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63(FY) SEM-4/MAJ/ECOMAJ2044

2025

ECONOMICS

(Major)

Paper : ECOMAJ2044

(Statistical Methods for Economics)

Full Marks : 70

Pass Marks : 28

Time : Three hours

**The figures in the margin indicate
full marks for the questions.**

1. Choose the correct option : $1 \times 6 = 6$
- (a) The method of collecting primary data includes :
- (i) Mailed questionnaire
 - (ii) Personal interview
 - (iii) Telephonic interview
 - (iv) All of the above

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Contd.

(b) Let X and Y represent prices (in Rs.) of a commodity in Assam and West Bengal respectively. If $\bar{X} = 65$, $\bar{Y} = 67$, $\sigma_X = 2.5$, $\sigma_Y = 3.5$ and $r_{XY} = 0.8$. What is the equation of regression of Y on X ?

(i) $Y = 0.175X - 5$

(ii) $Y = 1.12X - 5.8$

(iii) $Y = 1.12 - 5$

(iv) $Y = 0.17X + 508$

(c) In measure of skewness, the absolute skewness is equal to :

(i) Mean + Mode

(ii) Mean + Median

(iii) Mean - Mode

(iv) Mean - Median

(d) The statistical tool that studies the degree of association between two variables is called :

(i) Regression analysis

(ii) Index number

(iii) Correlation analysis

(iv) All of the above

(e) The arithmetic mean (A.M.), the geometric mean (G.M.), and the harmonic mean (H.M) of a series of n observations are connected by the relation :

(i) $A.M \geq G.M \geq H.M$

(ii) $A.M \leq G.M \leq H.M$

(iii) $A.M = G.M = H.M$

(iv) $G.M > A.M > H.M$

(f) Two unbiased coins are tossed. The probability of getting at most one head is equal to :

(i) $3/4$

(ii) $1/6$

(iii) $1/3$

(iv) $1/2$

2. Answer the following questions : **(any five)**

$2 \times 5 = 10$

(a) What is Lorenz curve ?

(b) What is the probability that a non-leap year will contain 53 Sundays ?

- (c) Calculate median from the following data :
- 22, 16, 18, 13, 15, 19, 17, 20, 23, 21
- (d) Show that $E(aX + b) = aE(X) + b$.
- (e) Prove that correlation coefficient is the geometric mean between the regression coefficients.
- (f) If A and B be any two events with $P(A) = 0.4$, $P(A \cup B) = 0.7$ and $P(B) = p$. Find the value of p for which A and B mutually exclusive.
- (g) In a moderately asymmetrical series, mean = 24.6, mode = 26.1. Find the value of median.
3. Answer the following questions : **(any six)**
5×6=30
- (a) Show that Karl Pearson's correlation coefficient lies between +1 and -1.
- (b) Define statistics. Explain the importance of statistics.

- (c) Draw a scatter diagram on a plain paper from the following data. 3+2=5

Height (inches) :	62	72	70	60	67	70	64	65	60	70
Weight (lbs) :	50	65	63	52	56	60	59	58	54	65

Also indicate whether correlation is positive or negative.

- (d) What is mathematical expectation? Show that mathematical expectation of a random variable is nothing but its arithmetic mean, i.e. $E(X) = \bar{X}$. 2+3=5
- (e) Calculate rank correlation coefficient between X and Y from the following data :
- X : 78 36 98 25 75 82 92 62 65 39
 Y : 84 51 91 69 68 62 86 58 35 49
- (f) State and prove Bayes' theorem of probability.
- (g) Define arithmetic mean. Mention *any two* merits and demerits of arithmetic mean. 1+2+2=5
- (h) Briefly state the probability mass function and probability density function.

- (i) Define moment. Establish the relation between moments about mean in terms of moments about arbitrary point.

$$1+4=5$$

4. Answer the following questions : **(any two)**

$$12 \times 2 = 24$$

- (a) What is regression analysis ? State how regression analysis is different from correlation analysis. Prove that regression coefficients are independent of change of origin but not of scale.

$$2+5+5=12$$

- (b) What is standard deviation ? Why standard deviation is considered to be the best measure of dispersion ? Also mention *any two* limitations of standard deviation. Calculate standard deviation from the following data.

Marks :	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of Students:	5	7	14	12	9	6	2

$$2+3+2+5=12$$

- (c) From the following data obtain two regression coefficients and regression equations. Also calculate coefficient of correlation between sales and purchases.

Sales :	91	97	108	121	67	124	51	73	111	57
Purchase :	71	75	69	97	70	91	39	61	80	47

$$6+4+2=12$$

- (d) State and prove the multiplication theorem of probability if events are not independent. A bag contains 5 white and 3 black balls and another bag contains 4 white and 5 black balls. From any one of these bags a single draw of 2 balls is made. Find the probability that one of them would be white and the other black ball.

$$6+6=12$$