Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MBA(N)/SEM-1 FT & PT/MB-105/2011-12

2011

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 : $10 \times 1 = 10$

i) Given U (Universal set) = { 0, 1, ..., 9 }, A = { 2, 4, 6 } and B = { 6, 7 }, find $(A \cup B)^c$.

a) { 2, 4, 6 } b) { 0, 1, 3, 5, 8, 9 }

c) { 6, 7 } d) none of these.

ii) The rational number from the following is

a) $(1 \cdot 21)^{1/2}$ b) $7^{1/2}$

c) $5^{1/2}$ d) all of these.

iii) The even function from the following is

a) $2x^2 + 5$ b) $3x^3 + 9$

c) $5x^5 + 11$ d) none of these.

iv) $\int x^{100}\,\mathrm{d}x$ is

a) $100x^{99}$ b) $100x^{99}+c$

c) $x^{101}/101+c$ d) none of these.

v) If $y=\log x$, then $\frac{\partial^2 y}{\partial x^2}$ is

a) $\frac{1}{x}$ b) $\frac{1}{x^2}$

c) $-\frac{1}{x^2}$ d) none of these.

vi) $\frac{\mathrm{d}}{\mathrm{d}x}a^x$ is

a) $a^x \log_e^a$ b) a^x

c) $\log_e^a$ d) none of these.

vii) $A\cup(B\cup C)=$

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

c) $(A\cap B)\cup(A\cap C)$ d) $(A\cup B)\cap(A\cup C)$.

viii) Set of all possible outcomes is called

a) sample space b) experiment

c) probability d) none of these.

ix) Statistics is data

a) collection b) analysis

c) interpretation d) all of these.

x) Matrix multiplication is possible between

a) any two matrices

b) matrices of same order

c) matrices of opposite order

d) none of these.

xi) Derivative ensures

a) limit b) continuity

c) integrability d) none of these.

xii) Standard deviation cannot be more than variance. It is

a) True

b) False

c) Insufficient information

d) None of these.

xiii) The regression equation of Y on X is $y = 1 - 2x$. Then the correlation between y and x is

a) positive b) negative

c) zero d) any one of these.

xiv) The median of 2, 7, 16, 5, 14, 19, 8, 11, 17, 15 is

a) 14 b) 11

c) 16·5 d) 12·5.

xv) The mean of a variable is 50. The mean of a new variable $(x - 30)/20$ is

a) 0·5 b) 1·0

c) 1·5 d) 2·0.

xvi) If $P (A \cap B) = 0$ then the events A & B are

a) mutually exclusive b) independent

c) exhaustive d) equally likely.

GROUP – B
(Short Answer Type Questions)

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

2. In a manufacturing firm of 100 casual workers, 45 workers carry raw materials, 52 workers handle machinery and 17 workers perform both the works. Find the number of workers who neither carry raw materials nor handle machinery.

3. Evaluate : $\lim_{x \to 0} \frac{\sqrt{(1 - x^3)} - \sqrt{(1 - x)}}{\sqrt{(1 + x^2)} - \sqrt{(1 + x)}}$

4. Box-1 contains 5 red and 5 black balls, box-2 contains 4 red and 8 black balls and box-3 contains 3 red and 6 black balls. One box is chosen at random and a ball is drawn. The colour of the ball is black. What is the probability that it has been drawn from box-3 ?

5. Develop a questionnaire for conducting market survey of a product of the company *XYZ* as the company wants to extend its business in another market. Consider the new market is highly competitive for that product.

6. The following are the monthly salaries in rupees of 20 employees of a firm :

130 125 110 100 80 62 76 98 103 122 145 151 65 71 132 118 142 115 85 95

The firm gives bonuses of Rs. 10, 15, 20, 25 and 30 for individuals in the respective salary groups : Rs. 60 but less than Rs. 80, Rs. 80 but less than Rs. 100 and so on up to Rs. 140 but not less than Rs. 160. Find the average bonus paid per employee.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Find the standard deviation and coefficient of variation from the following table given the marks of 150 students :

Marks	No. of students	Marks	No. of students
1-10	5	51-60	22
11-20	12	61-70	15
21-30	20	71-80	6
31-40	25	81-90	4
41-50	40	91-100	1

b) A student obtained the mean and the standard deviation of 100 observations as 40·1 and 5·0 respectively. It was later found that he had occupies 50 wrongly instead of the correct value 40. Find the correct mean and the correct standard deviation.

10 + 5

8. a) Show that the sum of all the numbers that can be formed with the digits 1, 2, 3, 4, 5, each number containing all the digits only once is 3999960.

   b) If $u = \frac{y}{z} + \frac{z}{x} + \frac{x}{y}$, show that $xu_x + yu_y + zu_z = 0$.

   c) Show that the function $f(x,y) = (x+y)^4 + (x-3)^6$ has a minimum at $(3,-3)$. 5 + 5 + 5

9. a) If $U = x^2 + y^2$, then find the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$. Also show that $\frac{\partial^2 u}{\partial y \partial x} = \frac{\partial^2 u}{\partial x \partial y}$.

   b) Group of the following dataset in eight equal intervals using tally mark and then calculate frequency density and cumulative frequency. With the frequency distribution draw pie-chart, histogram, frequency polygon and ogives. Show the required calculations in the table. Then find the median using ogives.

119	37	48	78	56	79	90	108	39	56
75	48	56	89	83	96	100	50	60	70
77	85	63	45	49	67	65	87	90	81
102	123	38	84	55	44	67	86	101	112
96	63	73	116	59	40	82	73	59	68

4 + 11

10. a) Find $\lim_{x \to 2} \frac{4 - x^2}{3 - \sqrt{x^2 + 5}}$.

    b) Find $\frac{dy}{dx}$ where $y = \sqrt{\frac{x-1}{x+1}}$.

c) Find the maximum and the minimum values of the function $f(x) = x^4 + 2x^3 - 3x^2 - 4x + 4$. 4 + 5 + 6

11. a) The following data shows the number of agricultural plots in acres in a district in West Bengal. Find the mean, mode and standard deviation of the area of plots :

Area in acre	<100	<200	<300	<400	<500	<600	<700	<800
Number of plots	7	19	35	57	71	83	92	100

b) The following are the number of runs scored by two cricketers in the last 10 innings of test matches. Find who is more consistent :

Cricketer *A*	93	72	85	26	35	17	108	56	43	135
Cricketer *B*	38	76	75	108	123	96	72	27	53	64

9 + 6

12. a) For a group containing 90 observations, the mean & standard deviation are 59 and 9 respectively. For 40 observations selected from the above 90 the mean and standard deviation were 54 and 6 respectively. Find mean and standard deviation of the other 50 observations.

b) Find the quartile deviation of the following distribution :

Wt. in kg	40-45	45-50	50-55	55-60	60-65	65-70
No. of obsv.	10	22	28	20	12	8

c) In order to find correlation coefficient between two variables X and Y from 12 pairs of observations the following calculations were made : $\sum X = 30$, $\sum Y = 5$, $\sum X^2 = 670$, $\sum Y^2 = 285$, $\sum XY = 334$. On subsequent verification it was found that a pair $(X = 11, Y = 4)$, was copied wrongly, the correct values being $(X = 10, Y = 14)$. Find the correct correlation coefficient.

5 + 5 + 5

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