छत्तीसगढ़ माध्यमिक शिक्षा मण्डल, रायपुर

0;olkf;d xf.kr

d{kk XII

lEiy i'u&i=

¼fo|kfpr bdkb½

NÙkhlx< ek/;fed f'k{kk e.My] jk;ij

i'u & i= dh ;kstuk

Scheme of Question Paper

fo"k;%& okf.kfT;d xf.kr i.kkZd % 100

fo"k; dkM&169 le; % 3 ?kV

ijh{kk % gk;j lsd.Mjh

¼v½ 'kS{kf.kd mn~ns'; ds vuqlkj eku

(A) Weightage as per Educational objective:

l0 Ø0	mn~ns';	vad	ifr'kr
1-	Kku (Knowledge)	35	35%
2-	vocks/k (Understanding)	50	50%
3-	vuqiz;ksx ,oa dkS'ky (Application & Skill)	15	15%
	;ksx	100	100%

¼c½ bdkbZokj vadksa dk eku

lØ0	bdkbZ dk uke	bdkbZ ij vkcafVr vad	i'u&i= ds ik:i vuqlkj vkcafVr vad
1-	vkf'kad foHkktu	10 vad	10
2-	lkjf.kd	10 vad	10
3-	vk0;g	10 vad	10
4-	lkf[;dh	10 vad	10
5-	lekdyu	10 vad	10
6-	ikf;drk	10 vad	10
7-	ifdyke f=dks.kuhfr	10 vad	10
8-	lfn'kks dk x.kuQy	10 vad	10
9-	f}eh; ,oa f=foeh; dk vFkZ ,oa mlus ij vk/kkfjr i'u	10 vad	10
10-	oÙk ,oa xksyk	10 vad	10

¼l½ dfBukb Lrj (Difficulty Level)

l0 Ø0	mnn';		vd	ifr'kr
1-	ljy (Easy)		35	35%
2-	vkl r (Average)		50	50%
3-	dfBu (Difficult)		15	15%
		;kx	100	100%

¼n½ i'ui= fn'kk fun'k ,o fodYi ;ktuk ¼&

(Instruction's & Scheme of Option for Question Paper)

- oLrfu"B i'u e ¼05½ cgfodYih; i'u rFkk ¼05½ fjDr LFkku dh ifr@mfpr tkMh cuk, dk i'u fn;k tkoxk vkj ;g iR;d lV e i'u Øekd 1 gkxk A
- iR;d lV e 1] 2 ,o 3 vdk d i'uk e fHkUurk jgxh A leLr 04 vd ;k bll vf/kd vdk d y?kmÙkjh; rFkk nh?kmÙkjh; i'uk e fodYi fn;k tkuk g A fodYi i'u mlh bdkb l rFkk leku mnn';k d jgx A 04 vd ;k bll vf/kd vdk d i'u iR;d lV e ,d leku jgx A
- vf/kdre mÙkj lhek

vfry?kmÙkjh;	¼2 vd@30 'kCn½	¼3 vd@50 'kCn½
y?kmÙkjh;	¼4 vd@75 'kCn½	¼5 vd@150 'kCn½
nh?kmÙkjh;	¼6 vd ;k vf/kd@250 'kCn½	

i'u & i= dk CyfiUV

Blue Print of Question Paper

fo"k;%& okf.kfT;d xf.kr | i.kkd % 100
fo"k; dkM&169 | le; % 3 ?kV
ijh{kk % gk;j ld.Mjh

bdkb l-Ø-	bdkb	bdkb ij vkcfVr vd	vdokj i'u						dy i'u
			1 vd	2 vd	3 vd	4 vd	5 vd	6 vd	
1	vkf'kd foHkkt u	10	2	1				1	2
2	lkjf.kd	10	3		1	1			2
3	vk0;g	10		1	1		1		3
4	lkf[;dh	10	3		1	1			2
5	lekdyu	10	2	1				1	2
6	ikf;drk	10		1		2			3
7	ifdyke f=dk.kuhfr	10		1	1		1		3
8	lfn'kk dk x.kuQy	10		1		2			3
9	f}eh; ,o f=foeh; dk vFk ,o mlij vk/kkfjr i'u	10		1	1		1		3
10	oÙk ,o xkyk	10		1	1		1		3
	;kx	100	10	8	6	6	4	2	26
	oLrfu"V ¼10 x 1½ uEcj dk i'u								1
						dy i'u			27

Set - A

gkbZ Ldwy lfVZfQdsV ijh{kk

High School Certificate Examination

lEiy&i'u i=

SAMPLE PAPER

fo"k; %& (Subject) - 0;olkf;d xf.kr   le; 3 ?k.Vk (Time- 3 Hrs)

d{kk %& (Class) - 12oh   i.kkZd 100 (M.M.)

(Instruction) & ¼funsZ'k½

1- lHkh i'u gy djuk vfuok;Z gSA

Attempt all the Question

2- i'u Øekd 01 e 10 vd fu/kkZfjr gSA nks dky[k.M gSA [k.M ^^v** e 05 cgfodYih; i'u rFkk [k.M ^^c** e 05 fjDr LFkkuksa dh iwfrZ vFkok mfpr lac/k tksfM,A iR;sd i'u dk fy, 1 vd vkcfVr gSA

Q. No. 01 Carries 10 Marks. There are two sub-section, Section A is Multiple choice carries 05 marks and section B is fill in the blanks or match the column carries 05 marks.

3- i'u Øekd 02 ls i'u Øekd 09 rd vfr y?kmRrjh; i'u gSA iR;sd i'u ij 02 vd vkcfVr gSA mRrj dh vf/kdre 'kCn lhek 30 'kCn A

Q. No. 2 to 09 are very short answer type question & it carries 02 marks each. Word limit is maximum 30.

4- i'u Øekd 10 ls i'u Øekd 15 rd y?kmRrjh; i'u gSA iR;sd i'u ij 03 vd vkcfVr gSA mRrj dh vf/kdre 'kCn lhek 50 'kCn A

Q. No. 10 to 15 are short answer type question & it carries 03 marks each. Word limit is maximum 50.

5- i'u Øekd 16 ls i'u Øekd 21 rd y?kmRrjh; i'u gSA iR;sd i'u e vkrfjd fodYi gS vkSj iR;sd i'u ij 04 vd vkcfVr gSA mRrj dh vf/kdre 'kCn lhek 75 'kCn A

Q. No. 16 to 21 are short answer type question & it carries 04 marks each. Each question has internal choice. Word limit is maximum 75.

6- i'u Øekd 22 l i'u Øekd 25 rd nh?kmRrjh; i'u g A iR;d i'u e vkrfjd fodYi g vkj iR;d i'u ij 05 vd vkcfVr g A mRrj dh vf/kdre 'kCn lhek 100 'kCn A

Q. No. 22 to 25 are long answer type question & it carries 05 marks each. Each question has internal choice. Word limit is maximum 100.

7- i'u Øekd 26 l i'u Øekd 27 rd nh?kmRrjh; i'u g A iR;d i'u e vkrfjd fodYi g vkj iR;d i'u ij 06 vd vkcfVr g A mRrj dh vf/kdre 'kCn lhek 150 'kCn A

Q. No. 26 to 27 are long answer type question & it carries 06 marks each. Each question has internal choice. Word limit is maximum 150.

[k.M&v

i'u 1&¼v½ lgh fodYi pfudj fyf[k, &

1- $\frac{1}{(x+3)(x+5)}$ dk vkf'kd fHkUu e cnyu ij A vkj B dk eku gkxk &

¼d½ $A = \frac{1}{2}, B = \frac{1}{2}$ ¼[k½ $A = \frac{1}{2}, B = -\frac{1}{2}$

¼x½ $A = 1, B = 1$ ¼?k½ $A = 1, B = 2$

2- $\begin{vmatrix} \sec x & \tan x \\ \tan x & \sec x \end{vmatrix}$ lkjf.kd dk eku gkxk &

