M.H.R.D. Semester–I Examination
QUANTITATIVE TECHNIQUES
Paper–MHRD/106

Time : Three Hours] [Maximum Marks : 80

N.B.:— (1) Attempt all questions.

(2) Figures to the right indicate full marks.

(3) Use of scientific calculator is permitted.

1. (a) Find three numbers in Arithmetic progression such that their sum is 15 and their product is 105. 4

(b) Find the 8^{th} term of the series in G.P. whose 3^{rd} term is 1 and 11^{th} term is $1/256$. 4

(c) Find the sum of 'n' terms of the series 0.8 + 0.88 + 0.888 + ------- to n terms. 4

(d) Find the value of A^2 where,

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

OR

(e) Find the Adjoint of the Matrix

$$A = \begin{bmatrix} 2 & 4 & 6 \\ 7 & 8 & 3 \\ 5 & 9 & 2 \end{bmatrix}$$ 4

(f) Insert 7 arithmetic means between 17 and 41. 4

(g) The common Ratio, last term and the sum of a G.P. are 3,486 and 728 respectively. Find the first term and the number of terms. 4

(h) Find the Minors and Co-factors for the following matrix :

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

2. (a) Find the mode for the following frequency distribution using interpolation formula :

Strength	No. of Lots
60–65	1
65–70	3
70–75	5
75–80	10
80–85	18
85–90	20
90–95	16
95–100	14
100–105	6
105–110	4
110–115	2
115–120	1

4

(b) From the following continuous series calculate Q_1, Q_3, D_4, D_9 :

C.I	10–20	20–30	30–40	40–50	50–60	60–70
f	12	35	40	25	10	6

4

(c) The mean height of 25 males in certain factory is 65 cms, and the mean height of 45 males in another group is 58 cms. Find the combined mean height for whole group.

4

(d) In a single die rolling experiment let A = [4, 5, 6.] and B = [3,6]. Find P[A∪B].

4

OR

(e) For the following data calculate standard deviation and also its coefficient :

X :	10	20	30	40	50	60	70	80
f :	10	5	7	9	20	4	6	8

4

(f) Find the Median Height from the following Heights of 10 students :

Height	52	59	66	74	71	42	68	84	49	90

4

(g) From the continuous series given below calculate mean and median :

C.I. :	10–20	20–30	30–40	40–50	50–60	60–70
Freq. :	12	35	40	25	10	6

4

(h) Calculate the mean deviation taken from mode from the following data and also its co-efficient :

X	45	67	68	70	79	90
f	4	1	1	1	1	2

4

3. (a) What is Correlation ? 4

(b) Calculate Spearman's Rank correlation coefficient :

X	53	98	95	81	75	61	59	55
Y	47	25	32	37	30	40	39	45

4

(c) From the following data obtain the regression line Y on X :

X	2	3	4	5	6
Y	3	4	6	5	8

4

(d) Distinguish between correlation and regression analysis. 4

OR

(e) Write a short note on Time-Series Analysis. 4

(f) Calculate Karl Pearson's correlation coefficient :

X	1	2	3	4	5	6	7	8	9	10
Y	19	18	17	16	15	14	13	12	11	10

4

(g) From the following data obtain the regression line X on Y :

X	1	2	3	4	5
Y	6	10	14	18	22

4

(h) Calculate Karl Pearson's co-efficient of correlation for the following data :

X	1	2	3	4	5	6	7	8	9	10
Y	12	14	16	18	20	22	24	26	28	30

4

4. (a) A firm maufactures two products A and B on which the profits earned per unit are Rs.3 and Rs. 4 respectively. Each product is processed on two machines M_1 and M_2. Product A requires one minute of processing time on M_1 and one minute of processing time on M_2. Machine M_1 is available for not more than 7 hours 30 minutes while machine M_2 is available for 10 hours during any working day. Find the number of units of product A and B needed to be manufactured to get maximum profit. Formulate the above as LPP and solve by Graphical Method. 16

OR

(b) Solve the following by Graphical method :

Maximize $Z = 3x_1 + 2x_2$

Subject to constraints

$$-2x_1 + x_2 \leq 1$$

$$x_1 \leq 2$$

$$x_1 + x_2 \leq 3$$

$$x_1, x_2 \leq 0$$

16

5. (a) Write a short note on Networking. Also mention its applications in project management and solve the following case study using decision tree approach.

Mr. Kumar quite often flies from Town A to Town B. He can use the airport bus which costs Rs. 25 but if he takes it, there is 0.08 chance that he will miss the flight. A Hotel limousine costs Rs. 270 with a 0.96 chance of being on time for the flight. If Mr. Kumar catches the plane on time, he will conclude a bussiness transaction which will produce a profit of Rs. 10,000/-, otherwise he will lose it. Which mode of transport should Mr. Kumar use ? Answer on the basis of EMV criterion. 16

OR

(b) What is CPM ?

A Project schedule has the following characteristics :

Activity	Time (days)
1–2	4
1–3	1
2–4	1
3–4	1
3–5	6
4–9	5
5–6	4
5–7	8
6–8	1
7–8	2
8–10	5
9–10	7

(i) Construct a network diagram

(ii) Find the Critical Path and total project duration. 16