) = -\left[\frac{x+2}{(x+1)^2}\right]$

$F'(x) < 0$ for Decresing function.

Ans(a)

$3\cos\theta = 3 - 4(1-\cos^2\theta)$

$3\cos\theta = 3 - 4 + 4\cos^2\theta$

$4\cos^2\theta - 3\cos\theta - 1 = 0$

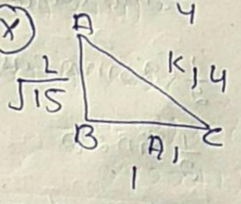
$4\cos^2\theta - 4\cos\theta + \cos\theta - 1 = 0$

$4\cos\theta(\cos\theta - 1) + 1(\cos\theta - 1) = 0$

$\cos\theta = 1 \quad \cos\theta = -1/4$

$\cos\theta = \frac{-1}{4}$

$\cos\theta = 1$ (×)



$\cos\theta = \frac{-1}{4}$

$\sin\theta = \frac{\sqrt{15}}{4}$

$\sin 2\theta = 2 \times \sin\theta \cos\theta$

$= \cancel{2} \times \frac{\sqrt{15}}{\cancel{4}_2} \times -\frac{1}{4}$

$= -\frac{\sqrt{15}}{8}$ Ans(×)

(175) $\cos^{-1}(1/2) + 2\sin^{-1}(1/2)$

$\frac{\pi}{3} + \frac{\pi}{3} = \frac{2\pi}{3}$

(176) $B = 2\sin^2 x - \cos 2x$

$B = 2\sin^2 x - \cos^2 x + \sin^2 x$

$= 2\sin^2 x - (1 - 2\sin^2 x)$

$= 2\sin^2 x - 1 + 2\sin^2 x$

$= 4\sin^2 x - 1$

$\therefore -1 \le \sin x \le 1$

$0 \le \sin^2 x \le 1$

$0 \le 4\sin^2 x \le 4$

$-1 \le 4\sin^2 x - 1 \le 3$

$-1 \le B \le 3$

Ans(1)

(177) $\sin^{-1}x = \pi/5 \quad \cos^{-1}x$

$\sin^{-1}x + \cos^{-1}x = \pi/2$

$\cos^{-1}x = \frac{\pi}{2} - \frac{\pi}{5}$

$= \frac{5\pi - 2\pi}{10} = \frac{3\pi}{10}$ Ans(2)

(178) $\tan^{-1}(1+x) + \tan^{-1}(1-x) = \pi/2$

$\tan^{-1}\left\{\frac{1+\cancel{x}+1-\cancel{x}}{1-(1-x^2)}\right\} = \pi/2$

$\tan^{-1}\left[\frac{2}{\cancel{1}-\cancel{1}+x^2}\right] = \pi/2$

$\frac{2}{x^2} = \infty$

$\frac{2}{x^2} = \frac{1}{0}$

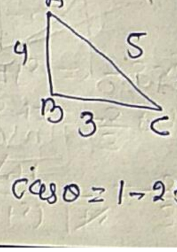
$x^2 = 0 \Rightarrow \boxed{x=0}$ Ans(3)

(179) $\sin\left[\frac{1}{2}\cot^{-1}(-3/4)\right]$

$\cot^{-1}(-3/4) = \theta$

$\cot\theta = -\frac{3}{4}$

$\cos\theta = \frac{3}{5}$



$\sin\theta/2$

$\cos\theta = 1 - 2\sin^2\theta/2$

(168) $2x^2-7xy+3y^2=0$

$a=2,\ h=-7/2\ \ b=3$

$$\tan\theta=\frac{2\sqrt{h^2-ab}}{a+b}$$

$$=\frac{2\sqrt{\frac{49}{4}-6}}{2+3}$$

$$=\frac{2\sqrt{\frac{49-24}{4}}}{5}$$

$$=\frac{\cancel{2}\times\cancel{5}}{\cancel{2}\ \cancel{5}}=1$$

$\theta=\tan^{-1}(1)=\pi/4$

Ans(1)

(169)

$x^2+y^2-3x+4y+k/2=0$

point circle is know as Radius are equal to zero

$\sqrt{\frac{9}{4}+4-k/2}$

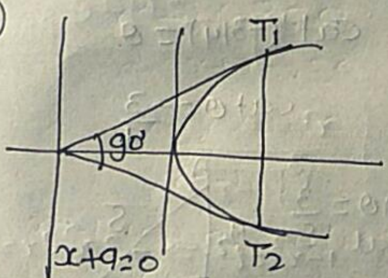
$\Rightarrow\sqrt{\frac{25}{4}-\frac{k}{2}}=0$

$\cancel{k=\frac{25}{2}}$

$\frac{k}{2}=\frac{25}{4}$

$\boxed{k=\frac{25}{2}}$ Ans(3)

