ii. Find the Karl Pearson's coefficient of correlation for the following data **5**

| | | | | | |
|---|---|---|---|---|---|
| x | 2 | 4 | 4 | 7 | 5 |
| y | 8 | 8 | 5 | 6 | 2 |

iii. Find the line of regression of y on x for the following data **5**

| | | | | | |
|---|---|---|---|---|---|
| x | 5 | 2 | 1 | 4 | 3 |
| y | 5 | 8 | 4 | 2 | 10 |

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*Total No. of Questions: 6* *Total No. of Printed Pages:4*

**Enrollment No......................................**

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

CA5BS01 Mathematical Foundation of Computer Science

Programme: MCA Branch/Specialisation: Computer Application

**Duration: 3 Hrs.** **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. If $A = \{1,2,3,4,5\}$ and $B = \{3,4,5,6\}$ then $A - B$ is **1**

(a) $\{3,4,5\}$ (b) $\{1,2\}$ (c) $\{6\}$ (d) None of these

ii. If for any two sets A and B such that $A \cap B = \emptyset$ then A and B are called **1**

(a) Equal sets (b) Universal sets

(c) Disjoint sets (d) None of these

iii. If $A = \{1,2,3\}$ and $B = \{a, b, c, d\}$ and if the relation $R = \{(1, a), (1, b), (2, a)\}$, then domain of R is the set **1**

(a) $\{1,2\}$ (b) $\{1,2,3\}$ (c) $\{a, b\}$ (d) None of these

iv. The range of the $f: R \rightarrow R$ defined by $f(x) = \sin x$, is **1**

(a) $[0,1]$ (b) $[-1,1]$ (c) $[-1,0]$ (d) $[-\pi, \pi]$

v. A matrix $M$ is called idempotent if **1**

(a) $M.M = M$ (b) $M^T.M = M$

(c) $M.M = 0$ (d) $M.M = I$

vi. Every square matrix satisfies its **1**

(a) Characteristic polynomial (b) Characteristic equation

(c) Characteristic vectors (d) Characteristic roots

vii. Calculating the difference between the largest and smallest figure produces which figure? **1**

(a) Variance (b) Range

(c) Quartile Deviation (d) None of these

viii. The sum of deviations taken from mean is always **1**

(a) Zero (b) Positive

(c) Negative (d) None of these

ix. The correlation coefficient is the ______________ of the two-regression coefficient. **1**

(a) Arithmetic mean (b) Geometric mean

(c) Harmonic Mean (d) None of these

x. A process by which we estimate the value of dependent variable on the basis of one or more independent variables is called **1**

(a) Correlation (b) Regression

(c) Deviation (d) None of these

Q.2 Attempt any two:

i. If A, B, C are three sets, prove that **5**

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

(b) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

ii. A class has 100 students. The following is the description showing the number of students studying one or more of the following subjects in this class: Mathematics 32; Physics 20; Chemistry 45; Mathematics and Physics 7; Mathematics and Chemistry 15; Physics and Chemistry 30; and none of the three subjects 30. Find how many students study all the three subjects? **5**

iii. If $A, B, C$ are three sets then prove that $A\times(B - C) = (A \times B) - (A \times C)$. **5**

Q.3 Attempt any two:

i. Prove that the relation R on the set $N \times N$ defined by **5**
$(a, b)R(c, d) \Leftrightarrow a + d = b + c$, for all $(a, b), (c, d) \in N \times N$ is an equivalence relation.

ii. If $f: R \to R$ defined by $f(x) = x^2$ for all $x \in R$ and $g: R \to R$ defined by $g(x) = \sin x$ for all $x \in R$ then show that $(f \circ g)x \neq (g \circ f)x$. **5**

iii. Prove that the relation "x divides y" or $y = kx$, for some positive integer k on the set of positive integer N is a partial order relation. **5**



Q.4 Attempt any two:

i. Define rank of a matrix and find the rank of matrix **5**

$$A=\begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{bmatrix}$$

ii. Test for consistency and solve **5**
$x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6.$

iii. Verify Cayley – Hamilton theorem for the matrix A and hence compute $A^{-1}$, **5**

where $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$.

