MMS-I **BM-01** 23-12-2013.

Roll No. **Total No. of Printed Pages: 4**

Total No. of Questions : 7 **Maximum Marks : 60**

Duration (hrs.) : 3 Hours

Business Mathematics.

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. Representative sample 2. Median class 3. Significance level
4. Posterior probability 5. Binomial distribution 6. Matrix

Q. 1 B State whether the following statements are true or false (Any five) 5

1. If we were to connect the midpoints of the consecutive bars of a frequency histogram with a series of lines, we would be graphing a frequency polygon.
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. The probability that a population parameter will lie within a given interval estimate is known as the confidence level.
5. The specific shape of F distribution depends on the number of degrees of freedom in both the numerator and denominator of the F ratio.
6. If the chi square value for an observation is zero, we know that there will never be any difference between observed and expected frequencies.
7. Correlation analysis is used to determine cause effect relationships.

Q. 1 C. Choose the correct alternatives from the given choices (Any five) 5

1. From an ogive constructed for a particular set of data
   a) the original data can always be constructed exactly.
   b) the original data can always be approximated.
   C) the original data can never be constructed or approximated.
   D) none of these.
2. If a data has only one mode and its value is less than that of a mean, it can concluded that the graph of the distribution is
   a) symmetrical b) skewed to the right c) skewed to the left d) platykurtic
3. Suppose that a normally distributed population with n= 144 has $\mu = 24$, what is the mean of the sampling distribution of mean for samples of size 25?
   a) 24 b) 2 C) 48 d) Cannot be determined from the information.
4. With a lower significance level, the probability of rejecting a null hypothesis that is actually true:
   a) Decreases b) Remains the same c)Increases d)All of these
5. Which of these distributions has a pair of degrees of freedom:
   a) Poisson b) Chi square c) Binomial d) None of these
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 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. 1 D. Write short notes on (Any three) 6

1. Bay's theorem 2. Student's t test 3. Regression analysis 4. Bernoulli Process
5. Hypothesis testing

Q. 2. Solve any two **10**

Q. 2 A. Knippon camera's introduced a new 35-millimeter camera and invested heavily in a nationwide publicity campaign at achieving substantial market penetration. Weekly sales increase for 40 districts were monitored and recorded in percentage figures. The data are given below.

0.3 1.8 1.4 0.8 0.2 1.5 0.3 1.3 1.1 0.7 0.8 0.9 0.7 0.7 0.9 1.6 0.8 1.2 1.2 1.5
1.2 1.0 1.1 0.9 0.8 0.7 0.1 0.7 1.8 1.4 0.1 1.5 1.3 1.7 1.0 0.6 0.5 0.5 1.1 1.0

a) Arrange the data in an array from the highest to lowest.
b) Construct a relative frequency distribution using interval of 0.25
c) Construct a histogram from the data.

Q. 2 B. When the price of a given commodity averaged Rs. 150, the company sold 10 units. When the price dropped to an average of Rs. 80, 20 units were sold by the same company. It has also been observed, when the price was Rs. 80, 20 units were available for sale. When the price reached Rs. 60, 15 units were available for sale. Find the demand and supply functions assuming both are linear. Also, determine consumer's and producer's surplus.

Q. 2 C. A financial controller of a company has company's short term cash in a variety of savings accounts with following rates: 5.25%, 5.5%, 5.75%, 6%, 6.5%, 7%. Calculate the mean, variance and standard deviation for these rates.

Q. 3. Solve any two **10**

Q. 3 A. Classify the following probability estimates into 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. Data on readership of a certain magazine indicate that the proportion of male readers over 30 years old is 0.20. The proportion of male readers under 30 is 0.40. If the proportion of readers under 30 is 0.70, what is

a) The proportion of subscribers that are male?
b) The probability that a randomly selected male subscriber is under 30?

Q. 3 C. A box contains 5 blue and 8 green balls. If two balls are selected at random from the box, what is the probability that

a) Both balls will be blue
b) One ball will be blue and another green

4. Solve any two **10**

Q. 4 A. From a population of size 240, a sample of 49 individuals is taken. From this sample, the mean is found to be 15.8 and the standard deviation 4.2

a) Find the estimated standard error of the mean

b) Construct a 98 percent confidence interval for the mean.