¼d½ 1 ¼[k½ –1

¼x½ 2 ¼?k½ –2

3- nk vk0;g x.kk fd; tk ldr g tc igy vk0;g dk nlj vk0;g l cjkcj gkrk g &

¼d½ dkye ¾ jk ¼[k½ jk ¾ dkye

¼x½ dkye ¾ vkMj ¼?k½ vkMj ¾ dkye

4- dk ij lekJ; x.kkd g &

¼d½ b_{yx} ¼[k½ b_{xy}

¼x½ r_{xy} ¼?k½ xy

5- $\int \log x dx$ dk lekdyu g&

¼d½ $x \log x - x$ ¼[k½ 1

¼x½ $1/x$ ¼?k½ x^2

Que 1 (A) Choose the correct Answer -

1. After converting $\frac{1}{(x+3)(x+5)}$ into partial function the value of A and B will be -

(i) $A = \frac{1}{2}, B = \frac{1}{2}$ (ii) $A = \frac{1}{2}, B = -\frac{1}{2}$

(iii) A = 1, B = 1 (iv) = 1, B = 2

2. The value of determinant $\begin{vmatrix} \sec x & \tan x \\ \tan x & \sec x \end{vmatrix}$ -

(i) 1 (ii) –1

(iii) 2 (iv) –2

3. Two matrices can be multipled when which of following of the one matrix is equal to the other matrix -

(i) Column = Row (ii) Row = column

(iii) Column = Order (iv) Order = column

4. The regression co-efficient of y on x is -

(i) b_{yx} (ii) b_{xy}

(iii) r_{xy} (iv) xy

5. The integra calculus of $\int \log x dx$ is -

(i) $x \log x - x$ (ii) 1

(iii) $1/x$ (iv) x^2

¼c½ fjDr LFkkuk dh ifr dhft; &

1- ,d lk/kkj.k ikl dk Qdk tkrk g rk le l[;k vku dh ikf;drk -------- gA

2- fo"ke l[;k vku dh ikf;drk ----------------- g A

3- ,d flDdk dk 10 ckj mNky tku ij ifrn'k -------------------- gkxkA

4- $\vec{a}.\vec{b}$ dk eku -------------------- gkrk g A

5- $\vec{a}\times\vec{b}$ dk eku -------------------- gkrk g A

(B) Fill in the blanks -

1. The probability of coming even number is .... when a simple dice is rolled.

2. The probability of coming odd number is .... when a simple dice is rolled.

3. The outcome will be .... when a coin is tossed 10 time.

4. The value of $\vec{a}.\vec{b}$ is ....

5. The value of $\vec{a}\times\vec{b}$ is ....

i'u 2& $\frac{1}{x^2-4x+3}$ fHkUu dk vkf'kd fHkUu e 0;Dr djkA

Express the fraction $\frac{1}{x^2-4x+3}$ in partial fraction.

i'u 3& Lkkjf.kd $\begin{vmatrix} 43 & 1 & 6 \\ 35 & 7 & 4 \\ 17 & 3 & 2 \end{vmatrix}$ dk EkkUk KkRk dhfTk,A

Find the value of determinant $\begin{vmatrix} 43 & 1 & 6 \\ 35 & 7 & 4 \\ 17 & 3 & 2 \end{vmatrix}$

i'u 4& $\begin{bmatrix} 2 & 1 \\ 3 & 2 \\ -1 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 1 \\ -1 & 2 & 1 \end{bmatrix}$ dk Xk.kk djkA

Multiply $\begin{bmatrix} 2 & 1 \\ 3 & 2 \\ -1 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 1 \\ -1 & 2 & 1 \end{bmatrix}$

i'u 5& lglc/k D;k g\

What is correlation?

i'u 6& ;fn ,d yhi (Leap) o"k dk ;knfPNd p;u fd;k x;k gk rk bl o"k e 53 jfookj gku dh ikf;drk Kkr djkA

Find the probability of 53 sundays in a year when random selection has been done for a leap year.

i'u 7& ;fn $tan^{-1}\left(\frac{1}{5}\right)=\theta$ gk rk $cot\,\theta$ dk eku Kkr djA

If $tan^{-1}\left(\frac{1}{5}\right)=\theta$, then find the value of $cot\,\theta$

i'u 8& fl) djk lfn'k $\hat{i}+4\hat{j}+3\hat{k}$ vkj lfn'k $4\hat{i}+2\hat{j}-4\hat{k}$ ijLij ycor gA

Prove that vector $\hat{i}+4\hat{j}+3\hat{k}$ and vector $4\hat{i}+2\hat{j}-4\hat{k}$ are parallel.

i'u 9& fcUn $(-2,6)$ vkj $(3,-6)$ d chp dh njh Kkr dhft,A

Find the distance between points $(-2,6)$ and $(3,-6)$

i'u 10& fdlh oRr d O;kl dk ,d fljk ¼3] 4½ vkj dUn ¼7] 7½ g nlj flj dk fun'kkd Kkr djkA

One end of the diameter of a circle is (3, 4) and the centre is (7, 7). Find the coordinate for the other end.

i'u 11& oRr $x^2+y^2=1$ dk ikpfyd :i e O;Dr djkA

Express circle $x^2+y^2=1$ in a parametric form.

i'u 12& ,d xkys dk lehdj.k $(x-1)(x+1)+(y-2)(y+2)+(z-3)(z+3)=0$ gA bldh dUn ,o f=T;k Kkr djA

Fnd the radious and centre of sphere

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

i'u 13& lfn'k fof/k l fl) dhft,&

Prove that vector method –

$$\cos(A-B)=\cos A\cdot\cos B+\sin A\cdot\sin B$$

i'u 14& $\int x^n + a^x + e^x + x\,dx$ dk LkEkkdYkUk dhfTk,

Find the integral calculus of $\int x^n + a^x + e^x + x\,d$

i'u 15& ml lekrj prHkt dk {k=Qy Kkr dhft, ftlds fod.k $\vec{a}=3\hat{i}+\hat{j}-2\hat{k}$] $\vec{b}=\hat{i}-3\hat{j}+4\hat{k}$ gA

Find the area of that parallelogram whose diagonals are $\vec{a}=3\hat{i}+\hat{j}-2\hat{k}$] and $\vec{b}=\hat{i}-3\hat{j}+4\hat{k}$

i'u 16& xf.kr dk ,d i'u rhu fo|kfFk;k dk gy dju d fy, fn;k x;kA mud }kjk gy dju dh ikf;drk, Øe'k% $\frac{1}{2},\frac{1}{3},\frac{1}{4}$ gA ;fn o lHkh i'u gy dju dk i;Ru dj rk i'u d gy fd, tku dh ikf;drk Kkr dhft,A

A problem of mathematics was given to three students for solving it. The probability of solving by them is $\frac{1}{2},\frac{1}{3},\frac{1}{4}$. If all students try for solving the problem, find the probability of solving.

^^vFkok** (OR)

;fn A rFkk B nk ?kVuk, g tcfd $P(A)=\frac{3}{8}$, $P(B)=\frac{5}{8}$ vkj $P(A\cup B)=\frac{3}{4}$ rk $P\left(\frac{A}{B}\right)$ rFkk $P\left(\frac{B}{A}\right)$ dk ifjdyu djA

Let A and B are two events. If $P(A)=\frac{3}{8}$, $P(B)=\frac{5}{8}$ and $P(A\cup B)=\frac{3}{4}$ the compute $P\left(\frac{A}{B}\right)$ and $P\left(\frac{B}{A}\right)$

i'u 17& fl) dhft, fd

Prove that -

$$tan^{-1}\left(\frac{2}{11}\right)+cot^{-1}\left(\frac{24}{7}\right)=tan^{-1}\left(\frac{1}{2}\right)$$

^^vFkok** (OR)

$sin\left(cos^{-1}\frac{4}{5}\right)$ dk eku Kkr dhft,A

Find the value of $sin\left(cos^{-1}\frac{4}{5}\right)$

i'u 18& ;fn $\vec{a}$ rFkk $\vec{b}$ ek=d lfn'k gk rk vkj mud chp dk dk.k θ gk rk fl) djk fd

$$sin\left(\frac{1}{2}\right)=\frac{1}{2}\left|\vec{a}-\vec{b}\right|$$

If $\vec{a}$ and $\vec{b}$ are two unit are vector and angle between them is θ then prove that $sin\left(\frac{1}{2}\right)=\frac{1}{2}\left|\vec{a}-\vec{b}\right|$

^^vFkok** (OR)

fl) djk fd lfn'k $\vec{a}=2\hat{i}-\hat{j}+\hat{k}$] $\vec{b}=\hat{i}-3\hat{j}-5\hat{k}$ rFkk $\vec{c}=3\hat{i}-4\hat{j}-4\hat{k}$,d ledk.k f=Hkt dh Hkt k, gA

Prove that vector $\vec{a}=2\hat{i}-\hat{j}+\hat{k}$] $\vec{b}=\hat{i}-3\hat{j}-5\hat{k}$ and $\vec{c}=3\hat{i}-4\hat{j}-4\hat{k}$ are the sides of rightangle Δ.

i'u 19& oRr $2x^2+2y^2+10x-6y-1=0$ dk dUn rFkk f=T;k Kkr djA

Find the centre and radius of circle $2x^2+2y^2+10x-6y-1=0$.