Q.5 Attempt any two:

i. The mean height of 27 boys in a section A of a class is 150cms and the mean height of 33 boys in a section B of same class is 140cms. Find the overall mean height of 60 boys. **5**

ii. An incomplete frequency distribution is given below **5**

| Class | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|---|---|---|---|---|---|---|---|
| Frequency | 12 | 30 | ? | 65 | ? | 25 | 18 |

Find the missing frequencies when the total frequency is 229 and the median is 46.

iii. Calculate the standard deviation for the following data by step deviation method **5**

| Class | 0-4 | 4-8 | 8-12 | 12-16 |
|---|---|---|---|---|
| Frequency | 4 | 8 | 2 | 1 |

Q.6 Attempt any two:

i. Following data are given: **5**

| | X | Y |
|---|---|---|
| Arithmetic mean | 65 | 67 |
| Standard deviation | 2.5 | 305 |

The correlation coefficient between X and Y is 0.8. Find the two regression equations.

P.T.O.

MEDI-CAPS UNIVERSITY, INDORE
Faculty of Engineering



End Sem (odd) Examination Dec-2019 — MARKS

CA5BS01 M.F.C.S.

Programme - MCA.

| | | |
|---|---|---|
| Que-1(i) | (b) $\{1, 2\}$ | +1 |
| ii | (c) Disjoint sets | +1 |
| iii | (a) $\{1, 2\}$ | +1 |
| iv | (b) $[-1, 1]$ | +1 |
| v | (a) M.M. = M | +1 |
| vi | (b) characteristic equation. | +1 |
| vii | (b) Range | +1 |
| viii | (a) zero | +1 |
| ix | (b) Geometric mean | +1 |
| x | (b) Regression. | +1 |

Que 2(i) Let $x$ be an arbitrary element of $A\cup(B\cap C)$. Then

$x\in A\cup(B\cap C) \Leftrightarrow x\in A$ or $x\in(B\cap C)$

$\Leftrightarrow x\in A$ or $(x\in B$ and $x\in C)$

$\Leftrightarrow (x\in A$ or $x\in B)$ and $(x\in A$ or $x\in C)$ +1

$\Leftrightarrow x\in(A\cup B)$ and $x\in(A\cup C)$

$\Leftrightarrow x\in(A\cup B)\cap(A\cup C)$ +1

Hence $A\cup(B\cap C) = (A\cup B)\cap(A\cup C)$ +0.5

(ii) Let $x$ be an arbitrary element of $A\cap(B\cup C)$. Then

$x\in A\cap(B\cup C) \Leftrightarrow x\in A$ and $x\in(B\cup C)$

$\Leftrightarrow x\in A$ and $(x\in B$ or $x\in C)$ +1

$\Leftrightarrow (x\in A$ and $x\in B)$ or $(x\in A$ and $x\in C)$

$\Leftrightarrow x\in(A\cap B)$ or $x\in(A\cap C)$

$\Leftrightarrow x\in(A\cap B)\cup(A\cap C)$ +1

Hence $A\cap(B\cup C) = (A\cap B)\cup(A\cap C)$ +0.5

Qu.2(ii) Let X denote the set of all students in the class — MARKS

Let M, P and C denote the set of students studying Mathematics, Physics and Chemistry respectively, then we have

$|X| = 100$, $|M| = 32$, $|P| = 20$, $|C| = 45$

$|M \cap P| = 7$ $|M \cap C| = 15$ $|P \cap C| = 30$ $|(M \cup P \cup C)'| = 30$ (+1)

By Principle of inclusion and exclusion

$$|M \cap P \cap C| = |M \cup P \cup C| - |M| - |P| - |C| + |M \cap P| + |M \cap C| + |C \cap P|$$ (+1)

Here

$$|M \cup P \cup C| = |X| - |(M \cup P \cup C)'|$$ (+1)

$$|M \cup P \cup C| = 100 - 30 = 70$$

$\therefore$ $|M \cap P \cap C| = 70 - 32 - 20 - 45 + 7 + 15 + 30 = 25$ (+2)

i.e. 25 students studying all the three subjects.

