CBCS SCHEME

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18IM44

Fourth Semester B.E. Degree Examination, July/August 2022
Statistics for Engineers

Time: 3 hrs. Max. Marks: 100

Note: **1.** ***Answer any FIVE full questions, choosing ONE full question from each module.***
2. ***Use of statistical tables is allowed.***

Module-1

1 a. Discuss the role of statistical thinking in engineering practices. **(08 Marks)**

b. The following tables gives the number of days in a 50 days period during which automobile accidents occurred in a city:

Number of Accidents	0	1	2	3	4
Number of days	21	18	7	3	1

Fit a Poisson distribution to the data. **(12 Marks)**

OR

2 a. Explain the different methods of collecting data? List their merits and demerits. **(10 Marks)**

b. A brokerage survey reports that 30 percent of individual investors have used a discount broken i.e. one which does not change the full commission in a random sample of 9 individuals, what is the probability that

(i) Exactly two of the sampled individuals have used a discount broker.
(ii) Not more than three have used a discount broken.
(iii) Atleast three of them have used discount broker. **(10 Marks)**

Module-2

3 a. Discuss the characteristics of normal distribution. Explain the circumstances under which binomial distribution is approximated to normal. **(08 Marks)**

b. Assume that test scores from a college admission test are normally distributed with a mean of 450 and standard deviation of 100.

(i) What percentage of people taking the test score one between 400 and 500?
(ii) Suppose someone received a score of 630, what percentage of the people taking the test score better? What percentage score worse?
(iii) If a particular university will not admit any one scoring below 480, what percentage of the persons taking the test would be acceptable to the university? **(12 Marks)**

OR

4 a. Discuss the properties of the good estimators. **(08 Marks)**

b. A continuous manufacturing process produces items whose weights are normally distributed with a mean weight of 800 grams and a standard deviation of 300 grams. 4 random samples of 16 items is to be drawn from the process.

(i) What is the probability that the arithmetic mean of the sample exceeds 900 grams?
(ii) Find the values of the sample arithmetic mean within which the middle 95% of all the sample means will fall. **(12 Marks)**

Module-3

5 a. With examples, distinguish between:

(i) Null Hypothesis and Alternative Hypothesis
(ii) Type I and Type II errors
(iii) One tailed and two tailed test **(06 Marks)**

b. Individual filing of income tax returns prior to 30 June had an average refund of Rs.1200. Consider the population of 'last minute' filers who file their returns during the last week of June. For a random sample of 400 individuals who filed a return between 25 and 30 June, the sample mean refund was Rs.1054 and the sample standard deviation was Rs.1600. Using 5% level of significance, test the belief that the individuals who wait until the last week of June to file their returns to get higher refund than early filers. **(14 Marks)**

OR

6 a. Two hundred randomly selected adults were asked whether TV shows as a whole are primarily entertaining, educational or a waste of time (only one answer could be chosen). The respondents were categorized by gender. Their responses are given in the following table:

Gender	Opinion			
	Entertaining	Educational	Waste of Time	Total
Female	52	28	30	110
Male	28	12	50	90
Total	80	40	80	200

Is this evidence convincing that there is a relationship between gender and opinion in the population interest? **(10 Marks)**

b. A survey of 800 families with 4 children each revealed following distribution:

Number of Boys	0	1	2	3	4
Number of Girls	4	3	2	1	0
Number of families	32	178	290	236	64

Is this result consistent with the hypothesis that male and female births are equally probable? **(10 Marks)**

Module-4

7 a. The following table gives the distribution of items of production and also the relatively defective items among them, according to size groups. Find the correlation coefficient between size and defect in quality.

Size-group	15 - 16	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21
Number of item	200	270	340	360	400	300
Number of defective item	150	162	170	180	180	114

(10 Marks)

b. Quotations of index numbers of security prices of a certain Joint Stock Company are given below:

Year	Debenture Price	Share Price
1	97.8	73.2
2	99.2	85.8
3	98.8	78.9
4	98.3	75.8
5	98.4	77.2
6	96.7	87.2
7	97.1	83.8

Using the rank correlation method, determine the relationship between debentures prices and share prices. **(10 Marks)**

OR

8 a. The owner of the small garment shop is hopeful that his sales are raising significantly week by week. Treating the sales for the previous six weeks as a typical examples of this raising trend, he recorded them in Rs.1000's and anlaysed the results.

Week	1	2	3	4	5	6
Sales	2.69	2.62	2.80	2.70	2.75	2.81

Fit a linear regression equation to suggest to him the weekly rate at which his sales are raising and use this equation to estimate expected sales for the 7^{th} week. **(10 Marks)**

b. The following data relates the scores obtained by 9 salesman of a company in an intelligence test and their weekly sales (in 1000's).

Salesman	A	B	C	D	E	F	G	H	I
Test Score	50	60	50	60	80	50	80	40	70
Weekly Sales	30	60	40	50	60	30	70	50	60

(i) Obtain a regression equation of sales on intelligence test scores of the salesmen.

(ii) If the intelligence test score of a salesmen is 65, what would be his expected sales?

(10 Marks)

Module-5

9 A study investigated the perception of corporate ethical values among individuals specializing in marketing. Using $\alpha = 0.05$ and the following data (higher scores indicates higher ethical values), test for significant differences in perception among three groups.

Marketing Manager	Marketing Research	Advertising
6	5	6
5	5	7
4	4	6
5	4	5
6	5	6
4	4	6

(20 Marks)

OR

10 a. What are the examples of statistically designed experiments? Explain with suitable engineering examples. **(08 Marks)**

b. Briefly explain following terms:

(i) Randomization

(ii) Replication

(iii) Analysis of variance

(iv) Random effect model **(12 Marks)**

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