^^vFkok** (OR)

ml oRr dk lehdj.k Kkr dj tk oRr $x^2+y^2-8x+6y-5=0$ d ldUnh; g rFkk fcUn (–2, –7) l gkdj tkrk gA

Find the equation of the circle which is equicentral with the circle -- and passes through point (–2, –7)

i'u 20& ØEkj fUk;kEk Lk gYk djk –

Solve by Cramer's Rule –

$6x + y - 3z = 4$

$x + 3y - 2z = 5$

$2x + y + 4z = 8$

^^vFkok** (OR)

$x - 4y - z = 11$

$2x - 5y + 2z = 39$

$-3x + 2y + z = 1$

i'u 21& fn; x; vkO;g Lkg[k.MTk KkRk dhfTk,A

Find cofactor -

$$\begin{bmatrix}1 & 0 & 2\\2 & 1 & 0\\3 & 2 & 1\end{bmatrix}$$

^^vFkok** (OR)

Find cofactor -

$$\begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$$

i'u 22& vk0¸kgk dh Lkgk¸kRkk Lk fUkEUk LkEkhdj.k gYk dhfTk, %

Solve by matrix method -

$$3x - y - z = 7$$
$$3x + y - z = 7$$
$$x + y - z = 3$$

^^vFkok** (OR)

$$3x - 4y + 2z = -1$$
$$2x + 3y + 5z = 7$$
$$x + z = 2$$

i'u 23& fUkEUkfYkf[kRk Lkkj.kh d fYk¸k Lkg–LkECkU/k Xk.kkd KkRk dhfTk¸kA

Determine coefficient of correlation of the following data -

x	1	3	5	7	8	10
y	8	12	15	17	18	20

^^vFkok** (OR)

x	20	25	30	35	40	45
y	16	10	8	20	5	10

i'u 24& fUkEUkfYkf[kRk dk x d LkkIk{k LkEkkdYkUk dhfTk,

Solve

$$\frac{\sin x}{1+\sin x} \quad \text{^^vFkok** (OR)} \quad \frac{1}{1+\cos x}$$

i'u 25& gy dhfTk, &

Solve –

$$\int_0^4 \frac{dx}{x+\sqrt{x}} = 2\log 3.$$

^^vFkok**

$$\int_0^{\frac{\pi}{2}} \sqrt{\cos\theta}\,\sin^3\theta\, d\theta$$

i'u 26& fn; x; vkO¸kg dk O¸kRØEk vkO¸kg KkRk dhfTk¸kA

Find the inverse of –

$$\begin{bmatrix} a & 0 & 1 \\ 1 & b & 0 \\ 0 & 1 & 0 \end{bmatrix}$$ ^^vFkok** (OR) $$\begin{bmatrix} a & 1 & b \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

i'u 27& nk Pkjk dh LkEkkJ¸k.k j[kk, fUkEUkfYkf[kRk g % 8x – 10y + 66 = 0 vkj 40x – 18y = 214 Rkk KkRk dhfTk, %

¼a½ x vkj y d Ekk/¸k

¼b½ Lkg–LkCk/k Xk.kkd

¼c½ nk IkLkj.kk dk vUkIkkRk

Regression coefficient of two variables is as follows :-

8x – 10y + 66 = 0 and 40x – 18y = 214

Find :

(a) Mean of x & y.

(b) coefficient of correlation

(c) Ratio of two expansion.

^^vFkok** (OR)

fl) djk&

Provt that –

$$t\left(\frac{1-r^2}{r}\right)\cdot\frac{\sigma_x\sigma_y}{\sigma_x{}^2+\sigma_y{}^2}$$

&&00&&

^^lEiy mRrj**

mRrj 1& ¼v½ lgh fodYi pfudj fyf[k, &

¼1½ & ¼[k½ ¾ A = $\frac{1}{2}$, B = $-\frac{1}{2}$

¼2½ & ¼d½ ¾ 1

¼3½ & ¼d½ ¾ dkye ¾ jk

¼4½ & ¼d½ ¾ b_{yx}

¼5½ & ¼d½ ¾ $x\ logx - x$

¼c½ fjDr LFkkuk dh ifr dhft ; &

¼1½ & P(E) = $1/2$

¼2½ & P(E) = $1/2$

¼3½ & $(2)^{10}$

¼4½ & $ab\cos\theta$

¼5½ & $ab\sin\theta$

mRrj 2& nh gbZ fHkUUk dk gj = $x^2 - 4x + 3$

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

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

$$= (x-1)\ (x-3)$$

vc ËkkUkk fd $\frac{1}{x^2 - 4x + 3} = \frac{A}{x-1} + \frac{B}{x-3}$

$$\therefore \quad 1 = A(x-3) + B(x-1)$$

mlk¸kDRk LkOkLkfËkdk d nkUkk lk{kk Ek $x = 1$ vkj $x = 3$ j[kUk lkj

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

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

$$\therefore \quad \frac{1}{x^2-4x+3} = \frac{1}{2}\left(\frac{1}{x-3} - \frac{1}{x-1}\right)$$ **mÙkj**

mRrj 3& EkkUkk $\Delta = \begin{vmatrix} 43 & 1 & 6 \\ 35 & 7 & 4 \\ 17 & 3 & 2 \end{vmatrix}$

$$\Delta = \begin{vmatrix} 45-(42+1) & 1 & 6 \\ 35-(28+7) & 7 & 4 \\ 17-(14+3) & 3 & 2 \end{vmatrix}$$

[LkfØ¸kk $C_1 \to C_1 - (7C_3 + C_2)$ Lk]

$= 0$ [$\because C_1$ d LkHkh vo¸kOk 'kU¸k g] **mÙkj**

mRrj 4& $\begin{bmatrix} 2 & 1 \\ 3 & 2 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 1 \\ -1 & 2 & 1 \end{bmatrix}$

$$= \begin{bmatrix} 2(1)+1(-1) & 2(0)+1(2) & 2(1)+1(1) \\ 3(1)+2(-1) & 3(0)+2(2) & 3(1)+2(1) \\ -1(1)+1(-1) & -1(0)+1(2) & -1(1)+1(1) \end{bmatrix}$$

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

mRrj 5& f}pj vkdMk e ;fn ,d pj d ekuk e ifjoru gku ij nlj pj d ekuk e Hkh ifjoru gk tk; ;k ifjoru gku dh iofRr ik;h tk; rk o lcf/kr pj dgykr g rFkk lc/k lg&lc/k dgykrk gA mRrj 6& ge tkurs gSa fd yhi o"kZ esa Qjojh ekg 29 fnu dk gksrk gSA

∴ yhi o"kZ esa dqy 366 fnu gksrs gSA vr% 52 iw.kZ lIrkg ¼jfookj lfgr½ rFkk nks fnu 'ks"k cprs gSA ;s nks fnu fuEu lkr lEHko izdkj ds gks ldrs gSA

(i) lkse vkSj eaxy
(ii) eaxy vkSj cq/k
(iii) cq/k vkSj x#
(iv) x# vkSj 'kqØ
(v) 'kqØ vkSj 'kfu
(vi) 'kfu vkSj jfo
(vii) jfo vkSj lkse

bu lkr lelEHkkoh n'kkvksa esa vfrfjDr nks esa jfookj 'kkfey gS vFkkZr vuqdwy n'kk,¡ gSA vr% bu 'ks"k nks fnuksa esa ,d jfookj gksu dh izkf;drk

$$= \frac{?kVuk\ ds\ vuqdwy\ fLFkfr;ksa\ dh\ la[;k}{lEHko\ ifj.kkeksa\ dh\ la[;k}$$

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

∴ vHkh"V izkf;drk $= \frac{2}{7}$

mRrj 7& fn;k gS $tan^{-1}\left(\frac{1}{5}\right) = \theta$

$$\Rightarrow tan\theta = \frac{1}{5}$$

$$\Rightarrow \frac{1}{tan\theta} = 5$$

$$\Rightarrow cot\theta = 5 \qquad \text{(Ans)}$$

mRrj 8& ekuk $\vec{a} = \hat{i} + 4\hat{j} + 3\hat{k}$ rFkk $\vec{b} = 4\hat{i} + 2\hat{j} - 4\hat{k}$

vc $\vec{a} \cdot \vec{b} = \left(\hat{i} + 4\hat{j} + 3\hat{k}\right) \cdot \left(4\hat{i} + 2\hat{j} - 4\hat{k}\right)$

$$\vec{a}\cdot\vec{b}=1\cdot 4+4\cdot 2+3\cdot(-4)$$

$$\vec{a}\cdot\vec{b}=4+8-12$$

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

$\because$ fn, x, lfn'kk dk vfn'k x.kuQy 'kU; g vr% fn, x, lfn'k ijLij ycor gA

mRrj 9& ekuk $A(x_1,y_1)=(-2,6)$ rFkk $B(x_2,y_2)=(3,-6)$

;gk ij $x_1=-2, x_2=3$

$y_1=6, y_2=-6$

vr% $AB=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$=\sqrt{(3+2)^2+(-6-6)^2}$