Qu.2(iii) Let $(x, y)$ be an arbitrary element of $(A \times (B - C))$, then

$(x, y) \in A \times (B - C) \Rightarrow x \in A$ and $y \in (B - C)$

$\Rightarrow x \in A$ and $(y \in B$ and $y \notin C)$

$\Rightarrow (x \in A$ and $y \in B)$ and $(x \in A$ and $y \notin C)$

$\Rightarrow (x, y) \in A \times B$ and $(x, y) \notin (A \times C)$

$\Rightarrow (x, y) \in (A \times B) - (A \times C)$ (+2.5)

$\therefore$ $A \times (B - C) \subseteq (A \times B) - (A \times C) \longrightarrow$ equ. (1)

Again let $(x, y) \in (A \times B) - (A \times C)$ be an arbitrary element

then $(x, y) \in (A \times B) - (A \times C) \Rightarrow (x, y) \in A \times B$ and $(x, y) \notin A \times C$

$\Rightarrow (x \in A$ and $y \in B)$ and $(x \in A$ and $y \notin C)$

$\Rightarrow x \in A$ and $(y \in B$ and $y \notin C)$

$\Rightarrow x \in A$ and $y \in (B - C)$

$\Rightarrow (x, y) \in A \times (B - C)$

i.e. $(A \times B) - (A \times C) \subseteq A \times (B - C) \longrightarrow$ equ. (2)

from (1) and (2) $A \times (B - C) = (A \times B) - (A \times C)$ (+2.5)

MARKS

Que.3(i) Suppose the relation R defined on N×N by
$(a,b) R (c,d) \Leftrightarrow (a+d) = (b+c) \quad \forall (a,b),(c,d) \in N\times N$ ①

(i) Reflexive Relation. (+1)

Let (a,b) be an arbitrary element of N×N. Then by defi. ①
$$a+b = b+a$$
$$\Rightarrow (a,b) R (a,b)$$

Thus $(a,b) R (a,b) \quad \forall (a,b) \in N\times N$.
$\Rightarrow$ Relation 'R' is reflexive on N×N. (+1)

(ii) Symmetry. Let $(a,b), (c,d) \in N\times N$. Then
$$(a,b) R (c,d) \Rightarrow a+d = b+c$$
$$\Rightarrow c+b = d+a$$
$$\Rightarrow (c,d) R (a,b)$$

i.e. $(a,b) R (c,d) \Rightarrow (c,d) R (a,b)$ (+1)
$\Rightarrow$ Relation 'R' is symmetric

(iii) Transitive. Let $(a,b), (c,d), (e,f) \in N\times N$. Then by ①
$(a,b) R (c,d) \Rightarrow a+d = b+c \rightarrow (*)$
and $(c,d) R (e,f) \Rightarrow c+f = d+e \rightarrow (**)$
$$\Rightarrow (a+d)+(c+f) = (b+c)+(d+e) \text{ by } (*) \,\&\, (**)$$
$$\Rightarrow a+f = b+e$$
$$\Rightarrow (a,b) R (e,f)$$
$$\Rightarrow R \text{ is transitive.}$$ (+1)

Thus relation R is an equivalence relation on N×N. (+1)

Que.3(ii) Given $f(x) = x^2$ and $g(x) = \sin x$

By defi. of composition of functions.
$$(g\circ f)(x) = g(f(x))$$
$$\therefore (g\circ f)(x) = g(x^2) = \sin x^2$$ (+2)

and $(f\circ g)(x) = f(g(x))$
$$\therefore (f\circ g)(x) = f(g(x)) = f(\sin x) = (\sin x)^2$$ (+2)

i.e. $f\circ g(x) = (\sin x)^2$ and $(g\circ f)(x) = \sin x^2$

Clearly $(f\circ g)(x) \neq (g\circ f)(x)$ (+1)

Que.3(ii) The given relation $x$ divides $y$ or $y=kx$ for some positive integer $k$ defined on the set of positive integer $N$ is given by MARKS

$x \le y \Leftrightarrow x|y$ or $y=kx$ $\forall\, x,y \in N$.

(i) Reflexive. since $x$ divides $x$ i.e. $x|x$ $\forall x \in N$.

