VPM's
DR VN BRIMS, Thane
Programme: PGDM (2015-17)
First Trimester Examination October-November 2015

Subject	Quantitative Techniques - 1		
Roll No.		**Marks**	60 Marks
Total No. of Questions	7	**Duration**	3 Hours
Total No. of printed pages	4	**Date**	31.10.2015

Note:
1. Question 1 is compulsory
2. Answer any four out of remaining six questions (Q 2 to 7).

Q. 1 A. Define the following terms (Any four)   **4**

1. Random sampling   2. Marginal Probability   3. Degrees of freedom
4. Dependent variable   5. Contingency table   6. Median value

Q. 1 B. State whether the following statements are true or false (Any four)
      4

1. A Histogram is series of rectangles, each proportional in width to the number of items falling within a specific class.
2. For a data array with 50 observations, the median will be the value of the 25th observation in the array.
3. If A and B are statistically independent event, the probability of A and B occurring together is P(A)*P(B)
4. In a normal distribution 100 percent of the population lies within 3 standard deviations of the mean.
5. Analysis of variance may be used to test whether the means of more than two populations can be considered equal.
6. Seasonal variation is a repetitive and predictable variation around the trend line within a year.

Q. 1 C. Write short notes on (Any four)   **8**

1. Decision Analysis   2. Normal Distribution   3. Regression Line
4. Analysis of variance   5. Central limit theorem   6. Hypothesis testing

Q. 1 D. Choose the correct alternative for the given choices (Any four)   **4**

1. Why is it true that classes in frequency distribution are all inclusive?
   a) No data point falls into more than one class   b) Every class has a class value
   c) All data fit into one class or another   d) All of these
2. If a group of data has only one mode and its value is less than that of the mean, it can be conduced that the graph of the distribution is:
   a) Symmetrical   b) Skewed to the right
   c) Skewed to the left d) None of these
3. Assume that you have been given quarterly sales data for five years period. To use the ratio to moving average method of computing a seasonal index, your first step would be:
   a) Compute the 4 quarter moving average.   b) Discard highest and lowest values.
   c) Calculate the 4-quarter moving total.   d) None of these.

4. In which of these cases would the Poisson distribution be a good approximation of the binomial distribution?
a) n = 40, p=.32   b) n = 40, q = .79   c) n = 200, q = .98   d) n = 10, p = .03
5. A certain product sells for Rs. 25 and is purchased by the retailer for Rs. 17. If it is not sold within two weeks the retailer will recoup only Rs. 8 of his original Rs. 17 investment because of spoilage. The value of MP for this situation is:
a) Rs. 9   b) Rs. 17   c) Rs. 8   d) Rs. 25
6. Suppose you are told that there is a direct relationship between the price of artichokes and the amount of rain that fell during the growing season. It can be concluded that;
a) Prices tend to be high when rainfall is high
b) Prices tend to be low when the rainfall is high.
c) A large amount of rain causes prices to rise
d) A lack of rain causes prices to rise

Q. 2. Attempt any two   **10**

Q. 2 A. Describe various types of graphs with examples.

Q. 2 B. The administrator of a hospital has ordered a study of the amount of time a patient must wait before being treated by emergency room personnel. The following data were collected. During a typical day.
   15 13 19 23 22 05 15 12 28 20 28 02 08 17 24 07 20 26 13 09
a) Arrange the data in an array from the lowest to the highest.
b) Construct a frequency distribution using 6 equal intervals.
c) Construct a relative frequency distribution table.

Q. 2 C. Below is the average number of city policemen and policewomen on duty each day between 8 and 12 pm. In a specific area.

Mon. 2,950 Tue. 2,900 Wed. 2,900 Thu. 2,980 Fri. 3,285 Sat. 3,430 Sun. 2.975
Calculate the variance and standard deviation of the distribution.

Q. 3. Attempt any two   **10**

Q. 3 A. Classify the following probability estimates as per their type (classical, relative frequency or subjective):

a) The probability that you will make a B in this course is 0.75
b) The probability that a randomly selected family from a particular community has two children is 0.25.
c) The probability that my candidate will win the election.
d) The probability that a student from a school will go to college is 0.90.
e) The probability my ticket's winning a raffle drawing for which 1000 tickets were sold

   is 0.001.

Q. 3 B. Two integers are selected at random from integers 1 through 11. If the sum is even, find the probability that both the numbers are odd.