$=\sqrt{25+144}$

$=\sqrt{169}$

$=13$ bdkb mRrj

mRrj 10&

$X=\dfrac{x_1+x_2}{2}$ $\qquad$ $Y=\dfrac{y_1+y_2}{2}$

$7=\dfrac{3+x_2}{2}$ $\qquad$ $7=\dfrac{4+y_2}{2}$

$14=3+x_2$ $\qquad$ $14=4+y_2$

$14-3=x_2$ $\qquad$ $14-4=y_2$

$x_2=11$ $\qquad$ $y_2=10$

vr% nljs fljs d fun'kkd $(x_2, y_2) = (11, 10)$ gA mRrj 11& oRr dk lehdj.k $x^2 + y^2 = 1$

;gk f=T;k $r = 1$ ekuk fd θ ikpy gA

$\therefore$ oRr dk ikpfyd lehdj.k

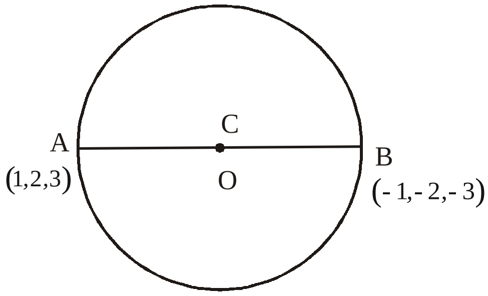
$x = r\cos\theta$,o $y = r\sin\theta$

$x = 1 \cdot \cos\theta$ $y = 1 \cdot \sin\theta$

mRrj 12& fn, x, xky dk lehdj.k g

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

xky d 0;kl AB d fljk d fun'kkd $A(1,2,3)$ rFkk $B(-1,-2,-3)$ gA



ekuk dUn C d fun'kkd (x, y, z) gA

$\because C, AB$ dk e/; fcUn gkrk gA

$\because x = \dfrac{x_1 + x_2}{2}$ $y = \dfrac{y_1 + y_2}{2}$ $z = \dfrac{z_1 + z_2}{2}$

$x = \dfrac{1 + (-1)}{2}$ $y = \dfrac{2 + (-2)}{2}$ $z = \dfrac{3 + (-3)}{2}$

$x = 0$ $y = 0$ $z = 0$

vr% xky dk dUn $C(x, y, z) = C(0,0,0)$ gA

rFkk f=T;k $CA = \sqrt{(1-0)^2 + (2-0)^2 + (3-0)^2}$

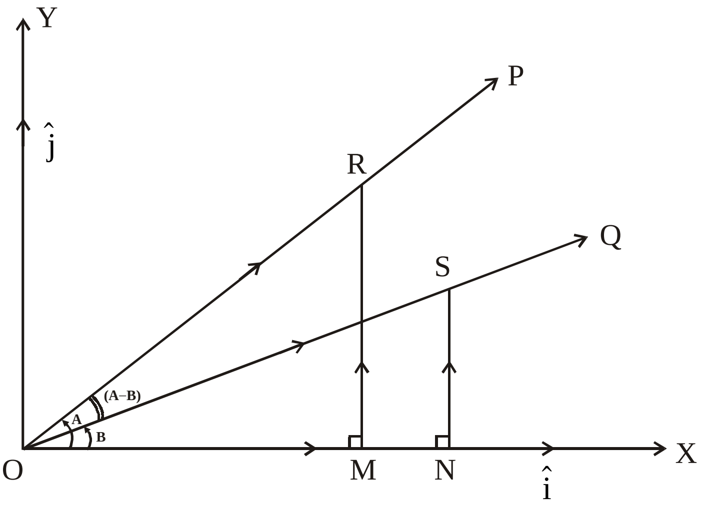
$CA = \sqrt{1+4+9} = \sqrt{14}$

vr% xky dk dUn $(0,0,0)$,o f=T;k $\sqrt{14}$ gA mRrj 13& ekuk fd OX rFkk OY ijLij ycor j[kk,¡ gA ftudh vufn'k ek=d lfn'k Øe'k% $\hat{i}$ rFkk $\hat{j}$ gA

ekuk nks lfjy j[kk,¡ OP rFkk OQ, OX d s ,d gh vksj gS rFkk OX d s lkFk Øe'k% A rFkk B dks.k cukrh gA

$\therefore \angle POQ = A - B$

OP rFkk OQ ij Øe'k% fcUnq R rFkk S bl izdkj fy;k fd OR = 1 = OS



vc R rFkk S ls Øe'k% yEc RM rFkk SN, OX ij MkyA

$\triangle ORM$ e]

$$\overrightarrow{OR} = \overrightarrow{OM} + \overrightarrow{MR}$$

$$\overrightarrow{OR} = (OM)\hat{i} + (MR)\hat{j}$$

$$\overrightarrow{OR} = (OR\, cos\, A)\hat{i} + (OR\, sin\, A)\hat{j}$$

$$\overrightarrow{OR} = (1 \cdot cos\, A)\hat{i} + (1 \cdot sin\, A)\hat{j}$$

$$\overrightarrow{OR} = cos\, A\hat{i} + sin\, A\hat{j} \qquad ....(1)$$

$\triangle OSN$ e]

$$\overrightarrow{OS} = \overrightarrow{ON} + \overrightarrow{NS}$$

$$\overrightarrow{OS} = (ON)\hat{i} + (NS)\hat{j}$$

$$\overrightarrow{OS} = (OS\, cos\, B)\hat{i} + (OS\, sin\, B)\hat{j}$$

$$\overrightarrow{OS} = (1 \cdot cos\, B)\hat{i} + (1 \cdot sin\, B)\hat{j}$$

$$\overrightarrow{OS} = cos\, B\hat{i} + sin\, B\hat{j} \qquad ....(2)$$

leh- (1) o (2) dk vfn'k x.kk djus ij

$$\overrightarrow{OR}\cdot\overrightarrow{OS}=\left(\cos A\hat{i}+\sin A\hat{j}\right)\cdot\left(\cos B\hat{i}+\sin B\hat{j}\right)$$

$$OR\cdot OS\cdot\cos(A-B)=\cos A\cdot\cos B+\sin A\cdot\sin B$$

$$1\cdot1\cdot\cos(A-B)=\cos A\cdot\cos B+\sin A\cdot\sin B$$

$$\cos(A-B)=\cos A\cdot\cos B+\sin A\cdot\sin B$$

;gh fl) djuk FkkA

mRrj 14& $I = \int x^n + n^x + e^x + x\,dx$

$$I = \int x^n\,dx + \int n^x\,dx + \int e^x\,dx + \int x\,dx$$

$$I = \frac{x^{n+1}}{n+1}+\frac{n^x}{\log_e n}+e^x+\frac{x^2}{2}$$ mÙkj

mRrj 15& fn;k g lekrj prHkt d fod.k

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

rFkk $\vec{b}=\hat{i}-3\hat{j}+4\hat{k}$

$$\therefore\ \vec{a}\times\vec{b} = \begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ 3 & 1 & -2\\ 1 & -3 & 4\end{vmatrix}$$

$$\vec{a}\times\vec{b}=\hat{i}(4-6)-\hat{j}(12+2)+\hat{k}(-9-1)$$

$$\vec{a}\times\vec{b}=-2\hat{i}+14\hat{j}-10\hat{k}$$

$$\therefore\left|\vec{a}\times\vec{b}\right|=\sqrt{(-2)^2+14^2+(-10)^2}$$

$$=\sqrt{4+196+100}$$

$$=\sqrt{300}$$

$$=10\sqrt{3}$$

∴ lekrj prHkt dk {k=Qy $=\frac{1}{2}\left|\vec{a}\times\vec{b}\right|$

$=\frac{1}{2}\left(10\sqrt{3}\right)$

$=5\sqrt{3}$ ox bdkb

mRrj 16& xf.kr dk i'u rhu fo|kfFk;k }kjk gy fd, tku dh ikf;drk, ekuk Øe'k% P_1, P_2 o P_3 gA

vr% $P_1=\frac{1}{2}, P_2=\frac{1}{3}$ rFkk $P_3=\frac{1}{4}$

∴ ml i'u dk nu rhuk }kjk gy u fd, tku dh ikf;drk, Øe'k%

$$q_1=1-p_1=1-\frac{1}{2}=\frac{1}{2}$$

$$q_2=1-p_2=1-\frac{1}{3}=\frac{2}{3}$$

rFkk $q_3=1-p_3=1-\frac{1}{4}=\frac{3}{4}$

vr% rhuk d }kjk lkFk&lkFk i'u gy u fd, tku dh ikf;drk $p=q_1\cdot q_2\cdot q_3$

$$p=\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)\left(\frac{3}{4}\right)=\frac{1}{4}$$

vr% i'u d gy fd, tku dh ikf;drk = de l de ,d fo|kFkh d i'u dk gy dju dh ikf;drk

$=1-p$

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

$=\frac{3}{4}$

^^vFkok**

fn;k g & $P(A)=\frac{3}{8}$, $P(B)=\frac{5}{8}$ vkj $P(A\cup B)=\frac{3}{4}$

ge tkur g fd $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$$\therefore\ \frac{3}{4}=\frac{3}{8}+\frac{5}{8}-P(A\cap B)$$