$\therefore$ Relation $x \le x$ or $x$ divides $x$ is reflexive. (+1)

(ii) Anti-Symmetric. for $x,y \in N$.

let $x \le y$ i.e. $x|y$ or $y=k_1x$

and $y \le x$ i.e. $y|x$ or $x=k_2y$

$\Rightarrow$ $y=k_1.(k_2y)$ or $k_1.k_2=1 \Rightarrow k_1=k_2=1$.

Hence $x \le y$, $y \le x \Rightarrow x=y$. (+2)

$\therefore$ Relation $x|y$ is anti-symmetric.

(iii) Transitive. let $x,y,z \in N$, then

$x \le y \Rightarrow y=k_1x$

$y \le z \Rightarrow z=k_2y$

$\therefore$ $z=k_2.k_1.x$ or $z=k.x$ where $k_1.k_2=k$

$\therefore$ $z=kx$ or $x$ divides $z$. i.e. $x|z$

Hence relation $x \le y \Leftrightarrow x$ divides $y$ or $y=kx$ (+2)

is partial order relation. and thus $(N, |)$ is a Poset.

Que.4(i) Rank of a matrix. let $A$ be any matrix. A number $r$ is called the rank of a matrix $A$ if it obeys the following two properties:

(i) there is at least one minor of $A$ of order $r$ which does not vanish.

(ii) every minor of $A$ of order higher than $r$ vanish. (+1)

Given

$$A=\begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{bmatrix} \Rightarrow |A| = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix}$$

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

$$A \sim \begin{bmatrix} 1 & 0 & 0 \\ a & b-a & c-a \\ a^3 & (b^3-a^3) & (c^3-a^3) \end{bmatrix}$$

$\therefore$ $|A| = (b-a)(c-a)(a-b)(a+b+c) \longrightarrow$ eqn. (1) (+1)

MARKS

Case I If $a=b=c$, then all minors of order 3 and 2 are zero
$\therefore \quad \rho(A)=1$ (+1)

Case II. If $a=b\neq c$, then, by ①
$|A|_{3\times3}=0$ but $\begin{vmatrix} 1 & 1 \\ a & c \end{vmatrix} = c-a \neq 0$

$\therefore \quad \rho(A)=2$ (+1)

Case III. If $a\neq b\neq c$ but $a+b+c=0$
then by ① $|A|=0$ but A has minor of order $2\times2$
$\begin{vmatrix} 1 & 1 \\ a & b \end{vmatrix} = b-a \neq 0 \quad \therefore \rho(A)=2$

Also if $a\neq b\neq c$ and $a+b+c\neq 0$
then by ①; $|A|_{3\times3}\neq 0$

$\therefore \quad \rho(A)=3$ (+1)

Ans.4(ii) We can write the above system of eqn. in matrix form
$AX=B$ as $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 4 \\ 6 \end{bmatrix}$

$\therefore [A:B] = \left[\begin{array}{ccc:c} 1 & 1 & 1 & 3 \\ 1 & 2 & 3 & 4 \\ 1 & 4 & 9 & 6 \end{array}\right]$ (+1)

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

$[A:B] \sim \left[\begin{array}{ccc:c} 1 & 1 & 1 & 3 \\ 0 & 1 & 2 & 1 \\ 0 & 2 & 6 & 2 \end{array}\right]$

$R_3 \to R_3\left(\frac{1}{2}\right)$

$[A:B] \sim \left[\begin{array}{ccc:c} 1 & 1 & 1 & 3 \\ 0 & 1 & 2 & 1 \\ 0 & 1 & 3 & 1 \end{array}\right]$

$R_3 \to R_3-R_2$

$[A:B] \sim \left[\begin{array}{ccc:c} 1 & 1 & 1 & 3 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 1 & 1 \end{array}\right]$ which is in upper triangular form. (+2)

MARKS

$\therefore \ \rho(A:B) = \rho(A) = 3$

Thus the given system of equations is consistent and have a unique solution. (+1)

Also by back substitution

$x+y+z=3, \ y+2z=1, \ z=0$

we get $z=0, \ y=1, \ x=2.$ (+1)

Q.4 (iii) Given

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

We know that $|A-\lambda I|=0$

$$\therefore \begin{vmatrix} 2-\lambda & -1 & 1 \\ -1 & 2-\lambda & -1 \\ 1 & -1 & 2-\lambda \end{vmatrix} = 0$$

On solving we get characteristic eqn.