Q. 3 C. A manufacturing firm produces pipes in two plants I and II with daily production of 1,500 and 2,000 pipes respectively. The fraction of defective pipes produced by two plants I and II are 0.006 and 0.008 respectively. If a pipe is selected at random from day's production is found to be defective, what is the chance that it has come from

plant I, plant II?

Q. 4. Attempt any two   **10**

Q. 4 A. Explain the terms Confidence Level, Confidence Interval and Confidence Limits.

Q. 4 B. The vice president for research and development of a large chemical and fiber manufacturing company believes that the firm's annual profits depend on the amount spent on R & D. The new chief executive officer does not agree and asked for evidence. If the data obtained are given in the table can you please help the vice president to provide evidence?

Year	Millions spent on R & D	annual profit in million
1978	2	20
1979	3	25
1980	5	34
1981	4	30
1982	11	40
1983	5	31

Q. 4 C. The manager of an assembly line in a clock manufacturing plant decided to study how different speeds of the conveyor belt affect the rate of defective units produced in an 8 hour shift. To examine this, he ran the belt at 4 different speeds for 8 hour shifts each and measured the number of defective units found at the end of the shift. The result is given below.

Shift 1: 36, 34, 37, 35, 33   Shift 2: 29, 34, 34, 36, 32

Shift 3: 31, 35, 32, 33, 39   Shift 4: 36, 28, 34, 32, 30

a) Calculate the mean number of defective units for each speed

b) Determine the grand mean

c) Estimate between column variance

d) Calculate within column variance

e) Calculate F ratio. If the F value for degree of freedom 3/14 in the table is 3.24, do four different conveyor belt speeds produce the same rate of defective clocks per shift (at the 0.05 level of significance)?

Q. 5. Attempt any two   **10**

Q. 5 A. Explain the terms null hypothesis and alternative hypothesis. State the null and alternative hypotheses for the following situations:
   a) The researcher wishes to test whether a certain enrichment class leads to test scores greater than the population average of 85 points.
   b) A university official wishes to determine if the average enrollment for the past 10 years is significantly different from a hypothesized value of 12,500.

Q. 5 B. Members of the public interest groups asserts that less that 60 % of the industrial plants in the area comply with air pollution standards. Environmental Protection Agency believes that 60 % of the industries comply with the standards. Sampling the record of 60 plants one finds that 33 are complying with the standards. Test the assertion of the public interest group at 0.02 significance level (Note that the z value at this significance level is 2.05).

Q. 5 C. Two independent samples of observations were collected. For the first sample of 36 elements, the mean was 240 and the standard deviation 14. The second sample of 49 elements had a mean of 230 and a standard deviation of 10.

a) Compute the standard error of the difference between the two means.
b) Test the hypothesis that the two samples are from populations with the same mean. Use 0.05 level of significance with a z value as 1.96.

Q. 6. Attempt any two   **10**

Q. 6 A. Explain the terms Correlation and Regression. Comment on the difference between these two methods of analysis.

Q. 6 B. Calculate Karl Pearson coefficient of correlation from the following data and comment on it.

Sr. No. of Students	1	2	3	4	5	6	7	8	9	10
Marks in Statistics	20	35	15	40	10	35	30	25	45	30
Marks in Accounts	25	30	20	35	20	25	25	35	35	40

Q. 6 B. The ranking of 10 individuals at the start and at the finish of a training course are given in the following table. Calculate the Spearman rank order correlation.

Individual	A	B	C	D	E	F	G	H	I	J
Rank before	1	6	3	9	5	2	7	10	8	4
Rank after	6	8	3	7	2	1	5	9	4	10

Q. 7. Attempt any two   10

Q. 7 A. Explain the term Time Series. Describe the types of variations involved in Time Series with examples. Explain the role of Time series Analysis in forecasting.

Q. 7 B. A company manufactures tables for office use. From the time the company started the number of tables they have sold is represented by the time series as given below.

Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Table sold	42	50	61	75	92	111	120	127	140	138

a) Find the linear equation that describes the trend in number of tables sold.
b) Estimate the sales of tables in 1998.

Q. 7 C. A Newspaper vendor kept a record of the demand of a particular weekly and found that it can be described by normal distribution with mean as 165 and standard deviations as 40. Copies of the weekly are obtained at the rate of Rs. 20 and sold at Rs. 50. If any weekly is left over it is sold at the price of Rs. 10 each in the following weeks. If the Newspaper vendor wants to maximize his expected profit how many copies he should order?