(170)



Ans(2)

(171)

$$\frac{x^2}{9}+\frac{y^2}{5}=1\qquad \frac{2b^2}{a}$$

length of latus Rectum

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

$$=\frac{2\times5}{3}=\frac{10}{3}$$ Ans(1)

(172)

$\sin\theta\cos\theta$ is maximum

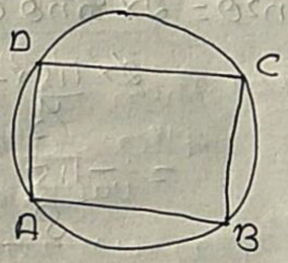
$\frac{1}{2}(2\sin\theta\cos\theta)$

$\frac{1}{2}\sin2\theta$ $\quad\because\sin2\theta$ is maxi $\theta=\pi/4$

$\frac{1}{2}\sin\cancel{2}\times\pi/\cancel{4}_2=\frac{1}{2}\times1=\frac{1}{2}$

Ans(2)

(173)



$A+C=180$

$B+D=180$

$D=180-B$

$\cos D=\cos(180-B)$

$\cos B+\cos(180-B)$

$\cos B-\cos B=0$

Ans(4)

(174)

$3\sin2\theta=2\sin3\theta$

$\cancel{2}\times3\,\cancel{\sin\theta}\cos\theta=\cancel{2}(3\sin\theta-4\sin^3\theta)$

$3\cos\theta=(3-4\sin^2\theta)$

$$\begin{vmatrix} 0 & -2c & -2b \\ b & c+a & b \\ c & c & a+b \end{vmatrix}$$

$$+2c(ab+b^2-bc)-2b(bc-c^2-ac)$$

$$2abc+\cancel{2b^2c}-\cancel{2bc^2}-\cancel{2b^2c}+\cancel{2bc^2}+2abc$$

$$=4abc$$ Ans( )

(163) $$\Delta = \begin{vmatrix} 5 & 15 & -25 \\ 7 & 21 & 30 \\ 8 & 24 & 42 \end{vmatrix}$$

$$C_1 \to 3C_1 - C_2$$

$$\begin{vmatrix} 0 & 15 & -25 \\ 0 & 21 & 30 \\ 0 & 24 & 42 \end{vmatrix}$$

$$=0$$ Ans(1)

(164) $$xy-x-y+1=0$$

$$x(y-1)-(y-1)=0$$

$$(x-1)(y-1)=0$$

$$x-1=0$$

$$y-1=0$$

$$ax+2y-3=0$$

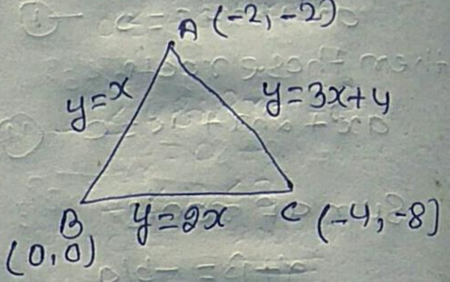
$$\begin{vmatrix} 1 & 0 & -1 \\ 0 & 1 & -1 \\ a & 2 & -3 \end{vmatrix}=0$$

$$1(-3+2)-1(0-a)=0$$

$$-1+a=0$$

$$\boxed{a=1}$$ Ans(4)

(165) $y=x$, $y=2x$, $y=3x+4$



Area of ΔABC

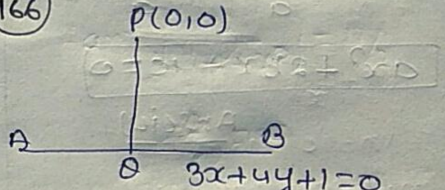
$$\frac{1}{2}\begin{vmatrix} -2 & -2 \\ -4 & -8 \\ -2 & -2 \\ 0 & 0 \end{vmatrix}$$

$$\frac{1}{2}[(0+8+0)-(0+16+0)]$$

$$\frac{1}{2}(8-16) = -\frac{8}{2} = 4 \text{ Units}$$

Ans(1)

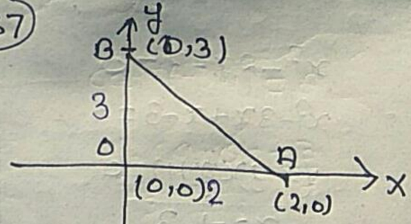
(166)



$$PQ = \frac{3\times 0+4\times 0+1}{\sqrt{9+16}}$$

$$=\frac{1}{5}$$ Ans(1)

(167)



$$OA^2+OB^2=AB^2$$

$$(3)^2+(2)^2 = 3^2+2^2$$

ΔABC are Rightangle Δ.