$\lambda^3 - 6\lambda^2 + 9\lambda - 4 = 0 \longrightarrow (1)$ (+1)

To verify Cayley Hamilton theorem we show that

$A^3 - 6A^2 + 9A - 4I = 0 \longrightarrow (2)$

$$A^2 = \begin{bmatrix} 6 & -5 & 5 \\ -5 & 6 & -5 \\ 5 & -5 & 6 \end{bmatrix}$$ (+1)

and

$$A^3 = \begin{bmatrix} 22 & -21 & 21 \\ -21 & 22 & -21 \\ 21 & -21 & 22 \end{bmatrix}$$ (+1)

putting above values in eqn. (2) we get

$A^3 - 6A^2 + 9A - 4I = 0$ (+1)

To find $A^{-1}$; pre multiplying by $A^{-1}$ in eqn. (2)

$A^2 - 6A + 9I - 4A^{-1} = 0$ or $A^{-1} = \frac{1}{4}(A^2 - 6A + 9I)$

$$\therefore \ A^{-1} = \frac{1}{4}\begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{bmatrix}$$ (+1)

| | | MARKS |
|---|---|---|
| Qu. 5(i) | Given $n_1 = 27$, $m_1 = 150$ c.m. | |
| | $n_2 = 33$, $m_2 = 140$ c.m. | (+1) |
| | $\therefore$ mean height of 60 students $= \dfrac{m_1 . n_1 + m_2 . n_2}{n_1 + n_2}$ | (+1) |
| | $= \dfrac{(150 \times 27) + (140 \times 33)}{(27 + 33)}$ | (+1) |
| | $= \dfrac{8670}{60} = 144.5$ | (+1) |
| | Hence the mean height of 60 students is 144.5 c.m. | (+1) |

5(ii) Let the missing frequency of the class 30–40 is "a" and that of 60–70 be "b" then

Cumulative frequency Table

| Class | frequency | C.F. |
|---|---|---|
| 10–20 | 12 | 12 |
| 20–30 | 30 | 42 |
| 30–40 | a | 42+a |
| 40–50 | 65 | 107+a |
| 50–60 | b | 107+a+b |
| 60–70 | 25 | 132+a+b |
| 70–80 | 18 | 150+a+b |
| Total | N = 150+a+b | |

(+2)

According to given condition N = 229

$\Rightarrow \quad 229 = 150 + a + b$

$\Rightarrow \quad a + b = 79 \longrightarrow$ equ. ①

Since median is 46 so median class is 40–50. Thus

$$Md = l_1 + \left\{ \frac{\left(\frac{N}{2}\right) - c}{f} \right\} \times i \qquad (+1)$$

$$\therefore 46 = 40 + \left\{ \frac{\left(\frac{229}{2}\right) - (42 + a)}{65} \right\} \times 10$$

$\therefore a = 72.5 - 39 = 33.5$ (+1)

and $b = 79 - 33.5 = 45.5$

i.e. $a = 33.5$ and $45.5$ (+1)

Que-5(iii) Standard deviation table — MARKS

| class interval | frequency $f$ | Mid value $(x)$ | $u=\frac{x-10}{4}$ | $u^2$ | $f.u^2$ | $f.u$ |
|---|---|---|---|---|---|---|
| 0 – 4 | 4 | 2 | −2 | 4 | 16 | −8 |
| 4 – 8 | 8 | 6 | −1 | 1 | 8 | −8 |
| 8 – 12 | 2 | 10 | 0 | 0 | 0 | 0 |
| 12 – 16 | 1 | 14 | 1 | 1 | 1 | 1 |
| Total | 15 | | | | 25 | −15 |

(+2)

Here $u = (x-a)/i$

Let the assumed mean $a = 10$, $i$ = class interval $= 4$

By step deviation method

S.D. $\sigma = i \times \sqrt{\frac{\Sigma fu^2}{N} - \left(\frac{\Sigma fu}{N}\right)^2}$ (+1)

