



**Fall 2012 (February 2013) Examinations**

Wednesday, the 27th February 2013

**BUSINESS MATHEMATICS & STATISTICAL INFERENCE – (ML-202)  
SEMESTER-2**

**Time Allowed: 02 Hours 45 Minutes**

**Maximum Marks: 90**

**Roll No.:**

- (i) Attempt ALL questions.
- (ii) Answers must be neat, relevant and brief.
- (iii) In marking the question paper, the examiners take into account clarity of exposition, logic of arguments, effective presentation, language and use of clear diagram / chart, where appropriate.
- (iv) Read the instructions printed inside the top cover of answer script CAREFULLY before attempting the paper.
- (v) Use of non-programmable scientific calculators of any model is allowed.
- (vi) DO NOT write your Name, Reg. No. or Roll No. anywhere inside the answer script.
- (vii) Question No.1 – “Multiple Choice Question” printed separately, is an integral part of this question paper.
- (viii) **Question Paper must be returned to invigilator before leaving the examination hall.**

		<b>Marks</b>
<b>SECTION “A”</b>		
<b>Q. 2 (a)</b>	Simplify the following:	<b>05</b>
	$\frac{\sqrt{x^3y^5}}{\sqrt[4]{x^7y^2}} \times \frac{\sqrt{xy^3}}{\sqrt[4]{xy^6}}$	
<b>(b)</b>	Solve the following equation:	<b>03</b>
	$\frac{x+6}{5} - \frac{2x-1}{2} = 3$	
<b>(c)</b>	An investor has Rs.400,000 to invest. Three investment opportunities are being considered, which have expected annual interest rates of 10%, 7%, and 8%. A goal has been set to earn an annual income of Rs.32,000 on the total investments. One condition set by the trust is that the combined investment in alternative 2 and 3 should be three times the amount invested in alternative 1. Determine whether there is a meaningful investment strategy, which will satisfy this requirement.	<b>07</b>
<b>Q. 3 (a)</b>	Find the location of all the critical points:	<b>05</b>
	$f(x) = x^2 + 5x + 6$	
<b>(b)</b>	How much money must be deposited at the end of each quarter if the objective is to accumulate Rs.600,000 after 8 years? Assume interest is earned at the rate of 10 percent per year compounded quarterly.  Given that $S_n = R \{(1+i)^n - 1\} \div i$	<b>05</b>
<b>(c)</b>	Find the derivative of the following function:	<b>04</b>
	$f(x) = \frac{6x^2 + 3x - 5}{\ln(5x^2 + 4)}$	
<b>(d)</b>	A sum of Rs.200,000 is to grow to Rs.1,000,000 over an 8-year period. At what annual interest rate must it be invested, given that the interest is compounded quarterly?	<b>06</b>

## SECTION "B"

**Marks**

- Q. 4 (a)** Random samples of size 2 are drawn from the finite population 2, 4, 6, 8, and 10 without replacement. Construct sampling distribution of mean. **05**

- (b)** The following scores represent the marks of 39 students:

25 20 35 45 14 25 32 17 28 23 18 31 37  
10 19 30 33 21 22 41 34 29 27 44 23 12  
44 12 40 22 25 37 28 37 19 40 12 39 25

**Required:**

Set up a frequency distribution for the above data. **05**

- (c)** Following are the marks obtained by 100 candidates in a Statistics examination:

Marks obtained	10 – 24	25 – 39	40 – 54	55 – 69	70 – 84	85 – 99
No. of students	10	16	23	29	16	6

**Required:**

Calculate arithmetic mean and median. **05**

- (d)** Population mean and variance of 10 observations are 15 and 50 respectively. One observation (which is 12) is replaced by 18. Find new mean and variance. **05**

- Q. 5 (a)** A study was made by a retail merchant to determine the relation between weekly advertising expenditure and sales. Following data was recorded:

Advertising Cost (Rs. '000')	48	22	25	20	30	50	40	55	45
Sales (Rs. '000')	380	420	395	365	475	440	490	565	515

**Required:**

- (i)** Find the equation of the regression line. **06**

- (ii)** Predict the amount of sales if advertising expenditure is Rs.60,000. **02**

- (b)** Find Fisher's Ideal index number of the year 2007 (treating 2012 as base year) for the following data: **08**

Commodity	Price (Rs.)		Quantity (Units)	
	2007	2012	2007	2012
A	12.50	15.00	125	150
B	30.00	40.00	160	185
C	75.00	85.10	140	165
D	95.15	105.00	78	85

- (c)** The weights of 10 boxes of a certain brand of cereal have a mean content of 278 grams with a standard deviation of 9.64 grams. If these boxes were purchased from 10 different stores and average price per box is Rs.129 with a standard deviation of Rs.9, can you conclude that the weights are relatively more homogeneous than the prices? **04**

- Q. 6 (a)** Describe the various characteristics of 'moving averages'. **03**

- (b)** In a poker hand consisting of 5 cards, find the probability of holding at most 2 aces. **06**

- (c)** A random sample of 17 college students showed mean marks 50 and variance 36. Assuming the scores to be normally distributed, construct a 95% confidence interval for average marks scored by the entire students? ( $t_{0.05,16} = 1.746$  or  $t_{0.025,16} = 2.120$ ) **06**

**THE END**