Ans(2)

158 α, β be roots are

$$ax^2+bx+c=0 \quad -(1)$$

then those roots

$$ax^2+2bx+4c=0 \quad -(11)$$

Sum of roots

$$\alpha+\beta = -b/a$$

$$\alpha\beta = c/a$$

$$2\alpha+2\beta = -\frac{2b}{a}$$

$$4\alpha\beta = 4c/a$$

roots are equn (11) is $\boxed{2\alpha, 2\beta}$

$$x^2-(2\alpha+2\beta)x+4\alpha\beta=0$$

$$x^2-2(\alpha+\beta)x+4\alpha\beta=0$$

$$x^2-2x\frac{-b}{a}x+\frac{4c}{a}=0$$

$$\boxed{ax^2+2bx+4c=0}$$

Ans(iv)

159 $2\log(x+1)-\log(x^2-1)=\log 2$

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

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

$$x^2-2x-3=0$$

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

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

$$\boxed{x=-1, 3}$$

$x=-1$ is not statisfy the equn

Hence $\boxed{x=3}$

Ans(4)

160 $A=\begin{bmatrix}3 & -5\\ -4 & 2\end{bmatrix}$

$$A-\lambda I=\begin{bmatrix}3-\lambda & -5\\ -4 & 2-\lambda\end{bmatrix}$$

$$=(3-\lambda)(2-\lambda)-20$$

$$\Rightarrow 6-2\lambda-3\lambda+\lambda^2-20$$

$$\Rightarrow \lambda^2-5\lambda-14$$

$$\Rightarrow A^2-5A=14I$$

Ans(3)

161 matrix A is such that $A^2=2A-I$ where I is the identity matrix then $n\geq 2$, A^n is equal to

(i) $nA-(n-1)I$

(ii) $nA-I$ (iii) $2^{n-1}A-(n-1)I$

(iv) $2^{n-1}A-I$

Soln:.

162 $\begin{vmatrix}b+c & a & a\\ b & c+a & b\\ c & c & a+b\end{vmatrix}$

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

$$\begin{vmatrix}0 & \cancel{a}-c-\cancel{a}-c & \cancel{a}-b-\cancel{a}-b\\ b & c+a & b\\ c & c & a+b\end{vmatrix}$$

x, y, z are in A.P

$2y = x+z$ —— (1)

$(x+y-z)(y+z-x)$

$\Rightarrow \cancel{xy} + y^2 - \cancel{yz} + xz + \cancel{yz} - z^2 - x^2 - \cancel{xy} + xz$

$\Rightarrow y^2 + 2xz - x^2 - z^2$

$y^2 + 2xz - (x^2+y^2)$

$y^2 + 2xz - \{4y^2 - 2xz) =$

$= 4xz - 3y^2$ Ans (no-match)

(154) A rational number in its lowest terms can be expressed as a terminating decimal iff the denominator has no. prime factor other then

(i) 2 (ii) 5 (iii) 2 and 5

(iv) 2 and 3

Soln:

If in denominator 2 and 5 then term are as a terminating decimal.

Ans (3)

(155) Each prime number has

(i) no-facter

(ii) only one facter

(iii) only two facter

(iv) more then two factor

$2\times1 = 2$ and 1

$3\times1 = 3$ and 1

$5\times1 = 5\times1$

two factor only itself factor and other is one. Ans (iii)

(156) $ix^2 - 2(i+1)x + 2 - i = 0$

one roots $(2-i)$

$\alpha = 2-i \quad \beta =$

$\alpha+\beta = \frac{2(i+1)}{i}$

$\alpha\beta = 2-i$

put $x = -i$

$i(-i)^2 - 2(i+1)x - i + 2 - i = 0$

$i^3 + 2(i^2+i) + 2 - i = 0$

$\cancel{-i} \cancel{-2} + \cancel{2i} + \cancel{2} \cancel{-i} = 0$

$\boxed{\beta = -i}$ Ans (i)

(157) If a and b are odd integer then roots of eqn

$2ax^2 + (2a+b)x + b = 0$

$a \neq 0$ are

(i) rational (ii) irrational

(iii) non-real (iv) equal

Suppose $a=1, b=3$

then $2x^2 + 5x + 3 = 0$

Here $D = 25 - 24 = 1$

$D > 0$ then roots are rational.

Ans (1)

$= {}^9C_6 \left(\frac{3}{2}\right)^3 \left(\frac{-1}{3}\right)^6$

$= {}^9C_6 \times \frac{\cancel{3^3}}{2^3} \times \frac{1}{\cancel{3^6}\, 3^3}$

$= \frac{\cancel{9} \times \cancel{8} \times 7}{3 \times 2 \times 1} \times \frac{1}{\cancel{2^3} \times \cancel{3^3}\, 3}$

$= \frac{7}{18}$ Ans(1)

(148) The two G.m betn 1 and 64 are

(i) 1, 64 (ii) 8, 16

(iii) 4, 16 (iv) 3, 16

Soln:- Suppose G_1, G_2 be G.M.