$\therefore \sigma = 4 \times \sqrt{\frac{25}{15} - \left(\frac{-15}{15}\right)^2}$

$= 4 \times \sqrt{1.666 - 1} = 4 \times \sqrt{0.666}$

$= 4 \times (0.8160) = 3.26$

i.e. $\sigma = 3.26$ (+2)

MARKS

Que. 6(i) Given $\bar{x} = 65$ $\sigma x = 2.5$

$\bar{y} = 67$ $\sigma y = 305$ $r = 0.8$ (+1)

The regression line of y on x is

$$(y-\bar{y}) = r.\frac{\sigma y}{\sigma x}(x-\bar{x})$$ (+1)

$$\Rightarrow (y-67) = (0.8) \times \frac{(305)}{(2.5)}(x-65)$$

$$(y-67) = (0.8)\times(122)(x-65) = (97.6)(x-65)$$

$$(y-67) = 97.6\,x - 6277$$

$$\therefore\ y = 97.6x - 6277$$ (+1)

The regression line of x on y is

$$(x-\bar{x}) = r.\frac{\sigma x}{\sigma y}(y-\bar{y})$$ (+1)

$$\therefore (x-65) = (0.8)\times\frac{2.5}{305}(y-67) =$$ +

$$= (0.8)(0.00819)(y-67) = (0.00655)(y-67)$$

$$(x-65) = 0.00655y + 65 - 0.4393$$

$$\Rightarrow\ x = 0.00655y + 64.5606.$$ (+1)

Que. 6(ii) We know that Karl Pearson's coefficient of correlation is

$$r_{xy} = \frac{\Sigma xy - \{(\Sigma x.\Sigma y)/n\}}{\sqrt{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}\sqrt{\Sigma y^2 - \frac{(\Sigma y)^2}{n}}}$$ (+1)

Table for calculation

| $x$ | $y$ | $x.y$ | $x^2$ | $y^2$ |
|---|---|---|---|---|
| 2 | 8 | 16 | 4 | 64 |
| 4 | 8 | 32 | 16 | 64 |
| 4 | 5 | 20 | 16 | 25 |
| 7 | 6 | 42 | 49 | 36 |
| 5 | 2 | 10 | 25 | 04 |
| $\Sigma x = 22$ | $\Sigma y = 29$ | $\Sigma xy = 120$ | $\Sigma x^2 = 110$ | $\Sigma y^2 = 193$ |

(+2)

MARKS

$$r_{xy} = \frac{120 - \{(22\times 29)/5\}}{\sqrt{110 - \frac{(22)^2}{5}}\sqrt{193 - \frac{(29)^2}{5}}} \quad (+1)$$

$$= \frac{-7.6}{\sqrt{13.2}\sqrt{24.8}} = -0.420$$

i.e. $r_{xy} = -0.420$ (+1)

Q.6(iii) Table for calculation.

| $x$ | $y$ | $x \cdot y$ | $x^2$ | $y^2$ |
|---|---|---|---|---|
| 5 | 5 | 25 | 25 | 25 |
| 2 | 8 | 16 | 04 | 64 |
| 1 | 4 | 04 | 01 | 16 |
| 4 | 2 | 08 | 16 | 04 |
| 3 | 10 | 30 | 09 | 100 |
| $\Sigma x=15$ | $\Sigma y=29$ | $\Sigma xy=83$ | $\Sigma x^2=55$ | $\Sigma y^2=209$ |

(+2)

The regression coefficient of $y$ on $x$ is

$$b_{yx} = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2}$$

$$= \frac{5\times 83 - 15\times 29}{5\times 55 - (15)^2} = \frac{-20}{50}$$

i.e. $b_{yx} = -0.4$ (+1)

Also $\bar{x} = \frac{\Sigma x}{n} = \frac{15}{5} = 3$ and $\bar{y} = \frac{\Sigma y}{n} = \frac{29}{5} = 5.8$ (+1)

The regression line of $y$ on $x$ is

$$(y - \bar{y}) = b_{yx}(x - \bar{x})$$

$\Rightarrow (y - 5.8) = (0.4)(x-3) = -0.4x + 1.2$

$\therefore\ y = -0.4x + 7$ (+1)