Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MBA (NEW)/SEM-1(FT&PT)/MB-105/2009-10

2009

QUANTITATIVE METHODS – I

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) If the mean of a variable is 50, then the mean of the new variable (X – 30) / 20 is

a) 0·5 b) 1·0

c) 1·5 d) 2·0

ii) Which of the following relationships is not correct ?

a) HM > GM < AM b) GM = AM + HM/2

c) HM = (GM)^2 / AM d) HM < GM < AM.

iii) $\lim_{x \to 1} \frac{1}{(x-1)}$ is

a) • b) 1

c) 0 d) e .

iv) The value of the second derivative at the point of maximum value is

a) negative b) positive

c) zero d) none of these.

v) If $A = \begin{bmatrix} 2 & 3 & -1 \\ 1 & 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 & 5 \\ -1 & 3 & 4 \\ 2 & 1 & 0 \end{bmatrix}$,

which of the operation is possible ?

a) $A + B$ b) $B + A$

c) AB d) BA.

vi) If A and B are two matrices, then

a) $(AB)^{-1} = (BA)^{-1}$

b) $(AB)^{-1} = A^{-1} B^{-1}$

c) $(AB)^{-1} = B^{-1} A^{-1}$

d) none of these.

vii) The probability of A hitting a target is 1/5 and the probability of B hitting the target is 2/3. Then the probability that they both hit the target together is

a) $\frac{13}{15}$ b) $\frac{2}{15}$

c) $\frac{8}{15}$ d) $\frac{1}{15}$.

viii) The number of ways in which the letters of the word HOLIDAY can be arranged so that vowels remain together is

a) 5040 b) 144

c) 720 d) 4320.

ix) The range of correlation coefficient 'r' is

a) – 1, 1 (both inclusive)

b) – 1, 1 (both exclusive)

c) 0, 1 (both inclusive)

d) 0, 1 (both exclusive).

x) Mode of 15, 12, 5, 13, 12, 15, 8, 8, 9, 9, 10, 15 is

a) 15 b) 12

c) 8 d) 9.

xi) The S.D. of the first n natural numbers is

a) $\sqrt{\frac{n^2-1}{12}}$ b) $\sqrt{\frac{n(n+1)}{2}}$

c) $\frac{n+1}{2}$ d) none of these.

xii) If ${}^{2n}C_4 : {}^{n}C_3 = 35 : 2$, then the value of n is

a) 4 b) 5

c) 7 d) 8.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. If $u = f\left(\frac{y}{x}\right)$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 0$.

3. Calculate the variance of the numbers 3, 7, 10, 18, 22.

4. If $y = \log\left[\sin\sqrt{x^2+1}\right]$, find $\frac{dy}{dx}$.

5. Evaluate $\int \frac{3x}{\sqrt{2x-1}}\,dx$.

6. The s.d. of a series Y is 4 and that of series X is 3. Correlation coefficient between X and Y is 0·65. Find the slope of the line of regression of Y on X.

7. A coin is thrown 4 times. Find out the probability of getting at least one head.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. a) If $y = e^{\tan^{-1} x}$, then show that

$$(1 + x^2)\, y_2 + (2x - 1)\, y_1 = 0.$$

b) Ages at death of 50 persons of a town are given below :

36	48	50	45	49	31	50	48	43	42
37	32	40	39	41	47	45	38	43	47
38	39	37	40	32	52	56	31	54	36
51	46	41	55	58	31	42	58	32	44
53	36	60	59	41	53	48	36	38	60

i) Arrange the data in a frequency distribution in 10 class intervals.

ii) Draw histogram, frequency polygon and ogive from the given data. 5 + 10

9. a) Prove that the maximum value of $x^{1/x}$ is $e^{1/e}$.

b) $\lim_{x \to 1} \dfrac{\sqrt{x+8} - \sqrt{8x+1}}{\sqrt{5-x} - \sqrt{7x-3}}$.

c) A function $f(x)$ is defined as follows :

$$f(x) = \begin{cases} 2x - 1 ; & \text{if } x < 3 \\ k ; & \text{if } x = 3 \\ m , & \text{if } x > 3 \end{cases}$$

Find the values of k and m ; if $f(x)$ is continuous at $x = 3$. 5 + 5 + 5

10. Test Score and Sales Data of Salesmen are given in the following table.

Salesmen	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***
Test Score (X)	50	80	60	70	90	60	80	50	70	90
Sales (000 Rs.)	3·5	7·0	5·0	6·0	5·0	4·0	6·0	4·0	5·5	4·0

a) Calculate the regression coefficient of Y on X.

b) From above table calculate the regression line of Y on X.

c) From above table calculate the regression line of X on Y. 5 + 5 + 5

11. a) Find the rank correlation from the following table :

Candidates	1	2	3	4	5	6	7	8	9	10
Marks by I	58	62	45	30	90	72	65	45	50	55
Marks by II	65	60	55	45	75	80	50	52	62	70

b) The following data show the mean and the standard deviation of the prices of two shares :

	Mean	***S.D.***
ABC Ltd.	39·5	10·8
XYZ Ltd.	47·5	16·8

If the correlation between the share prices is 0·404, find

i) the most likely price of *ABC* when *XYZ* is 60.

ii) the likely price of *XYZ* when *ABC* is 55. 7 + 8

12. a) A sample of 100 observations had mean 64 and s.d. 7·5. Two observations whose values were 14 and 18 were wrongly recorded as 24 and 24. Make necessary correction of mean and s.d.

b) A survey among hotels in the city reveals the figures below :

No. of customers	0 — 20	20 — 40	40 — 60	60 — 80	80 — 100
No. of days	5	15	40	30	10

Calculate

i) the upper and lower quartile

ii) quartile deviation

iii) co-efficient of skewness. 6 + 9

13. a) Calculate the mean, median and mode from the following data :

Age :	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55
Frequency :	50	70	100	180	150	120	70

b) Calculate the missing frequencies f_1 and f_2 :

Class :	0 — 20	20 — 40	40 — 60	60 — 80	80 — 100
Frequency :	19	f_1	32	f_2	19

Mean = 50 N = 120. 8 + 7