$1, G_1, G_2, 64$ are in GP.

$T_4 = 64 \Rightarrow ar^3 = 64 \Rightarrow r = 4$

$G_1 = ar = 1 \times 4 = 4$

$G_2 = ar^2 = 1 \times 16 = 16$

G.M = 4, 16 Ans (3)

(149) $\left(x + \frac{1}{x}\right)^{10}$

$n = 10$ even

middle trmes is

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

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

$T_6 = T_{5+1} = {}^{10}C_5\, \cancel{x^5} \times \frac{1}{\cancel{x^5}}$

$= {}^{10}C_5$ Ans(2)

(150) 3, 10, 17 ---- are in A.P

63, 65, 67 ---- are in A.P

$T_p = T_q$ are equal

$3 + (n-1)7 = 63 + (n-1)2$

$3 + 7n - 7 = 63 + 2n - 2$

$7n - 4 = 2n + 61$

$5n = 65$ $\boxed{n = 13}$ Ans(1)

(151) The A.M, G.M and H.m betn two positive number a and b are equal then

(i) $ab = 1$ (ii) $a > b$ (iii) $a < b$

(iv) $a = b$

Given $\frac{a+b}{2} = \sqrt{ab} \Rightarrow (\sqrt{a} - \sqrt{b})^2 = 0$

$\sqrt{a} = \sqrt{b} \Rightarrow a = b$

A.m = G.m = H.m equal होगे जब दोनों संख्याऐं same होगी।

Ans (4)

(152) $x,\ 2x+2,\ 3x+3$ are G.P

$(2x+2)^2 = x \times (3x+3)$

$4x^2 + 4 + 8x = 3x^2 + 3x$

$x^2 + 5x + 4 = 0$

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

$x(x+4) + 1(x+4) = 0$

$(x+4)(x+1) = 0$

$\boxed{x = -1, -4}$

put $x = -1$

$-1, 0, 0$ are not G.P

$x = -4$

$-4,\ -8+2,\ -12+3$

$-4, -6, -9$ are in G.P

$\frac{-6}{-4} = \frac{3}{2}$, $\frac{-9}{-6} = \frac{3}{2}$

$a = -4$, $r = 3/2$, $n = 4$

$T_4 = ar^{n-1} = -4\,(3/2)^3$

$= -\cancel{4} \times \frac{27}{\cancel{8}\,2} = \frac{-27}{2}$

Ans(4)

(153) If x, y, z are in A.P then the value of $(x+y-z)(y+z-x)$ is

(i) $8yz - 3y^2 - 4z^2$ (ii) $4xz + 3y^2$

(iii) $8xy + 4x^2 - 3y^2$ (iv) $8xz - 3y^2$

(141) $|x-1|>5$

$x-1<-5 \quad x<-5+1 \Rightarrow x<-4$

$x\in(-\infty,-4)$

$x-1>5$

$x>6 \Rightarrow x\in(6,\infty)$

$x\in(-\infty,-4)\cup(6,\infty)$ Ans(3)

(142) Given that x, y and a are Real number then $x<y$, $a<0$ then

(i) $\frac{x}{a}<\frac{y}{a}$ (ii) $\frac{x}{a}\le\frac{y}{a}$

(iii) $\frac{x}{a}>\frac{y}{a}$ (iv) $\frac{x}{a}\ge\frac{y}{a}$

$x<y \quad a<0$ (-ve)

Ex $x=1,\ y=3$

$\frac{x}{a}>\frac{y}{a}$

$\boxed{\begin{array}{c} a=-2 \\ 1<3 \\ \frac{-1}{2}>\frac{-3}{2}\end{array}}$

Ans(3)

(143) $-5x+20<-15$

$-5x+35<0$

$5x-35>0$

$x-7>0$

$\boxed{x\in(7,\infty)}$ Ans(~~4~~)(1)

(144) Sum of coffn $(1-x)^{10}$

$(1-x)^{10}={}^{10}C_0-{}^{10}C_1+{}^{10}C_2-{}^{10}C_3+{}^{10}C_4-{}^{10}C_5+\ldots$

$=0$

S.C. put $x=1$

$(1-1)^{10}=0$ Ans(2)

(145) The Expansion of $\frac{1}{\sqrt{6-3x}}$ in power of x is vaild if

(i) $x<2$ (ii) $|x|<2$ (iii) $x>2$

(iv) $|x|>2$

Soln: $(6-3x)^{-1/2}$

$(6)^{-1/2}\left(1-\frac{3x}{6}\right)^{-1/2}$

$(6)^{-1/2}\left(1-\frac{x}{2}\right)^{-1/2}$

$\left|\frac{-x}{2}\right|<1\Rightarrow|x|<2$

Ans(ii)

