

Name :

Roll No. :

Invigilator's Signature :

CS/MBA (NEW)/SEM-1(FT & PT)/MB-105/2010-11

2010-11

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 A and B are any two sets then $A - (A - B) =$

- a) ϕ
- b) $A \cap B$
- c) $B - A$
- d) none of these.

ii) If $y = 5t^2$, $x = 10t$, then $\frac{d^2y}{dx^2}$ is

- a) $\frac{1}{5}$
- b) $\frac{1}{10}$
- c) $\frac{1}{15}$
- d) none of these.



iii) Total number of arrangements of the letters of the word STATISTICS is

- a) 3360 b) 504
c) 16800 d) 50400.

iv) The sum of deviations taken from their A.M. is always equal to

- a) one b) zero
c) depends on values d) none of these.

v) The s.d. of 50 observations is 6. If 2 is added to each observation the new s.d. will be

- a) 2 b) 6
c) 4 d) 10.

vi) If A' be the complement of A , then

- a) $P(A') = 1 - P(A)$ b) $P(A') = P(A)$
c) $P(A') = P(A) - 1$ d) $P(A') = 2P(A) - 1$.

vii) The value of $\lim_{x \rightarrow 0} |5x|$ is

- a) + 5 b) - 5
c) value does not exist d) none of these.

viii) The number of diagonals which can be drawn with the vertices of a polygon of n sides are

- a) ${}^n C_2$ b) ${}^n P_2$
c) ${}^n C_2 - 1$ d) none of these.



ix) The median of the following set of observation 18, 15, 25, 22, 21, 16, 20, 12, 30

is

- a) 21 b) 20
c) 19.8 d) none of these.

x) If $b_{xy} = 0.54$ and $b_{yx} = 1.2$, then r_{xy} is

- a) 0.648 b) 0.42
c) 0.804 d) 1.

xi) A matrix A is known as Involutory, if

- a) $A^2 = A$ b) $A^2 = I$
c) $A^2 = A^T$ d) $A^2 = -A$.

xii) The value of $\int \frac{dx}{a^2 - x^2}$ is (when $|x| < |a|$)

- a) $\frac{1}{2a} \log \left| \frac{a+x}{a-x} \right|$ b) $\frac{1}{a} \log \left| \frac{a+x}{a-x} \right|$
c) $\frac{1}{2a} \log \left| \frac{a-x}{a+x} \right|$ d) none of these.

GROUP - B

(Short Answer Type Questions)

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

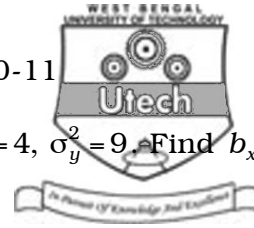
2. If $y = \sqrt{x} + 1/\sqrt{x}$, then show that $2xy \left(\frac{dy}{dx} \right) + y^2 = 2(1+x)$.

3. Evaluate $\int \frac{\cos x - \sin x}{1 + \sin^2 x} dx$.

4. If $A = \begin{bmatrix} 1 & -2 & 3 \\ 4 & 0 & -5 \\ -3 & 2 & 4 \end{bmatrix}$ and $2A^T + 3B = 4I$, where I is an identity

matrix of order 3, then find B .

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5. If $\Sigma x = 50$, $\Sigma y = 60$, $\Sigma xy = 350$, $n = 10$, $\sigma_n^2 = 4$, $\sigma_y^2 = 9$. Find b_{xy} and b_{yx} .

6. Prove D' Morgan's laws for the following sets :

$$U = \{ 2, 3, 4, 5, 6, 8, 9 \}, A = \{ 3, 5, 9 \}, B = \{ 4, 6, 8 \}.$$

GROUP - C

(Long Answer Type Questions)

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

7. a) In a survey of 1,000 customers, the No. of customers buying various grades of coffee were as follows :

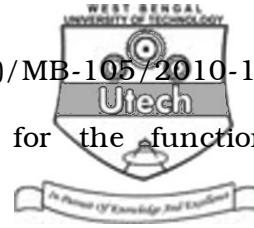
A grade only — 180, A but not B — 230, A & C grade — 80,
A grade — 260, C grade — 480, B & C grade — 80, none of
the grades — 240. Calculate how many buy :

- a) B grade coffee
- b) C but not B
- c) C & B but not A ?

b) For any 2 finite sets A & B, if

$A \cup B = A \cap B$, then prove $A = B$.

c) If $y = ae^{mx} + be^{-mx}$, prove that $y_2 - m^2 y_1 = 0$. $9 + 3 + 3$



8. a) State and verify Euler's theorem for the function $2x^3 - 11x^2y + 3y^3$.
- b) Find the minimum value of $f(x, y) = x^2 + y^2$, subject to $x + y = 10$.
- c) Solve the following equations using the matrix inversion method :

$$x + y + z = 4$$

$$2x - y + 3z = 1$$

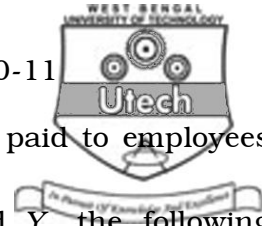
$$3x + 2y - z = 1$$

5 + 4 + 6

9. The profits of 50 firms in thousand rupees is given below :

28	35	61	29	36	48	57	67	69	50
48	40	47	42	41	37	51	62	63	33
31	32	35	40	38	37	60	51	54	56
37	46	42	38	61	59	58	44	39	57
38	44	45	45	47	38	44	47	47	64

- a) Arrange the above data into classes of interval 5 starting from 25.
- b) Find the relative frequency, frequency density and more than and less than cumulative frequencies of each class.
- c) Draw the ogives and find the median profit. 6 + 4 + 5



10. a) From the analysis of monthly wages paid to employees in two service organizations X and Y, the following results were obtained :

	Organization X	Organization Y
No. of wage earners	550	650
Average monthly wages	5000	4500
Variance of distribution of wages	900	1600

- i) Which organization pays a larger amount as monthly wages ?
 - ii) In which organization is there greater variability in individual wages of all the wage earners taken together ?
- b) A person's salary increases by 4% in the first year, 6% in the second year, and by 9% in the third year. What is the average increase in salary in the 3 years ? 12 + 3



11. a) Find the value of $\lim_{x \rightarrow 1} \frac{\sqrt{x+8} - \sqrt{8x+1}}{\sqrt{5-x} - \sqrt{7x-3}}$.

- b) Show that the maximum value of the function $f(x) = x + 1/x$ is less than its minimum value. Sketch the curve of this function, indicating the asymptotes, if any.

c) Evaluate $\int \frac{x^2 + x + 1}{\sqrt{x^2 + 2x + 3}} dx$ 5 + 5 + 5
