

K.J. Somaiya Institute of Management Studies and Research

MMM – I Sem.(2017-20 Batch)

Sub: Quantitative Methods in Business

(End Term Exam.)

Max Marks: 50

Time: 3 hours

23/11/2017

Note: Read the instruction carefully

- Attempt **any 5** questions. All question carries equal marks (10 each)
- All answers to be given in the **answer sheet only (stepwise)**
- Use of **Excel** is allowed for calculations (**no need to mail the sheet**)
- Take assumptions/ Sketches/Curves where ever necessary and make a note of it.
- No graph paper is provided for LLP, make rough sketch in answer sheet only.

Q1. The table below shows the annual sales (\$ millions) of Speed call mobile phones of random sample of 150 outlets

Annual sale of Speed call mobile phones (\$million)	Number of Outlets
5-10	18
10-15	35
15-20	41
20-25	21
25-30	15
30-35	13
35-40	7

- What is the proportion of outlets is having annual sales of Speed call mobile phones at least \$ 30 million?
- What proportion of Outlets has the sales between the 20-25?
- What proportion of outlets has the annual sale of Speed call mobile phones at the most \$ 30 million?

Q1.2. For the following data related to the age of the policy holder draw the histogram and comment.

Age in years	20-25	25-30	30-35	35-40	40-45	45-50
No. of policy holders	8	12	24	16	15	5

Q2. A study investigated the perception of corporate ethical values among individuals specializing in marketing. Use the data given in excel sheet (higher ethical score indicate higher ethical value) to test for significant difference in perception among three groups namely marketing managers, marketing research and advertising.

Marketing manager	marketing research	advertising
6	5	6
5	5	7
4	4	6
5	4	5
6	5	6
4	4	6
5	4.5	6

1. Calculate all three measures of central tendency.
2. Measures of variation

Keeping variability as one of the indicators also, comment on the ethical value of the three groups.

Q3.1 The personnel department of a company has records which show the following analysis of its 200 engineers:

Age	Bachelor's degree only	Master's degree	Total
Under 30	90	10	100
30 to 40	20	30	50
Over 40	40	10	50
Total	150	50	200

If one engineer is selected at random from the company, find:

- (a) The probability that he has only a bachelor's degree.
- (b) The probability that he has a master's degree, given that under 30.
- (c) The probability that he is 30-40 years, given that he has only a Master's degree.
- (d) Probability that he is over 40 and has master's degree
- (e) Why simple probabilities are called marginal probabilities?

Q3.2. Customer 's arrival for inquiring about an insurance plan in a company are random and independent, the probability of an arrival in any one minute period is same as the probability of arrival in any other one minute period. Answer the following questions assuming a mean arrival rate of 3 customers per minutes.

- a) What is the probability of exactly four customers in a one minute period?
- b) What is the probability of at most three customers in a one minute period?

Q4.1 Because of the relatively high interest rates most of the credit card holders pay off their bills promptly. However this is not always possible. An analysis of the amount of interest paid monthly by a bank's visa card holder reveals that the amount is normally distributed with a mean of \$27 and standard deviation of \$7.

- a. What proportion of banks visa cardholders pay more than \$30 in interest?
- b. What proportion of the banks visa cardholders between \$30 and \$40 in interest?
- c. What proportion of banks visa cardholders pay less than \$15 in interest?
- d. What interest payment is exceeded by only 20% of the banks visa card holders?

Q4.2. A market research organization claims that 60% of all the house wives in a certain area prefer Brand A cleanser to all competing brands. Out of 5 housewives selected, what is the probability that

- a. No one uses this brand?
- b. At least 4 do not use this brand
- c. Less than 3 use this brand
- d. All uses this brand.

Q5. Attempting to analyze the relationship between advertising and sales, the owner of the furniture store recorded the monthly advertising budget (\$ thousands) and the sales (\$ millions) for a sample of 12 months. The data are listed here:

Advertising	23	46	60	54	28	33
sales	9.6	11.3	12.8	9.8	8.9	12.5

Advertising	25	31	36	88	90	99
sales	12.0	11.4	12.6	13.7	14.4	15.9

- a. Develop a scatter plot for the data with advertising as independent variable.
- b. What does the scatter diagram developed in part (a) indicate about the relationship between both variables?
- c. Provide an interpretation for the coefficient of determination.
- d. Predict the bonus for an advertising expenditure of 30,000.

Q6.1 An advertising agency wishes to reach two types of audiences: costumers with annual income greater than one lakh rupees (target audience X1) and the costumers with annual income of less than one lakhs rupees (target audience X2). The total ad budget is Rs. 2, 00,000. One program of TV ad costs Rs. 50,000; one program of Radio television costs Rs. 20,000. For contracts reasons at least 3 programs ought to be on T.V. and the no. of radio programs must be limited to 5. Surveys indicate that a TV that a single TV program reaches 4,50,000 prospective customers in target audience a and 50,000 in target audience B. one radio program reaches 20,000 prospective customers in target audience A and 80,000 in target audience B. Determine the media Mix to maximize the total reach.(Draw on the answer sheet only).

Q6.2 Calculate Transportation cost using VAM method.

	D1	D2	D3	D4	Supply
S1	21	16	15	3	11
S2	32	27	18	41	13
S3	17	18	14	23	19
Demand	6	10	12	15	