(146) Fifth trmes from end $\left(\frac{x^3}{2}-\frac{2}{x^2}\right)^{12}$

Formula

अन्त से pवाँ = शुरू से $(n-p+2)$

$=12-5+2=9$th

$T_9=T_{8+1}={}^{12}C_8\left(\frac{x^3}{2}\right)^{12-8}\left(\frac{-2}{x^2}\right)^8$

$=\left(\frac{1}{8}\right)^4\frac{x^{12}(-2)^8}{x^{16}x^4}$

$={}^{12}C_8\frac{2^4}{x^4}$

$=\frac{7920}{x^4}$ Ans(1)

(147) $\left(\frac{3}{2}x^2-\frac{1}{3x}\right)^9$

$T_{r+1}={}^9C_r\left(\frac{3}{2}\right)^{9-r}x^{18-2r}\left(\frac{-1}{3}\right)^r x^{-r}$

$={}^9C_r\left(\frac{3}{2}\right)^{9-r}\left(\frac{-1}{3}\right)^r x^{18-3r}$

trmes independent of x

$18-3r=0$

$3r=18$

$\boxed{r=6}$

(132) The number of possible outcomes when a coin is tossed 6-times is

(i) 36 (ii) 32 (iii) 12 (iv) 64

$n = 6$

$p = \frac{1}{2}$ $q = 1/2$

r = Successive outcomes

$P(r) = \sum_{r=0}^{6} {}^{n}C_{r}\, q^{n-r} \cdot p^{r}$

$= \sum_{r=0}^{6} {}^{6}C_{r} \left(\frac{1}{2}\right)^{6-r} \left(\frac{1}{2}\right)^{r}$

$= 2^6 = 64$

$(p+q)^n = (p+q)^6$

$= 2^n = 2^6 = 64$ Ans(4)

(133) ${}^{n}C_{2} = 66$

$n(n-1) = 132$

$n^2 - n - 132 = 0$

$n^2 - 12n + 11n - 132 = 0$

$n(n-12) + 11(n-12) = 0$

$n = 12, -11$

$\boxed{n = 12}$ Ans(2)

(134) 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

A B C D E F G H I
9 9 8 7 6 5 4 3 2

$9 \times 9!$ Ans(4)

(135) ${}^{n}C_{12} = {}^{n}C_{8}$

$n = 12 + 8 = 20$

$\boxed{n = 20}$

(136) Formula

$|z|^2 = z \cdot \bar{z}$

$(z+3)(\bar{z}+3) = |z+3|^2$

Ans(1)

(137) $\sin\theta + i\cos 2\theta$ and $\cos\theta - i\sin 2\theta$ are conjugate to each other

then $\tan\theta = 1$ $\tan 2\theta = 1$

$\theta = n\pi + \pi/4$ $\theta = \frac{n\pi}{2} + \pi/4$

then not statisfy so no-value of θ Ans(4)

(138) $\left(\frac{1+i}{1-i}\right)^{x} = 1$

$\frac{1 + \cancel{i^2} + 2i}{1 \cancel{+1}}$ $(i)^{x} = 1$

put $x = 4n$ Ans(2)

(139) let $x, y \in R$ then $x+iy$ is a non-real complex number if

(i) $x = 0$ (ii) $y = 0$ (iii) $x \neq 0$ (iv) $y \neq 0$

$x+iy$ is complex number then $y \neq 0$ होगा तभी $x+iy$ एक complex number होगा।

Ans(4)

(140) Formula

$|x| > k$ i.e $x > k$

$x < k$

$|x| > a$

$x > a \Rightarrow x \in (a, \infty)$

$x < -a \Rightarrow x \in (-\infty, -a)$

$x \in (-\infty, -a) \cup (a, \infty)$

Ans(4)

$2 \geq -2\cos x \leq -2$

or

$-2 \leq -2\cos x \leq 2$

$-2+1 \leq 1-2\cos x \leq 2+1$

$-1 \leq 1-2\cos x \leq 3$

$-1 \leq \frac{1}{1-2\cos x} \leq \frac{1}{3}$

Range of $f(x) = [-1, \frac{1}{3}]$

Ans (2)

(126) let $f(x) = \sqrt{1+x^2}$ then

(i) $f(xy) = f(x) \cdot f(y)$

(ii) $f(xy) = f(x) + f(y)$

(iii) $f(xy) \geq f(x) + f(y)$

(iv) $f(xy) \leq f(x) \cdot f(y)$

$f(x) = \sqrt{1+x^2}$ & $f(y) = \sqrt{1+y^2}$

$f(xy) = \sqrt{1+x^2y^2}$

then $f(x) \cdot f(y) = \sqrt{1+x^2y^2+x^2+y^2}$

$f(x) \cdot f(y) = f(xy) + K$ K is constant

$f(x) \cdot f(y) \geq f(xy)$

Ans (4)