$$\therefore\ P(A\cap B)=\frac{3}{8}+\frac{5}{8}-\frac{3}{4}$$

$$P(A\cap B)=\frac{3+5-6}{8}=\frac{2}{8}=\frac{1}{4}$$

$$\because\ P\left(\frac{A}{B}\right)=\frac{P(A\cap B)}{P(B)}=\frac{\frac{1}{4}}{\frac{5}{8}}=\frac{1}{4}\times\frac{8}{5}=\frac{2}{5}$$

rFkk $P\left(\frac{B}{A}\right)=\frac{P(A\cap B)}{P(A)}=\frac{\frac{1}{4}}{\frac{3}{8}}=\frac{1}{4}\times\frac{8}{3}=\frac{2}{3}$

mRrj 17 $\text{L.H.S.}=tan^{-1}\left(\frac{2}{11}\right)+cot^{-1}\left(\frac{24}{7}\right)$

$$=tan^{-1}\left(\frac{2}{11}\right)+tan^{-1}\left(\frac{1}{\frac{24}{7}}\right)\qquad\left\{\because cot^{-1}x=tan^{-1}\frac{1}{x}\right\}$$

$$=tan^{-1}\left(\frac{2}{11}\right)+tan^{-1}\left(\frac{7}{24}\right)$$

$$=tan^{-1}\left[\frac{\frac{2}{11}+\frac{7}{24}}{1-\frac{2}{11}\cdot\frac{7}{24}}\right]\qquad\left\{\because tan^{-1}x+tan^{-1}y=tan^{-1}\left(\frac{x+y}{1-xy}\right)\right\}$$

$$= tan^{-1}\left[\frac{\frac{48+77}{264}}{\frac{264-14}{264}}\right]$$

$$= tan^{-1}\left[\frac{\frac{125}{264}}{\frac{250}{264}}\right]$$

$$= tan^{-1}\left[\frac{125}{264}\times\frac{264}{250}\right]$$

$$= tan^{-1}\left[\frac{1}{2}\right]$$

$= \text{R.H.S.}$

^^vFkok**

ekuk fd $cos^{-1}\left(\frac{4}{5}\right) = \theta$

$$\Rightarrow cos\,\theta = \frac{4}{5}$$

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

$$\therefore sin\,\theta = \sqrt{1 - \left(\frac{4}{5}\right)^2}$$

$$sin\,\theta = \sqrt{1 - \frac{16}{25}}$$

$$sin\,\theta = \sqrt{\frac{25-16}{25}}$$

$$sin\,\theta = \sqrt{\frac{9}{25}} \quad = \quad sin\,\theta = \frac{3}{5}$$

$$\therefore sin\left(cos^{-1}\frac{4}{5}\right) = \frac{3}{5}$$

mRrj 18 fn;k g $\vec{a}$ rFkk $\vec{b}$ ek=d lfn'k g

$$\therefore |\vec{a}| = |\vec{b}| = 1$$

vc $\vec{a}\cdot\vec{b} = |\vec{a}|\cdot|\vec{b}|\cdot cos\,\theta$

$$\therefore \vec{a}\cdot\vec{b} = 1\cdot 1\cdot cos\,\theta \qquad ....(1)$$

iu% $|\vec{a}-\vec{b}|^2 = \left(\vec{a}-\vec{b}\right)^2$ [$\therefore$ lfn'k dk ox ¾ lfn'k d ekikd dk ox]

$$|\vec{a}-\vec{b}|^2 = \left(\vec{a}-\vec{b}\right)\cdot\left(\vec{a}-\vec{b}\right)$$

$$= \left(\vec{a}\right)^2 + \left(\vec{b}\right) - 2\vec{a}\cdot\vec{b}$$

$$= |\vec{a}|^2 + |\vec{b}|^2 - 2\,cos\,\theta$$ [$\because$ lehñ (1) l]

$$= 1 + 1 - 2\,cos\,\theta$$ [$\because$ $|\vec{a}| = |\vec{b}| = 1$]

$$= 2 - 2\,cos\,\theta$$

$$= 2\left(1 - cos\,\theta\right)$$

$$= 2\cdot 2\,sin^2\left(\frac{\theta}{2}\right)$$ [l= %& $2\,sin^2\left(\frac{\theta}{2}\right) = 1 - cos\,\theta$]

$$|\vec{a}-\vec{b}|^2 = 4\,sin^2\left(\frac{\theta}{2}\right)$$

oxey yu ij

$$|\vec{a}-\vec{b}| = 2\,sin\left(\frac{\theta}{2}\right)$$

$$\frac{1}{2}|\vec{a}-\vec{b}| = sin\left(\frac{\theta}{2}\right)$$

vr% $sin\left(\frac{\theta}{2}\right) = \frac{1}{2}|\vec{a}-\vec{b}|$

^^vFkok**

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

$$\vec{b} = \hat{i} - 3\hat{j} - 5\hat{k}$$

$\vec{c} = 3\hat{i} - 4\hat{j} - 4\hat{k}$

vc $\quad \vec{a} + \vec{b} = \left(2\hat{i} - \hat{j} + \hat{k}\right) + \left(\hat{i} - 3\hat{j} - 5\hat{k}\right)$

$\vec{a} + \vec{b} = 3\hat{i} - 4\hat{j} - 4\hat{k}$

vr% $\vec{a} + \vec{b} = \vec{c}$ ¼lfn'k ;kx f=Hkt }kjk½

vr% $\vec{a}, \vec{b}, \vec{c}$,d f=Hkt dh Hktk, gA

vc $\quad \vec{a} \cdot \vec{b} = \left(2\hat{i} - \hat{j} + \hat{k}\right) \cdot \left(\hat{i} - 3\hat{j} - 5\hat{k}\right)$

$\vec{a} \cdot \vec{b} = 2 \cdot 1 + (-1) \cdot (-3) + 1 \cdot (-5)$

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

vr% $\vec{a}$ rFkk $\vec{b}$ ijLij yEcor g vr% Hktk $\vec{a}$ rFkk $\vec{b}$ d chp dk dk.k 90° gA vr% $\vec{a}, \vec{b}, \vec{c}$,d ledk.k f=Hkt dh Hktk, cukr gA

mRrj 19& oRr dk lehdj.k

$$2x^2 + 2y^2 + 10x - 6y - 1 = 0$$

$$\Rightarrow x^2 + y^2 + 5x - 3y - \frac{1}{2} = 0$$

;g oRr $x^2 + y^2 + 2gx + 2fy + c = 0$ d :i dk gA

vr% nkuk lehdj.kk dh ryuk dju ij]

$$2g = 5, \quad 2f = -3, \quad c = -\frac{1}{2}$$

$$g = \frac{5}{2}, \quad f = -\frac{3}{2}$$

vr% oRr dk dUn $(-g, -f) = \left(-\frac{5}{2}, \frac{3}{2}\right)$ rFkk

f=T;k $\quad r = \sqrt{g^2 + f^2 - c}$

$$r = \sqrt{\left(\frac{5}{2}\right)^2 + \left(\frac{-3}{2}\right)^2 - \left(\frac{-1}{2}\right)}$$

$$r=\sqrt{\frac{25}{4}+\frac{9}{4}+\frac{1}{2}}$$

$$r=\sqrt{\frac{36}{4}}=\sqrt{9}=3$$

vr% oRr dk dUn $\left(-\frac{5}{2},\frac{3}{2}\right)$ rFkk f=T;k 3 gksxkA

^^vFkok**

fn;k x;k oRr dk lehdj.k

$$x^2+y^2-8x+6y-5=0 \quad .... (1)$$

oRr (1) d ldUnh; oRr dk lehdj.k

$$x^2+y^2-8x+6y-c=0 \quad .... (2)$$

$\because$ oRr (2) fcUnq $(-2,-7)$ l gksdj tkrk g vr% ;g fcUnq oRr d lehdj.k dk lrq"V djxkA

$$\therefore (-2)^2+(-7)^2-8(-2)+6(-7)+c=0$$

$$4+49+16-42+c=0$$

$$27+c=0$$

$$c=-27$$

vr% leh- (2) e $c=-27$ j[ku ij

$$x^2+y^2-8x+6y-27=0$$

;gh oRr dk vHkh"V lehdj.k gA

mRrj 20& fn;k g&

$$6x+y-3z=4$$
$$x+3y-2z=5$$
$$2x+y+4z=8$$

$$\Delta = \begin{vmatrix} 6 & 1 & -3 \\ 1 & 3 & -2 \\ 2 & 1 & 4 \end{vmatrix}$$

[R_1 d lkkis{k foLrkj lkj]

$$\Delta = 6\begin{vmatrix} 3 & -2 \\ 1 & 4 \end{vmatrix} - 1\begin{vmatrix} 1 & -2 \\ 2 & 4 \end{vmatrix} - 3\begin{vmatrix} 1 & 3 \\ 2 & 1 \end{vmatrix}$$

