

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 five of the following questions:

1. (a) A project yields an average cash flow of Rs. 500 lakhs with a standard deviation of Rs. 60 lakhs. Calculate –
 - i) cash-flow will be more than Rs. 560 lakhs.
 - ii) cash-flow will be less than Rs. 420 lakhs.
 - iii) cash-flow will be between Rs.460 lakhs and Rs. 540 lakhs and
 - iv) cash flow will be more than Rs. 680 lakhs.

(1½x4= 6)

(b) Show that the Mean of the Binomial distribution is greater than its Variance. (4)
2. (a) Give the classical definition of probability. One card is drawn from a standard pack of 52 .What is the probability that it is either a king or a queen? (5)
- (b) 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,
 - (i) Both of them will be selected.
 - (ii) Only one of them will be selected.
 - (iii) None of them will be selected.

(5)
3. (a) Write short notes on the following: (4+6=10)
 - (i) Type I and Type II errors
 - (ii) Null and alternative hypothesis.

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($1\frac{1}{2} \times 4 = 6$)
- (b) Show that the Mean of the Binomial distribution is greater than its Variance. (4)
2. (a) Give the classical definition of probability. One card is drawn from a standard pack of 52 .What is the probability that it is either a king or a queen? (5)
- (b) A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is $\frac{1}{7}$ and that of wife's selection is $\frac{1}{5}$.What is the probability that,
 - (i) Both of them will be selected.
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 - (iii) None of them will be selected.

(5)
3. (a) Write short notes on the following: (4+6=10)
 - (i) Type I and Type II errors
 - (ii) Null and alternative hypothesis.

- (b) The following figures show the distribution of digits in numbers chosen at random from a telephone directory.

Digits	0	1	2	3	4	5	6	7	8	9	Total
Frequency	1026	1107	997	966	1075	933	1107	972	853	964	10000

Test whether the digits may be taken to occur equally frequency in the directory. (Tabulated chi square for 9 d.f at 5% level of significant is 16.919)

4. (a) What are the desirable properties of a point estimate? Do you agree that an interval estimate is better than a point estimate? Explain. (5)
- (b) Fuel costs are important to profitability in the airline business. A small regional carrier has been operating three types of aircraft and has collected the following cost data from its 14 planes, expressed as fuel cost per available seat mile in Rupees: (5)

Type A	73	83	76	68	80		
Type B	56	75	72				
Type C	79	95	87	83	94	84	

At the 1 % level of significance, can it be said that there is no true difference between plane types and fuel costs?

5. (a) Pantaloon manager is keeping track of the arrival of customers at checkout counters to see how many cashiers are needed to handle the flow. In a sample of 500 five-minute time periods, customers arrived at a checkout counter were as follows: (5)

No of Samples	22	74	115	95	94	80	20
No of Customers	0	1	2	3	4	5	6

Are these data consistent at the 5 % level of significance with a Poisson distribution with $\lambda = 3$?

- (b) A research company has designed 3 different systems to clean up oil spills. The following table contains the results, measured by how much surface area (m²) is cleared in 1 hour. The data were found by testing each method in several trials. Are the 3 systems equally effective? Use the 0.05 level of significance. (5)

System A	55	60	63	56	59	55
System B	57	53	64	49	62	
System C	66	52	61	57		

6. (a) "Karl Pearson's coefficient of correlation is based on covariance." Explain. (3)
 (b) From the following data set, calculate the multiple-regression plane. Also predict Y when X = 10.5 (7)

X	Y
11.4	4.5
16.6	8.7
20.5	12.6
29.4	19.7

7. (a) What are the components of time series? Discuss them with examples.
 (b) Determine 3 yearly moving averages from the following series. (5+5=10)
8. (a) What is a control chart? Describe how a control chart is constructed and interpreted. (5)
 (b) List four types of patterns that indicate that a process is out-of-control. Give examples where each might arise. (5)

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(PART A- Objective Type)

I. Choose the correct answer:

1×20=20

1. The classical definition of probability assumes that all possible outcomes of an experiment are:
a. Equally Likely
b. Mutually Exclusive
c. Mutually Exclusive & Equally Likely
d. Independent
2. Much of the development in the theory of probability is associated with the name of:
a. Fisher
b. Bayes
c. Karl Pearson
d. Gosset
3. In a Poisson distribution:
a. Mean and Variance are equal
b. Mean is greater than Variance
c. Mean is smaller than Variance
d. None of these
4. A binomial distribution may be approximated by a Poisson distribution, if:
a. n is large and p is small
b. n is large and p is large
c. n is small and p is small
d. n is small and p is large
5. Which of the following is a method of sampling that belongs to the category of probability sampling?
a. Judgement Sampling
b. Quota Sampling
c. Purposive Sampling
d. Stratified Sampling
6. In random sampling, we can describe mathematically how objective our estimates are. Why?
a. Each item in the entire population has equal chance of being selected.
b. Every sample always has an equal chance of being selected
c. All samples are of exactly the same size and can be counted.
d. (a) and (b) but not (c)
7. When choosing an estimator of a population parameter, one should consider:
a. Sufficiency
b. Efficiency
c. Clarity
d. (a) and (b) but not (c)

8. Normal distribution can be used to represent the sampling distribution of the population, when:
- The sample size is > 10
 - The sample size is < 50
 - The sample size is > 5
 - None of the above
9. The central limit theorem
- Requires some knowledge of the frequency distribution.
 - Permit us to use sample statistics to make inferences about population parameters.
 - Relates the shape of a sampling distribution of the mean to the mean of the sample.
 - Requires a sample to contain fewer than 30 observations.
10. When observed and expected frequencies completely coincide, Chi-square will be:
- ≥ 1
 - ≤ 1
 - Zero
 - between $+ 1$ and $- 1$
11. Analysis of variance technique was developed by:
- Gosset
 - R A Fisher
 - Karl Pearson
 - De Moivre
12. Large sample theory is applicable, when:
- $\frac{\sigma}{\sqrt{N}}$ is at least 100
 - $N = 30$
 - N is > 30
 - N is < 30
13. The mean of a Binomial distribution is:
- Npq
 - Np
 - \sqrt{np}
 - \sqrt{npq}
14. Standard error of mean is given by:
- σ / \sqrt{N}
 - $\sigma / \sqrt{N - 1}$
 - σ / N
 - σ^2 / \sqrt{N}
15. The seasonal variations are:
- Periodic and regular
 - Periodic and irregular
 - Not periodic
 - None of these
16. Seasonal variations create problems for:
- The individual firms only
 - The economy only
 - Individual firms as well as for the economy
 - None of the above
17. There will be only one regression line in case of two variables, if:
- r is either $+ 1$ or $- 1$
 - r is very low
 - r is zero
 - None of these
18. The regression of Y on X measures:
- The variation of Y series
 - The functional relationship between X & Y
 - The variation of X series
 - All of the above
19. The p chart is designed to control:
- The proportion of defectives
 - The number of defects per unit
 - The variability of quality produced
 - None of these

20. SQC helps in detecting:

- a. Assignable variation
- c. Both chance and assignable variation

- b. Chance variation
- d. None of these