(127) $f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$

$g_1(x) = \sqrt{4-x}$

$4-x \geq 0$

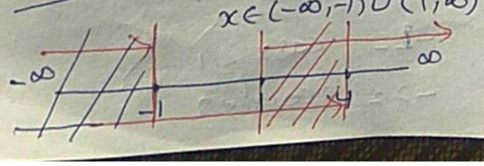
$x-4 \leq 0 \Rightarrow x \in [-\infty, 4]$

$x \in (1,4]$

$x \in (-\infty,-1) \cup (1,4]$

$x^2-1 > 0$ Ans(1)

$x \in (-\infty,-1) \cup (1,\infty)$



(128)

$f(x) = 3x^2 - 1$

(129) $f(x) = px + q$

put $x = -1$

$f(-1) = -p + q = -5$ — (i)

put $x = 3$

$f(3) = 3p + q = 3$ — (ii)

$-p + q = -5$

$3p + q = 3$

$-4p = -8$

$\boxed{p = 2}$

$q = -5+2 = -5+2 = -3$

$\boxed{q = -3}$

$(p, q) = (2, -3)$ Ans(2)

(130) $x^n - 1$ is Divisible by $x - k$ then least value of k is

$K = 1$ Ans(3)

(131) $3 \cdot 5^{2n+1} + 2^{3n+1}$

put $n = 1$

$3 \cdot 5^3 + 2^4$

$3 \times 125 + 16$ Ans(2) = 17

$\Rightarrow 375 + 16 = \frac{391}{17} = 23$

(118) $\vec{x} = -15\hat{i} + 3\hat{j} - 9\hat{k}$

$\vec{y} = 15\hat{i} + 9\hat{j} + k\hat{k}$

are orthogonal then

$\vec{x} \cdot \vec{y} = 0$

$-225 + 27 - 9k = 0$

$9k = -198$

$k = \frac{-198}{9} = -22$

$k = -22$ Ans(2)

(119) $\vec{x} = \vec{c_1}\alpha + \vec{c_2}\beta + \vec{c_3}\gamma$

$26\hat{i} + 12\hat{j} + 2\hat{k} = (\hat{i} - \hat{j} - \hat{k})\alpha + (\hat{i} + \hat{j})\beta + (\hat{k})\gamma$

$\alpha + \beta = 26$ —(I)

$-\alpha + \beta = 12$ —(II)

$-\alpha + \gamma = 2$ —(III)

equ^n (I) (II) are

$2\beta = 38$

$\boxed{\beta = 19}$

$\alpha = 26 - \beta = 7$

$\gamma = 2 + 7 = 9$

$(\alpha, \beta, \gamma) = (7, 19, 9)$

Ans(4)

(120) $U = 50$

$n(C) = 20 \quad n(H) = 15$

$n(C \cap H) = 5$

$n(C \cup H) = n(C) + n(H) - n(C \cap H)$

$= 20 + 15 - 5$

$= 30$

either are or $\Rightarrow$ neigth nor

$n(C \cup H)' = n(U) - n(C \cup H)$

$= 50 - 30 = 20$ Ans(2)

(121) $X = \{8^n - 7n - 1\} \quad n \in N$

$Y = 49n - 49 \quad n \in N$

put $n = 1, 2, 3$ ----

$X = \{0, 49, 98 ----\}$

$Y = \{0, 49, 98 ----\}$

$X \subseteq Y$ Ans(1)

(122) $2^m = 112 + 2^n$

$2^m - 2^n = 112$

$2^n(2^{m-n} - 1) = 2^4 \times 7$

$n = 4$

$2^{m-n} - 1 = 7$

$2^{m-n} = 8 = 2^3$

$m - n = 3$

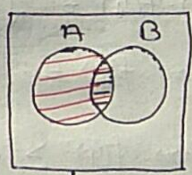
$m = 3 + n = 3 + 4 = 7$

$(m, n) \Rightarrow (7, 4)$ Ans(7,4) (3)

(123)

$A \cup (A \cap B) = A$

Ans(4)

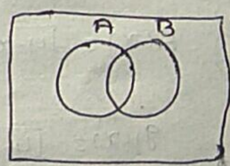


$A \cap B$

(124)

$(A \cup B)' = A' \cap B'$

$A' \cap B' = \phi$



$A \cap (A \cup B)'$

$= A \cap (A' \cap B') = A \cap \phi = \phi$

Ans(3)