$= 6 [(3)(4) - (1)(-2)] - 1 [(1)(4) - (2)(2)] - 3 [(1)(1) - (3)(2)]$

$= 6 [12 + 2] - 1 [4 + 4] - 3 [1 - 6]$

$= 84 - 8 + 15 = 91$

$$\Delta_1 = \begin{vmatrix} 5 & 1 & -3 \\ 5 & 3 & -2 \\ 8 & 1 & 4 \end{vmatrix}$$

[R_1 d LkkIk{k f0kLRkkj Ikj]

$$\Delta_1 = 5\begin{vmatrix} 3 & -2 \\ 2 & 4 \end{vmatrix} - 1\begin{vmatrix} 5 & -2 \\ 8 & 4 \end{vmatrix} - 3\begin{vmatrix} 5 & 3 \\ 8 & 1 \end{vmatrix}$$

$= 5 [12 + 2] - 1 [20 + 16] - 3 [5 - 24]$

$= 70 - 36 + 57 = 91$

rFkk $$\Delta_2 = \begin{vmatrix} 6 & 5 & -3 \\ 1 & 5 & -2 \\ 2 & 8 & 4 \end{vmatrix}$$

[R_1 d LkkIk{k f0kLRkkj Ikj]

$\Delta_2 = 6 [20 + 16] - 5 [4 + 4] - 3 [8 - 10]$

$= 216 - 40 + 6 = 182$

$$\Delta_3 = \begin{vmatrix} 6 & 1 & 5 \\ 1 & 3 & 5 \\ 2 & 1 & 8 \end{vmatrix}$$

[R_1 d LkkIk{k f0kLRkkj Ikj]

$\Delta_3 = 6 [24 - 5] - 1 [8 - 10] - 5 [1 - 6]$

$= 114 + 2 - 25 = 91$

ØEkj fUk,kEk Lk , $$\frac{x}{\Delta_1} = \frac{y}{\Delta_2} = \frac{z}{\Delta_3} = \frac{1}{\Delta}$$

$$\Rightarrow \quad \frac{x}{91} = \frac{y}{182} = \frac{z}{91} = \frac{1}{91}$$

$\therefore$ x = 1, y = 2, z = 1. mÙkj

^^vFkok**

fn;k gS& $x - 4y - z = 11$
$2x - 5y + 2z = 39$
$-3x + 2y + z = 1$

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

[R_1 d LkkIk{k foLRkkj Ikj]

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

$= 6(-5-4) + 4(2+6) - 1(4-15)$

$= -9 + 32 + 11$

$= 34$

$\Delta_1 = \begin{vmatrix} 11 & -4 & -1 \\ 39 & -5 & 2 \\ 1 & 2 & 1 \end{vmatrix}$

[R_1 d LkkIk{k foLRkkj Ikj]

$\Delta_1 = 1\begin{vmatrix} -5 & 2 \\ 2 & 1 \end{vmatrix} + 4\begin{vmatrix} 39 & 2 \\ 1 & 1 \end{vmatrix} - 1\begin{vmatrix} 39 & -5 \\ 1 & 2 \end{vmatrix}$

$= 11(-5-4) + 4(39-2) - 1(78+5)$

$= 11(-9) + 4 \times 37 - 83$

$= -99 + 148 - 83$

$= -182 + 148$

$= -34$

rFkk $\Delta_2 = \begin{vmatrix} 1 & 11 & -1 \\ 2 & 39 & 2 \\ -3 & 1 & 1 \end{vmatrix}$

[R_1 d LkkIk{k foLRkkj Ikj]

$\Delta_2 = 1\begin{vmatrix} 39 & 2 \\ 1 & 1 \end{vmatrix} - 11\begin{vmatrix} 2 & 2 \\ -3 & 1 \end{vmatrix} - 1\begin{vmatrix} 2 & 39 \\ -3 & 1 \end{vmatrix}$

$= 1(39-2) - 11(2+6) - 1(2+117)$

$$A_{22} = (-1)^{2+2}\begin{vmatrix}1 & 2\\3 & 1\end{vmatrix} = 1 - 6 = -5$$

$$A_{23} = (-1)^{2+3}\begin{vmatrix}1 & 0\\3 & 2\end{vmatrix} = -(2-0) = -2$$

$$A_{31} = (-1)^{3+1}\begin{vmatrix}0 & 2\\1 & 0\end{vmatrix} = 0 - 2 = -2$$

$$A_{32} = (-1)^{3+2}\begin{vmatrix}1 & 2\\2 & 0\end{vmatrix} = -(0-4) = 4$$

और $$A_{33} = (-1)^{3+3}\begin{vmatrix}1 & 0\\2 & 1\end{vmatrix} = 1 - 0 = 1$$

अतः $$\text{Adj } A = \begin{bmatrix}A_{11} & A_{21} & A_{31}\\A_{12} & A_{22} & A_{32}\\A_{13} & A_{23} & A_{33}\end{bmatrix} = \begin{bmatrix}1 & 4 & -2\\-2 & -5 & 4\\1 & -2 & 1\end{bmatrix}$$ उत्तर

“अथवा”

दिया गया आव्यूह है $A = \begin{bmatrix}1 & 2 & 1\\3 & 2 & 3\\1 & 1 & 2\end{bmatrix}$

$$\therefore \quad A_{11} = (-1)^{1+1}\begin{vmatrix}2 & 3\\1 & 2\end{vmatrix} = 4 - 3 = 1$$

$$A_{12} = (-1)^{1+2}\begin{vmatrix}3 & 3\\1 & 2\end{vmatrix} = -(6-3) = -3$$

$$A_{13} = (-1)^{1+3}\begin{vmatrix}3 & 2\\1 & 1\end{vmatrix} = 3 - 2 = 1$$

$$A_{21} = (-1)^{2+1}\begin{vmatrix}2 & 1\\1 & 2\end{vmatrix} = -(4-1) = -3$$

$$A_{22} = (-1)^{2+2}\begin{vmatrix}1 & 1\\1 & 2\end{vmatrix} = 2 - 1 = 1$$

$$A_{23} = (-1)^{2+3}\begin{vmatrix}1 & 2\\1 & 1\end{vmatrix} = -(1-2) = 1$$

$$A_{31} = (-1)^{3+1}\begin{vmatrix}2 & 1\\2 & 3\end{vmatrix} = 6 - 2 = 4$$

$$A_{32} = (-1)^{3+2}\begin{vmatrix}1 & 1\\ 3 & 3\end{vmatrix} = -(3-3) = 0$$

vkj $$A_{33} = (-1)^{3+3}\begin{vmatrix}1 & 2\\ 3 & 2\end{vmatrix} = 2-6 = -4$$

vRk% $$\text{Adj}\,A = \begin{bmatrix}A_{11} & A_{21} & A_{31}\\ A_{12} & A_{22} & A_{32}\\ A_{13} & A_{23} & A_{33}\end{bmatrix} = \begin{bmatrix}1 & -3 & 4\\ -3 & 1 & 0\\ 1 & 1 & -4\end{bmatrix}$$ mÙkj

mRrj 22& fn¸k g¸ LkEkhdj.kk dk gEk vk0¸kg LkEkhdj.k $AX = B$ d :Ik Ek fYk[k LkdRk g] Tkgk

$$A = \begin{bmatrix}2 & -1 & -1\\ 3 & 1 & -1\\ 1 & 1 & -1\end{bmatrix},\quad X = \begin{bmatrix}x\\ y\\ z\end{bmatrix}$$ vkj $$B = \begin{bmatrix}7\\ 7\\ 3\end{bmatrix}$$

$$\therefore \quad |A| = \begin{bmatrix}2 & -1 & -1\\ 3 & 1 & -1\\ 1 & 1 & -1\end{bmatrix}$$

$$\therefore \quad |A| = 2(-1+1) - 1(-1+3) - 1(3-1)$$
$$= -2-2 = -4$$

$$\therefore \quad A_{11} = \begin{vmatrix}1 & -1\\ 1 & -1\end{vmatrix} = -1+1 = 0$$

