

Name :

Roll No. :

Invigilator's Signature :

**CS/MBA/SEM-1 (FT & PT)/MB-105/2012-13
2012**

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.*

Graph sheet(s) will be supplied by the Institute on demand.

GROUP - A

(Multiple Choice Type Questions)

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

10 × 1 = 10

i) For what value of x , the function $f(x) = \sqrt{x}$ is not defined ?

- a) 0
- b) 1
- c) - 1
- d) any negative integer.

ii) The irrational function from the following is

- a) $x^{1/3}$
- b) $(2x^3 + 5)^{1/2}$
- c) x
- d) both (a) and (b).

16005

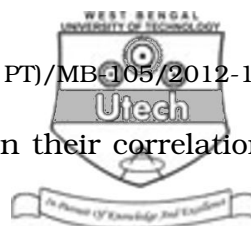
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- iii) The odd function of the following is
- a) $2x^2 + 5$ b) $3x^3 - 5x$
c) $5x^4 + 11$ d) 1.
- iv) $\int x^{89} dx$ is
- a) $89x^{99}$ b) $90x^{90} + c$
c) $x^{90} / 90 + c$ d) 1.
- v) If $y = 19x$, then $\frac{\delta^2 y}{\delta x^2}$ is
- a) 19 b) $19x^2$
c) 0 d) 1.
- vi) $\frac{d}{dx}$ of 6^x is
- a) $6^x \log_e 6$ b) 6^x
c) $\log_e 6$ d) 1.
- vii) Coefficient of variation is found by using the formula
- a) $\left(\frac{\sigma}{\bar{x}}\right) 100$ b) $\left(\frac{\sigma}{\bar{x}}\right) 10$
c) $\left(\frac{\bar{x}}{\sigma}\right) 1000$ d) $\sigma \bar{x}$.
- viii) Mean Deviation is equal to
- a) $2 \times \text{S.D.}$ b) $\frac{4}{5} \times \text{S.D.}$
c) $\frac{2}{3} \times \text{S.D.}$ d) all of these.
- ix) Age of applicants for LIC and the insurance premium have correlation
- a) negative b) positive
c) zero d) 1.

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- x) If two variables are independent, then their correlation coefficient is
- a) $r = 0$ b) $r = + 1$
c) $r = - 1$ d) $r = 0.5$.
- xi) The Struges rule for obtaining the number of class-interval is
- a) $K = 1 - 3.322 \log N$ b) $K = 1 + 3.322 \log N$
c) $K = 1 - 2.322 \log N$ d) $K = 1 + 2.322 \log N$.
- xii) Total number of arrangement of the letters of the word STATISTICS is
- a) 3360 b) 504
c) 16800 d) 50400.
- xiii) The value of the second derivative at the point of maximum value is
- a) negative b) positive
c) zero d) none.
- xiv) The sum of deviations taken from their A.M. is always equal to
- a) one b) zero
c) depends on values d) 2.
- xv) Mode of 15, 12, 5, 13, 12, 15, 8, 8, 9, 9, 10, 15 is
- a) 15 b) 12
c) 8 d) 9.

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GROUP - B

(Short Answer Type Questions)

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

2. a) Find domain of $f(x) = \frac{x^2 + x + 5}{x^2 - 6x + 8}$.

b) Evaluate $\lim_{x \rightarrow -1} \frac{2x^2 - x - 3}{x^2 - 2x - 3}$.

3. The following is the distribution of salaries of 20 workers of a company :

Salary group	1000 – 2000	2000 – 3000	3000 – 4000	4000 – 5000
No. of workers	3	6	7	4

The company gave bonus of Rs. 500, Rs. 800, Rs. 1,200 and Rs. 1,500 to the salary groups respectively. Find the average bonus per worker.

4. Find the number of ways in which four groups of three each can be formed from twelve persons.

5. Find $\frac{\partial (x, y)}{\partial (u, v)}$ where $u = x^2 + y^2$, $v = 2xy$.

6. A bag contains 4 red, 4 white and 5 green balls. Three balls are drawn at random. What is the probability that a red, a white and a green balls are drawn.

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GROUP - C

(Long Answer Type Questions)

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

7. a) Prove that the minimum value of $9e^x + 25e^{-x}$ is 30. 4

b) $\int_0^1 \frac{x dx}{\sqrt{1+x^2}}$, evaluate the definite integration. 5

c) Justify $A^2 - 4A + 3I = 0$ where,
 $A = \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$, $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$. If possible find A^{-1} . 6

8. a) The results of 21 footballs (win, loser, draw) are to be predicted. How many different forecasts can contain exactly 18 correct results ? 5

b) A fair coin and a fair die are thrown. Find the probabilities of (i) head on the coin and the number 6 on the die, (ii) head on the coin and even number on the die. 5

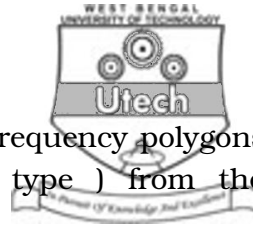
c) The demand function for a particular brand of pocket calculator is $P = 75 - 0.3Q - 0.05Q^2$. Find the consumer's surplus at a quantity of 15 calculators.
 (Apply integration) 5

9. a) If $F = f(y - z, z - x, x - y)$, prove that $\frac{\partial F}{\partial x} + \frac{\partial F}{\partial y} + \frac{\partial F}{\partial z} = 0$. 5

b) Find the standard deviation and quartile deviation from the following data : 10

Class	120-124	125-129	130-134	135-139	140-144	145-149
Frequency	12	25	28	15	12	8

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10. a) Draw the histogram and cumulative frequency polygons (more than as well as less than type) from the following table :

Marks	1-10	11-20	21-30	31-40	41-50
Frequency	5	13	12	10	8

Also find the median from the graph. 8

b) If $x^m \cdot y^n = (x + y)^{m+n}$, then prove that $\frac{dy}{dx} = \frac{y}{x}$. 4

c) Prove De Morgan's laws for the following sets :
 $U = \{ 2, 3, 4, 5, 6, 8, 9 \}$, $A = \{ 3, 5, 9 \}$, $B = \{ 4, 6, 8 \}$ 3

11. a) Show that the function $f(x) = \begin{cases} x^2 & \text{when } x \neq 1 \\ 2 & \text{when } x = 1 \end{cases}$ is discontinuous at $x = 1$. 2

b) From the following data of the wages of 50 workers of a factory compute first four moments about mean and also β_1, β_2 . Comment on the results. 8

Weekly wages (Rs.)	No. of workers	Weekly wages (Rs.)	No. of workers
110 - 120	1	180 - 200	12
120 - 140	3	200 - 220	4
140 - 160	7	220 - 240	3
160 - 180	20		

c) With the help of Lagrange's Multiplier, find the minimum value of $x^2 + y^2 + z^2$, subject to the condition $2x + 3y + 5z = 30$. 5

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12. a) Solve the following system of equations by matrix inversion method : 5

$$2x - y + 3z = 9$$

$$x + 3y - z = 4$$

$$3x + 2y + z = 10$$

- b) The two lines of regression are $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$ and variance of x is 12. Calculate the values of \bar{x} , \bar{y} , σ_y^2 and r . 8
- c) Distinguish between Primary data and Secondary data. 2

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