(125) $f(x) = \frac{1}{1 - 2\cos x}$

$-1 \leq \cos x \leq 1$

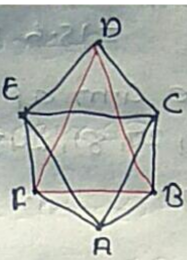
$-2 \leq 2\cos x \leq 2$

(111)

$S(A) = {}^{6}C_{3}$

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

$= 20$



$F(A) =$ triangle with these vertices are equilateral

$= 2$ (ACE and BDF)

$P(A) = \frac{F(A)}{S(A)} = \frac{2}{20} = \frac{1}{10}$ Ans(4)

(112) let $P(C) = x$

$P(A) = \frac{x}{3}$ $\quad P(B) = \frac{x}{2}$

$P(A) + P(B) + P(C) = 1$

$x + \frac{x}{2} + \frac{x}{3}$

$\frac{6x + 2x + 3x}{6} = 1$

$x = \frac{6}{11}$

then $P(A) = \frac{1}{3} \times \frac{6}{11} = \frac{2}{11}$ Ans(2)

(113) 0, 2, 4, 6, 8 (Repeatiation allow)

A B C

$4 \times 5 \times 5 = 100 = S(A)$

$F(A) =$ all digits are same

{(222), (444) {666} (888)}

$= 4$

$P(A) = \frac{F(A)}{S(A)} = \frac{4}{100} = \frac{1}{25}$ Ans(4)

(114) at least one of the events A and B

$P(A \cup B) = 0.6$

A and B occur simultaneously

$P(A \cap B) = 0.2$

formula

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

$P(A \cup B) + P(A \cap B) = 1 - P(\bar{A}) + 1 - P(\bar{B})$

$0.6 + 0.2 = 2 - (P(\bar{A}) + P(\bar{B}))$

$0.8 = 2 - (P(\bar{A}) + P(\bar{B}))$

$P(\bar{A}) + P(\bar{B}) = 2 - 0.8$

$= 1.2$ Ans(3)

(115) which of the following set of vector of linear independent

(i) $\begin{pmatrix} 0 \\ 2 \\ 2 \end{pmatrix} \begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix} \begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix}$

(ii) $\begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix} \begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix} \begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix}$

(iii) $\begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix} \begin{pmatrix} 2 \\ 2 \\ 2 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix}$

(iv) $\begin{pmatrix} 0 \\ -1 \\ -1 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \\ 1 \end{pmatrix} \begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix}$

Soln

$2\alpha_1 + 2\alpha_2 + \alpha_3 = 0$ — (i)

$2\alpha_2 - \alpha_3 = 0$ — (ii)

$2\alpha_2 + \alpha_3 = 0$ — (iii)

solving eqn (i) (ii) (iii) then we get

$\alpha_1 = 0 \quad \alpha_2 = 0 \quad \alpha_3 = 0$

Hence the vectors. Independent (L.I)

Ans(iii)

(116) ~~PROBABILITY~~

$S(A) = {}^{11}C_{1}$

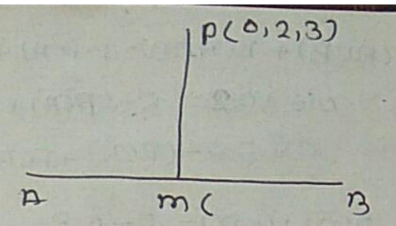
$F(A) = {}^{3}C_{1}$ $\quad$ (a, a, i, o)

a → same हैं इसलिए vowel काउन्ट करा

$P(A) = \frac{F(A)}{S(A)} = \frac{3}{11}$

Ans(4)

(106)



line (AB)

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

paint m (5t-3, 2t+1, 3t-4)

Direction ratio of pm

$(x_2-x_1,\ y_2-y_1,\ z_2-z_1)$

$= (5t-3-0,\ 2t+1-2,\ 3t-4-3)$

$= (5t-3,\ 2t-1,\ 3t-7)$

pm ⊥ AB then

$l_1l_2+m_1m_2+n_1n_2=0$

$25t-15+4t-2+9t-21=0$

$38t-38=0$

$t=38/38=1$

$\boxed{t=1}$

then foot of perpendicular

m(2, 3, -1) Ans(3)

(107) The mean of first three terms is 14 and the mean of next two trem is 18 then mean of all the five trmes is

(i) 14.5 (ii) 15.0

(iii) 15.2 (iv) 15.6

$$\frac{x_1+x_2+x_3}{3} = 14 \quad \text{—(i)}$$

$$\frac{x_4+x_5}{2} = 18 \quad \text{—(ii)}$$

$x_1+x_2+x_3+x_4+x_5 = 42+36$

$$\frac{x_1+x_2+x_3+x_4+x_5}{5} = \frac{78}{5}$$

$= 15.6$ Ans(4)