$$A_{12} = -\begin{vmatrix}3 & -1\\ 1 & -1\end{vmatrix} = -(-3+1) = 2$$

$$A_{13} = \begin{vmatrix}3 & 1\\ 1 & 1\end{vmatrix} = 3-1 = 2$$

$$A_{21} = -\begin{vmatrix}-1 & -1\\ 0 & -1\end{vmatrix} = -(1+1) = -2$$

$$A_{22} = \begin{vmatrix}2 & -1\\ 1 & -1\end{vmatrix} = -2+1 = -1$$

$$A_{23} = -\begin{vmatrix}2 & -1\\ 1 & 1\end{vmatrix} = -(2+1) = -3$$

$$A_{31} = \begin{vmatrix}-1 & -1\\ 1 & -1\end{vmatrix} = 1+1 = 2$$

$$A_{32} = -\begin{vmatrix} 2 & -1 \\ 3 & -1 \end{vmatrix} = -(-2+3) = -1$$

vkj $$A_{33} = \begin{vmatrix} 2 & -1 \\ 3 & 1 \end{vmatrix} = 2 + 3 = 5$$

$$\therefore \text{ Adj } A = \begin{bmatrix} A_{11} & A_{21} & A_{31} \\ A_{12} & A_{22} & A_{32} \\ A_{13} & A_{23} & A_{33} \end{bmatrix} = \begin{bmatrix} 0 & -2 & -2 \\ 2 & -1 & -1 \\ 2 & -3 & 5 \end{bmatrix}$$

vRk% $$A^{-1} = \frac{1}{|A|}\text{Adj } A = -\frac{1}{4}\begin{bmatrix} 0 & -2 & -2 \\ 2 & -1 & -1 \\ 2 & -3 & 5 \end{bmatrix}$$

$$\therefore X = A^{-1}B$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = -\frac{1}{4}\begin{bmatrix} 0 & -2 & -2 \\ 2 & -1 & -1 \\ 2 & -3 & 5 \end{bmatrix} \times \begin{bmatrix} 7 \\ 7 \\ 3 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = -\frac{1}{4}\begin{bmatrix} 0\times7-2\times7+2\times3 \\ 2\times7-1\times7-1\times3 \\ 2\times7-3\times7+5\times3 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = -\frac{1}{4}\begin{bmatrix} -8 \\ 4 \\ 8 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ -2 \end{bmatrix}$$

vr% $x = 2,\ y = -1,\ z = -2$ **mÙkj**

^^vFkok**

fn¸k Xk¸k LkEkhdj.k fUkdk¸k dk $AX = B$ d :Ik Ek fYk[k LkdRk g] Tkgk

$$A = \begin{bmatrix} 3 & -4 & 2 \\ 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}, \quad X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \text{ vkj } B = \begin{bmatrix} -1 \\ 7 \\ 2 \end{bmatrix}$$

$$\therefore \quad |A| = \begin{bmatrix} 3 & -4 & 2 \\ 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}$$

$$\therefore \quad |A| = 3(3-0) + 4(5-2) + 2(0-3)$$
$$= 9 - 12 - 6 = -9$$

$$\therefore \quad A_{11} = \begin{vmatrix} 3 & 5 \\ 0 & 1 \end{vmatrix} = 3 - 0 = 3$$

$$A_{12} = -\begin{vmatrix} 2 & 5 \\ 1 & 1 \end{vmatrix} = -(2-5) = 3$$

$$A_{13} = \begin{vmatrix} 2 & 3 \\ 1 & 0 \end{vmatrix} = 0 - 3 = -3$$

$$A_{21} = -\begin{vmatrix} -4 & 2 \\ 0 & 1 \end{vmatrix} = -(4-0) = 4$$

$$A_{22} = \begin{vmatrix} 3 & 2 \\ 1 & 1 \end{vmatrix} = 3 - 2 = 1$$

$$A_{23} = -\begin{vmatrix} 3 & -4 \\ 1 & 0 \end{vmatrix} = -(0+4) = -4$$

$$A_{31} = \begin{vmatrix} -4 & 2 \\ 3 & 5 \end{vmatrix} = -20 - 6 = -26$$

$$A_{32} = \begin{vmatrix} 3 & 2 \\ 2 & 5 \end{vmatrix} = -(15-4) = -11$$

vkj $A_{33} = \begin{vmatrix} 3 & -4 \\ 2 & 3 \end{vmatrix} = 9 + 8 = 17$

$$\therefore \quad \text{Adj } A = \begin{bmatrix} A_{11} & A_{21} & A_{31} \\ A_{12} & A_{22} & A_{32} \\ A_{13} & A_{23} & A_{33} \end{bmatrix} = \begin{bmatrix} 3 & 4 & -26 \\ 3 & 1 & -11 \\ -3 & -4 & 17 \end{bmatrix}$$

vRk% $A^{-1} = \frac{1}{|A|} \text{Adj } A = \frac{1}{9}\begin{bmatrix} 3 & 4 & -26 \\ 3 & 1 & -11 \\ -3 & -4 & 17 \end{bmatrix}$

$$\therefore \quad X = A^{-1}B$$

$$X = \frac{1}{9}\begin{bmatrix} 3 & 4 & -26 \\ 3 & 1 & -11 \\ -3 & -4 & 17 \end{bmatrix} \times \begin{bmatrix} -1 \\ 7 \\ 2 \end{bmatrix}$$

$$X = -\frac{1}{9}\begin{bmatrix} -3\times1+4\times7-26\times2 \\ -3\times1+7\times1-11\times2 \\ -3\times1+4\times7-17\times2 \end{bmatrix} = -\frac{1}{9}\begin{bmatrix} -27 \\ -18 \\ 9 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \\ -1 \end{bmatrix}$$

vr% $x = 3, \quad y = 2, \quad z = -1$ mÙkj

mRrj 23& u = x – 6 RkFkk v = y – 15 EkkUk YkUk Ikj]

x	y	u = x –6	v = y–15	uv	u^2	v^2
1	8	5	7	35	25	49
3	12	3	3	9	9	9
5	15	-1	0	0	1	0
7	17	1	2	2	1	4
8	18	2	3	6	4	9
10	20	4	5	20	16	25
		$\sum u = -2$	$\sum v = 0$	$\sum uv = 72$	$\sum u^2 = 56$	$\sum v^2 = 96$

¸kgk n = 10

vRk% vHkh"V Lkg&LkECkU/k Xk.kkd]

$$r = \frac{\sum uv - \frac{\sum u \sum v}{n}}{\sqrt{\sum u^2 - \frac{(\sum u)^2}{n}}\sqrt{\sum v^2 - \frac{(\sum v)^2}{n}}}$$

$$= \frac{72-0}{\sqrt{56-\frac{4}{6}}.\sqrt{96-0}}$$

$$= \frac{72}{\sqrt{332\times16}}$$

$= 0.988$ mÙkj

^vFkok**

$u = x - 35$ RkFkk $v = y - 10$ EkkUk YkUk Ikj]

x	y	u = x –35	v = y–10	uv	u^2	v^2
20	16	15	6	90	225	36
25	10	10	0	0	100	0
30	8	5	2	10	25	4
35	20	0	10	0	0	100
40	5	5	5	25	25	25
45	10	10	0	0	100	0
		$\sum u = -15$	$\sum v = 9$	$\sum uv = -105$	$\sum u^2 = 475$	$\sum v^2 = 165$

¸kgk $n = 10$

vRk% vHkh"V Lkg–LkEcU/k Xk.kkd]

$$r = \frac{\frac{\sum uv}{n} - \left(\frac{\sum u}{n}\right)\left(\frac{\sum v}{n}\right)}{\sqrt{\frac{\sum u^2}{n} - \left(\frac{\sum u}{n}\right)^2}\sqrt{\frac{\sum v^2}{n} - \left(\frac{\sum v}{n}\right)^2}}$$

$$= \frac{\frac{-105}{6} - \left(\frac{-15}{6}\right)\left(\frac{9}{6}\right)}{\sqrt{\frac{475}{6} - \left(\frac{-15}{6}\right)^2}\sqrt{\frac{165}{6} - \left(\frac{9}{6}\right)^2}}$$

$$= \frac{-17.5 + 3.75}{\sqrt{29.17 - 6.25}\sqrt{27.5 - 2.25}}$$

$$= \frac{-13.75}{\sqrt{72.91 \times 25.25}} = -\frac{13.75}{42.9}$$

$$= 0.32$$

mRrj 24& (i) I

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

$$= \int \left[1 - \frac{1}{1+\sin x}\right] dx$$

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

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

$$= x - \int \frac{1-\sin x}{1-\sin^2 x}\,dx$$

$$= x - \int \frac{1-\sin x}{\cos^2 x}\,dx$$

$$= x - \int \left[\frac{1}{\cos^2 x} - \frac{\sin x}{\cos^2 x}\right] dx$$

$$= x - \int \left[\sec^2 x - \sec x \tan x\right] dx$$

mÙkj

(ii) I

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

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

$$= \int \frac{1-\cos x}{1-\cos^2 x}\,dx$$

$$= \int \frac{1-\cos x}{\sin^2 x}\,dx$$

$$= \int \left[\frac{1}{\sin^2 x} - \frac{\cos x}{\sin^2 x}\right] dx$$

$$= \int \left[\operatorname{cosec}^2 x - \operatorname{cosec} x \cot x\right] dx$$

$$= \int \operatorname{cosec}^2 x\,dx + \int \operatorname{cosec} x \cot x\,dx \quad = \quad -\cot x - \operatorname{cosec} x$$

