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18BT31

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024
Biostatistics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain about:
   (i)   Randomised control studies
   (ii) Historically controlled studies   **(10 Marks)**

   b. Draw the histogram, frequency polygon, and frequency curve for the following distribution:

Weekly Profits (Rs.)	500-600	600-700	700-800	800-900	900-1000	1000-1100	1100-1200
No. of cows	15	25	10	10	15	20	5

   (10 Marks)

OR

2 a. Explain about: (i) Factorial design (ii) Completely randomized block design   **(10 Marks)**

   b. The expenditure of 1000 families is given as follows:

Expenditure (Rs.) for feeding animals	40-59	60-79	80-99	110-119	120-139
No. of animals		150	?	250	50

   The mean for the distribution is Rs.87.50. Calculate the missing frequencies.   **(10 Marks)**

Note: first cell in No. of animals row is ?

Module-2

3 a. Evaluate the Q.D. and CD[Q] for the given data:

Difference in years	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	449	705	507	281	109	52	16	4

   (10 Marks)

   b. Determine the mean deviation from mean and median.

Class Internal (Blood glucose)	69-76	76-83	83-90	90-97	97-104	104-111	111-118	Total
No. of dogs	6	9	8	3	2	1	2	31

   (10 Marks)

OR

4 a. The chances that a doctor will diagnose a disease correctly are 60%. The chances that a patient will die by this treatment after correct diagnosis are 40% and chances of death by wrong diagnosis are 70%. A patient of doctor, who had disease, was died. What is the chance that his disease was diagnosed correctly?   **(10 Marks)**

   b. X is a discrete random variable having the following probability distribution:

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

   Find:
   (i)   Value of k
   (ii) The value of $P(X > b)$
   (iii) The value of $P(X \geq 2)$ **(10 Marks)**

Module-3

5 a. A two-tailed t-test for the two-tailed hypothesis $H_0 : \mu_1 = \mu_2$; $H_1 : \mu_1 \neq \mu_2$ [which could also be sated as $H_0 : \mu_1 - \mu_2 = 0$ and $H_1 : \mu_1 \neq \mu_2 \neq 0$]. The data are human blood clotting time (in minutes) of individuals given one of two drugs. [$t_{0.95, 11} = 2.201$].

Given drug B	Given drug G
8.8	9.9
8.4	9.0
7.9	11.1
8.7	9.6
9.1	8.7
9.6	10.4
	9.5

(10 Marks)

b. A survey of 320 families with 5 children each revealed the following distribution.

No. of Boys	5	4	3	2	1	0
No. of girls	0	1	2	3	4	5
No. of families	14	56	110	88	40	12

Is the result consistent with the hypothesis that male and female births are equally probable?
$x^2_{(tab)}(0.01,5) = 15.09$. **(10 Marks)**

OR

6 a. Explain about the one-way of classification using Anova method. **(10 Marks)**

b. Construct the regression lines between pesticides and food poisoning. Find the value of Y when X = 10.

Quantum of Pesticides applied (in kg) X	17	13	15	16	6	11	14	9	7	2
Intensity of food poisoning Y	36	46	35	24	12	18	27	22	2	8

(10 Marks)

Module-4

7 a. A company appoints four salesmen S_1, S_2, S_3 and S_4 and observes their sales in three seasons summer, winter and monsoon. The data regarding the sales figures unified as 1 unit = 1 lakh of rupees.

Season/Salesman	S_1	S_2	S_3	S_4	Season Total (Rs.)
Summer	36	36	21	35	128
Winter	28	29	31	32	120
Monsoon	26	28	29	29	112
Salesman Total	90	93	81	96	360

Analyse the significant difference between sales and season by RCBD.
[$F(6, 3, 0.05) = 8.94$; $F(6, 2, 0.05) = 19.3$] **(10 Marks)**

b. Explain about the advantages and disadvantages:
   (i) Latin square design
   (ii) Randomised block design **(10 Marks)**

OR

8 a. In a varietal trial on paddy to test the yield ability of five verities (A, B, C, D and E) an experiment was laid out in a 5 × 5 Latin square design. The net plot size was 10 × 5 square meter. The results are presented in the following table. Analyse the data and conclude the results.

D 39.0	A 24.1	E 26.1	B 37.0	C 42.2	Total 168.4
E 21.2	B 38.1	A 24	C 39.3	D 33.1	155.7
C 35.6	E 33.5	B 38.1	D 40.8	A 24.2	172.2
A 30.8	C 31.1	D 46.7	E 28.7	B 44.9	182.2
B 44.3	D 29.6	C 41.1	A 26.3	E 24.4	165.7
170	156.4	176	172.1	168.8	844.2

$F(0.01, 4, 12) = 5.41$
$F(0.05, 4, 12) = 3.26$ **(15 Marks)**

   b. Explain the advantages of factorial design. **(05 Marks)**

Module-5

9 a. Explain about the basic syntax:
   (i) Variables (ii) Strings (iii) Arrays
   (iv) Decision making (v) Input method **(10 Marks)**
   b. Write down the SAS program for histogram. **(10 Marks)**

OR

10 a. Explain about reading raw data:
   (i) Merging (ii) Subsetting (iii) Sort
   (iv) Format data set (v) Output delivery system **(10 Marks)**
   b. Explain about the SAS basic statistical procedure for T-test. **(10 Marks)**

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