(108) The G.m of the number 3, 9, 27, 81, 243 is

(i) 9 (ii) 27 (iii) 81

(iv) 243

A.M. of 'n' terms $= (a_1 a_2 a_3 \text{---} a_n)^{1/n}$

then A.M. of 3, 9, 27, 81, 243 ⇒ n = 5 terms

$= (3\times9\times27\times81\times243)^{1/5}$

$= (27)^{5 \cdot 1/5}$

$= 27$

Ans (2)

(109) The mean and S.D of 1,2,3 4,5,6 is

(i) $\frac{7}{2}, \sqrt{\frac{35}{12}}$ (ii) 3,3 (iii) $\frac{7}{2}, \sqrt{3}$

(iv) $3, \frac{35}{12}$

$$\text{mean} = \frac{1+2+3+4+5+6}{6}$$

$$= \frac{21}{6} = \frac{7}{2}$$

$$S.D = \sqrt{\frac{n^2-1}{12}} = \sqrt{\frac{36-1}{12}} = \sqrt{\frac{35}{12}}$$

Ans(i)

(110) The mean of 100 observation is 50 and their S.D is 5 the sum of square of all observation is

(i) 50,000 (ii) 2,50,000

(iii) 252500 (iv) 255000

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(101)
$\vec{a} = \hat{i} - 2\hat{j} + \hat{k}$
$\vec{b} = 4\hat{i} - 4\hat{j} + 7\hat{k}$

projection $\vec{a}$ on $\vec{b} = \dfrac{\vec{a}\cdot\vec{b}}{|\vec{b}|}$

$= \dfrac{4+8+7}{\sqrt{16+16+49}} = \dfrac{19}{\sqrt{81}}$

$= \dfrac{19}{9}$ Ans(2)

(102) $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

put $\beta = \gamma = 60$

$\cos^2\alpha + \cos^2 60 + \cos^2 60 = 1$

$\cos^2\alpha + \frac{1}{4} + \frac{1}{4} = 1$

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

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

$\alpha = 45^\circ$ Ans(1)

(103) $\vec{a}\cdot(\vec{b}+\vec{c}) + \vec{b}\cdot(\vec{c}+\vec{a}) + \vec{c}\cdot(\vec{a}+\vec{b}) = 0$

$2(\vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{c} + \vec{c}\cdot\vec{a}) = 0$

$\therefore \vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{c} + \vec{c}\cdot\vec{a} = 0$

$|a+b+c|^2 = (\vec{a}+\vec{b}+\vec{c})\cdot(\vec{a}+\vec{b}+\vec{c})$

$= a^2 + b^2 + c^2 + 2\vec{a}\cdot\vec{b} + 2\vec{b}\cdot\vec{c} + 2\vec{c}\cdot\vec{a}$

$= 1 + 16 + 64 = 81$

$|\vec{a}+\vec{b}+\vec{c}|^2 = 81$

$|\vec{a}+\vec{b}+\vec{c}| = 9$ Ans(3)

(104)
$\dfrac{x-1}{2} = \dfrac{y-2}{3} = \dfrac{z-3}{4} = t_1$

$\dfrac{x-2}{3} = \dfrac{y-4}{4} = \dfrac{z-5}{5} = t_2$

$\vec{r} = (\hat{i}+2\hat{j}+3\hat{k}) + t_1(2\hat{i}+3\hat{j}+4\hat{k})$

$\vec{r} = (2\hat{i}+4\hat{j}+5\hat{k}) + t_2(3\hat{i}+4\hat{j}+5\hat{k})$

$S.D = \dfrac{[\vec{a}_2-\vec{a}_1,\ b_1, b_2]}{|b_1\times b_2|}$

$= \begin{vmatrix} 2-1 & 4-2 & 5-3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix}$

$= \begin{vmatrix} 1 & 2 & 2 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix}$

$= 1(15-16) - 2(10-12) + 2(8-9)$

$= -1 + 4 - 2 = 1$

$\vec{b}_1\times\vec{b}_2 = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix}$

$= \hat{i}(15-16) - \hat{j}(10-12) + \hat{k}(8-9)$

$\vec{b}_1\times\vec{b}_2 = -\hat{i} + 2\hat{j} - \hat{k}$

$|\vec{b}_1\times\vec{b}_2| = \sqrt{1+4+1} = \sqrt{6}$

$S.D = \dfrac{1}{\sqrt{6}}$ Ans(2)

(105) The standard deviation of the first n-natural number is

(i) $\dfrac{n+1}{2}$ (ii) $\sqrt{\dfrac{n(n+1)}{2}}$

(iii) $\sqrt{\dfrac{n^2-1}{12}}$ (iv) $\dfrac{(2n+1)(n+1)}{6}$

Standard Deviation

$= \sqrt{\dfrac{n^2-1}{12}}$ Ans(iii)