M.COM
First Semester
STATISTICS FOR DECISION MAKING
MCM – 104

Duration: 3Hrs. **Full Marks: 70**

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins. **Marks: 50**

Answer any *four* from *Question no.* 2 to 8
***Question no.* 1 is compulsory.**

1. What is sampling? Critically examine the well – known methods of probability sampling and non- probability sampling. (10)

2. Give the classical definition of probability. A bag contains 5 white and 8 red balls. Two drawings of 3 balls are made such that (a) the balls are replaced before the second trial and (b) the balls are not replaced before the second trial. Find the probability that the first drawing will give 3 white and the second will give 3 red balls in each case. (3+7 = 10)

3. (A) A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is 1/7 and that of wife's selection is 1/5. What is the probability that: (6+4=10)
   i) both of them will be selected.
   ii) only one of them will be selected.
   iii) none of them will be selected.

(B) Define binomial distribution. Under what conditions does it tend to Poisson distribution?

4. What are the chief properties of normal distribution? The lifetime of certain kinds of electronic devices have a mean of 300 hours and S.D of 25 hours. Assuming that the distribution of these lifetimes, which are measured to the nearest hours, can be approximately closely with a normal curve. (4+6=10)
   a) Find the probability that any one of these electronic devices will have a lifetime of more than 350 hours.
   b) What percentage will have lifetimes of 300 hours or less?
   c) What percentage will have lifetimes from 220 or 260 hours?

5. (A) Write short notes on the following: **(3+7=10)**

   (i) Null and alternative hypothesis

   (ii) Type I and Type II errors

   (iii) Level of significance.

   (B) The mean life time of a sample of 400 fluorescent light bulbs produced by a company is found to be 1600 hours with a S.D of 150 hours. Test the hypothesis that the mean life time of the bulbs produced in general is higher than the mean life of 1570 hours at 1% level of significance.

6. What is the χ^2 –test of goodness of fit? A book has 700 pages. The number of pages with misprints is recorded below: **(2+8=10)**

No. of misprints	0	1	2	3	4	5
No. of pages with misprints	616	70	10	2	1	1

   Can a Poisson distribution be fitted to this data?

   (Given, χ^2_{tab} at 5 % level of significance = 5.99)

7. (A) What is correlation? Given the following information about advertising expenditure and sales: **(5+5=10)**

	Advertisement (X) (Rs. in lakh)	Sales(Y) (Rs. in lakh)
Arithmetic mean, $\bar{X}$	10	90
Standard deviation,σ	3	12

   Correlation coefficient=0.8

   Obtained two regression lines

   (B) Explain the four principal components of a time – series with examples.

8. (A) What is a control chart ? Describe how a control chart is constructed and interpreted.

   (B) During an examination of equal length , the following number of defects were observed : 2,3,4,0,5,6,7,4,3,2. Draw a control chart for the number of defects and comment whether the process is under control or not. **(5+5=10)**

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Duration: 20 minutes **Marks – 20**

(PART A - Objective Type)

1. State whether the following statements are true…. (T) or False (F) **(1×5= 5)**

a) The classical approach to probability theory requires that the total number of possible outcomes be known or calculated and that each of the outcomes be equally likely.

(T) / (F)

b) The mean of the binomial distribution is greater than its variance.

(T) / (F)

c) Within 2σ limits from mean, the area under a normal curve is 95.45 %.

(T) / (F)

d) Standard error of the mean is the standard deviation of the sampling distribution of the mean.

(T) / (F)

e) Type I error is the probability of accepting null hypothesis when it is true.

(T) / (F)

2. Choose the correct option: **(1×15= 15)**

a) A bag contains 3 red, 6 white and 7 blue balls. If two balls are drown at random, then the probability of getting both white balls is :

a) 5/40 b) 6/40 c) 7/40 d) 14/40

b) The symmetry of the normal distribution about its mean indicates that:

a) The distribution is bell- shaped

b) The area under the curve on both sides of the mean is equal

c) The two tails extend indefinitely on either sides of the mean

d) All of the above.

c) The standard deviation of the binomial distribution is :

a) np b) $\sqrt{np}$ c) npq d) $\sqrt{npq}$

d) A binomial distribution may be approximated by a Poisson distribution provided

a) n is small and p is large b) n is large and p is small

c) n is large and p is large d) n is small and p is small

e) Which of the following is the probability method of selecting samples from a population?

a) Quota sampling b) Purposive sampling

c) Judgment sampling d) None of these

f) A significant difference between the statistic and parametric value implies that:

a) statistic values used to approximate parameter

b) sample statistic is representative of the population

c) the difference is real

d) none of the above

g) The degrees of freedom used in a t- distribution are equal to

a) sample size n

b) sample size n-1

c) sample size n+1

d) (a) or (b) but not (c)

h) The test statistic to test $\mu_1 = \mu_2$ for normal population is

a) F-test b) z- test c) t-test d) none of the above

i) A null hypothesis is accepted when

a) $\chi^2_{cal} \leq \chi^2_{tab}$ b) $\chi^2_{cal} \geq \chi^2_{tab}$ c) $\chi^2_{cal} = \chi^2_{tab}$ d) none of these

j) The lowest strength of association is reflected by which of the following correlation coefficients?

a) 0.95 b) – 0.60 c) – 0.35 d) 0.29

k) If the relationship between x and y is positive, as variable y decreases, variable x

a) increases b) decreases c) remains same d) changes linearly

l) If two coefficients of regression are 0.8 and 0.2 , then the value of coefficient of correlation is :

a) 0.16 b) - 0.16 c) 0.40 d) – 0.40

m) A component of time – series used for short- term forecast is

a) positive b) negative c) absolute d)none of these

n) The type of chart used to control the number of defects per unit of output is

a) $\bar{X}$ – chart b) R- chart c) p – chart d) *none of these*

o) Control charts for attributes are

a) $\bar{X}$ – chart b) R- chart c) p – chart d) $\overline{C}$ – chart

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