Note that z value at 98 percent confidence level is 2.33.

Q. 4 B. To determine whether different income groups have different purchasing habits concerning a certain brand, a marketing researcher asked 4 income groups, Do you always, never or sometimes purchase the brand? If the results of the survey are as given in the table below should null hypothesis be accepted or rejected at 0.10 significance level?

Income group	< $7000	$7,000 - 12999	$13,000 – 19,999	$20,000.00	Total
Always	25	40	47	46	158
Never	69	51	74	57	251
Sometimes	36	29	19	37	121
Total	130	120	140	140	530

a) State the null and alternative hypothesis.

b) calculate chi square value.

c) At the 0.10 significance level, should the null hypothesis be rejected? (Note that the value from Chi square table is 6.251).

Q 4 C. The study compared the effects of 4 one- month point-of-purchase promotions sales. Below are the unit sales for 5 stores using all 4 promotions in different months,

Free sample:	77	86	80	88	84
One-pack gift:	95	92	88	91	89
Cents off:	72	77	68	82	75
Refund by mail:	80	84	79	70	82

a) Calculate the mean unit sale for each promotion and then determine the grand mean.

b) Estimate between-column variance

c) Calculate within-column variance.

d) Calculate F ratio (11.31). At the 0.05 level of significance do the promotions produce different effects on sale? (Note that the F ratio at the degree of freedom 3/16 is 3.24).

Q. 5. Solve 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 point.

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. A coal fired power plant is comparing two different systems for pollution abatement. The first system has reduced the emission of pollution to acceptable levels 63 percent of time as determined from 200 air samples. The second (and more expensive) system has reduced the emission of pollutants to acceptable levels 79 percent of time, as determined from 300 air samples. At the 0.10 level of

significance can management conclude that the more expensive system is no significantly more effective than the inexpensive system? (z value at 0.1 level of significance is 1.64).

Q. 5 C. A consumer research organization routinely selects several car models a year and tests their claims regarding safety, mileage, and comfort. In one study of two similar subcompact models manufactured by two different automakers, the average gas mileage for 7 cars of make A was 21 miles per gallon with a standard deviation of 5.8. For 9 cars of make B, the average gas mileage was 26 miles per gallon with a standard deviation of 5.3 miles per gallon. Test the hypothesis that the average gas mileage for cars of make B is greater than the average gas mileage for cars of make A. Use the 0.05 level of significance where the value of t is 1.734.

Q. 6. Solve any two **10**

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

Sr. No. of Students	01	02	03	04	05	06	07	08	09	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. Two ladies were asked to rank 7 different lipsticks. The ranks given by them are shown below. Calculate the Spearman rank order correlation.

Lipstick	A	B	C	D	E	F	G
Lady 1	2	1	4	3	5	7	6
Lady 2	1	3	2	4	5	6	7

Q. 6 C. A sales Manager for a large appliance retailer is measuring his radio advertising campaign featuring major appliances. Over the last seven weeks he has purchased a varying amount of radio time. The first row gives the value of radio time in minutes while the second row gives the number of appliances sold that week.

Minutes (X)	25	18	32	21	35	28	30
No. sold (Y)	16	11	20	15	26	32	20

a) Calculate the equation of a best fitting line

b) Find Y when X is 27.

Q. 7. Solve any two **10**

Q. 7 A. the cost of a banana, an orange and a papaya is Rs. 2, Rs. 4 and Rs. 8 respectively. If A purchased 9 bananas, 8 oranges, 7 papaya, B purchased 4 bananas, 5 oranges and 6 papaya: C purchased 8 banana, 9 oranges and 6 papaya, find the total amount spent by A, B and C respectively using matrix method.

Q. 7 B. An amount of Rs. 5000 is put into three investments at the rates of interest of 6%, 7% and 8% per annum respectively. The total annual income is Rs. 358. If the combined income from the first two investment is Rs. 70 more than the income from the third, find the amount of each investment by using Cramer's rule of evaluating determinants.

Q. 7 C. A company charges Rs. 550 for a transistor set on orders of 50 or less sets. The charge is reduced by Rs. 5 per set for each set ordered in excess of 50. Find the largest size order company should allow so as to receive a maximum revenue.