mRrj 25& gYk % $I = \int_0^4 \frac{dx}{x+\sqrt{x}}$

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

TkCk $x = 0$ RkCk $t = 0$

RkFkk TkCk $x = 4$ RkCk $t = 2$

$\therefore \quad I = \int_0^1 \frac{2dt}{t+1}$

$= 2[\log(t+1)]_0^2$

$= 2[\log(2+1) - \log(0+1)]$

$= 2[\log 3 - 0]$

$= 2\log 3$ ¸kgh fLk) djUkk FkkA

$I = \int_0^{\frac{\pi}{2}} \sqrt{\cos\theta}\,\sin^3\theta d\theta$

$= \int_0^{\frac{\pi}{2}} \sqrt{\cos\theta}\,\sin^2\theta \sin\theta d\theta$

$= \int_0^{\frac{\pi}{2}} \sqrt{\cos\theta}\,(1-\cos^2\theta)\sin\theta d\theta$

EkkUkk $\cos\theta = t \Rightarrow -\sin\theta d\theta = dt$

TkCk $x = 0$ RkCk $t = 1$

RkFkk TkCk $\theta = \frac{\pi}{2}$ RkCk $t = 0$

$\therefore \quad I = -\int_1^0 \sqrt{t}(1-t)^2 dt$

$= -\left[\frac{t^{\frac{1}{2}+1}}{\frac{1}{2}+1}\right]_1^0 + \left[\frac{t^{\frac{5}{2}+1}}{\frac{5}{2}+1}\right]_1^0$

$= -\frac{2}{3}\left[t^{\frac{3}{2}}\right]_1^0 + \left[t^{\frac{7}{2}}\right]_1^0$

$= -\frac{2}{3}[0-1] + \frac{2}{7}[0-1] = \frac{2}{3} - \frac{2}{7} = \frac{14-6}{21}$

$= \frac{8}{21}$ ¸kgh fLk) djUkk FkkA

mRrj 26& EkkUkk $A = \begin{bmatrix} a & 0 & 1 \\ 1 & b & 0 \\ 0 & 1 & 0 \end{bmatrix}$

$\therefore \quad |A| = a(0-0) + 1(1-0) = 1$

$A_{11} = \begin{vmatrix} b & 0 \\ 1 & 0 \end{vmatrix} = 0 - 0 = 0$

$$A_{12} = -\begin{vmatrix} 1 & 0 \\ 0 & 0 \end{vmatrix} = 0 - 0 = 0$$

$$A_{13} = \begin{vmatrix} 1 & b \\ 0 & 1 \end{vmatrix} = 1 - 0 = 1$$

$$A_{21} = -\begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix} = -(0 - 1) = 1$$

$$A_{22} = \begin{vmatrix} a & 1 \\ 0 & 0 \end{vmatrix} = 0 - 0 = 0$$

$$A_{23} = -\begin{vmatrix} a & b \\ 0 & 1 \end{vmatrix} = -(a - 0) = -a$$

$$A_{31} = \begin{vmatrix} 0 & 1 \\ b & 0 \end{vmatrix} = 0 - b = -b$$

$$A_{32} = -\begin{vmatrix} a & 1 \\ 1 & 0 \end{vmatrix} = -(0 - 1) = 0$$

vkj $$A_{33} = \begin{vmatrix} a & 0 \\ 1 & b \end{vmatrix} = ab - 0 = ab$$

$$\therefore \text{ Adj } A = \begin{bmatrix} A_{11} & A_{21} & A_{31} \\ A_{12} & A_{22} & A_{32} \\ A_{13} & A_{23} & A_{33} \end{bmatrix} = \begin{bmatrix} 0 & 1 & -b \\ 0 & 0 & 1 \\ 1 & -a & ab \end{bmatrix}$$

vr% $$A^{-1} = \frac{1}{|A|} \text{ Adj } A = \frac{1}{1}\begin{bmatrix} 1 & -1 & -b \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix} = \begin{bmatrix} 1 & -1 & -b \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$$ mÙkj

^^vFkok**

ekuk $$A = \begin{bmatrix} a & 1 & b \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\therefore \quad |A| = a(1 - 0) + 1(0 - 0) + b(0 - 0) = a$$

$$A_{11} = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} = 1 - 0 = 1$$

$$A_{12} = -\begin{vmatrix} 0 & 0 \\ 0 & 1 \end{vmatrix} = 0$$

$$A_{13} = \begin{vmatrix} 0 & 1 \\ 0 & 0 \end{vmatrix} = 0$$

$$A_{21} = -\begin{vmatrix} 1 & b \\ 0 & 1 \end{vmatrix} = -(1-0) = -1$$

$$A_{22} = \begin{vmatrix} a & b \\ 0 & 1 \end{vmatrix} = a - 0 = a$$

$$A_{23} = -\begin{vmatrix} a & 1 \\ 0 & 0 \end{vmatrix} = 0$$

$$A_{31} = \begin{vmatrix} 1 & b \\ 1 & 0 \end{vmatrix} = 0 - b = -b$$

$$A_{32} = -\begin{vmatrix} a & b \\ 0 & 0 \end{vmatrix} = -(0-0) = 0$$

vkj $A_{33} = \begin{vmatrix} a & 1 \\ 0 & 1 \end{vmatrix} = a - 0 = a$

$$\therefore \ \text{Adj } A = \begin{bmatrix} A_{11} & A_{21} & A_{31} \\ A_{12} & A_{22} & A_{32} \\ A_{13} & A_{23} & A_{33} \end{bmatrix} = \begin{bmatrix} 1 & -1 & -b \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$$

vRk% $A^{-1} = \dfrac{1}{|A|} \text{Adj } A = \dfrac{1}{a}\begin{bmatrix} 1 & -1 & -b \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$

$$= \begin{bmatrix} \frac{1}{a} & -\frac{1}{a} & -\frac{b}{a} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$ mÙkj

mRrj 27&

¼a½ LkEkkJ¸k.k j[kk,¡ g¨%

$$8x - 10y + 66 = 0$$

RkFkk $40x - 18y - 214 = 0$

$\because$ ¸k j[kk, $(\bar{x}, \bar{y})$ Lk gkdj TkkRkh g]

$$\therefore \quad 8x - 10y + 66 = 0$$

vkj $40x - 18y - 214 = 0$

bUg gYk djUk Ikj] $\overline{x} = 13$ RkFkk $\overline{y} = 17$ **mÙkj**

¼b½ EkkUkk y dh x Ikj LkEkkJ¸k.k j[kk g½

$8x - 10y + 66 = 0$

vkj x dh y Ikj LkEkkJ¸k.k j[kk g½

$40x - 18y - 214 = 0$

bUg mfPkRk :Ik Ek fYk[kUk Ikj

$$y = \frac{8}{10}x + \frac{66}{10} \qquad ....(1)$$

RkFkk

$$x = \frac{18}{40}y + \frac{214}{40} \qquad ....(2)$$

vRk½ $b_{yx} = \frac{8}{10}$ RkFkk $b_{xy} = \frac{18}{40}$

$$\therefore \quad r = \sqrt{b_{yx}.b_{xy}} = \sqrt{\frac{8}{10} \times \frac{18}{40}} = \frac{6}{10} = 0.6$$ **mÙkj**

(c) $b_{yx} = r\frac{\sigma_y}{\sigma_x} = \frac{8}{10}; \quad b_{xy} = r\frac{\sigma_x}{\sigma_y} = \frac{18}{40}$

$$\therefore \quad \frac{r\sigma_x}{\sigma_y} \div \frac{r\sigma_y}{\sigma_x} = \frac{8}{10} \div \frac{18}{40}$$

$$\Rightarrow \quad \frac{\sigma_y^{\ 2}}{\sigma_x^{\ 2}} = \frac{8}{10} \times \frac{18}{40} = \frac{16}{9}$$

$\therefore$ y dk IkLkj.k ½ x dk IkLkj.k = 16 : 9 **mÙkj**

^^vFkok**

$$\tan\theta = \left(\frac{1-r^2}{r}\right)\frac{\sigma_x\sigma_y}{\sigma_x^{\ 2} + \sigma_y^{\ 2}}$$

Equation of Regration Line X on Y is = $X - \overline{X} = b_{xy}(y - y_1)$

Equation of Regration Line Y on X is = $X - \overline{X} = b_{yx}(y - y_1)$

$m_1 = b_{xy}, \quad m_2 = b_{yx}$

$$\tan\theta = \frac{b_{xy} - b_{yx}}{1 + b_{xy} b_{yx}}$$

$$\tan\theta = \frac{r\frac{b_x}{b_y} - r\frac{b_y}{b_x}}{1 + \left(r\frac{b_x}{b_y}\right)\left(r\frac{b_y}{b_x}\right)}$$

When simplify,

$$\tan\theta = \left(\frac{1 - r^2}{r}\right)\frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}$$

&&00&&