CBCS SCHEME

USN | | | | | | | | | |

BBT402

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2024
Biostatistics and Tools

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Bio-Statistics and explain its importance	06	L2	CO1
	b.	The following table shows the area an millions of Sq. km of oceans of world. Draw a pie chart to represent the data. Ocean: Pacific	Atlantic	Indian	Antarctic	Arleta Area (m.sq.km): 70.8	41.2	28.5	7.6	4.8	07	L2	CO1
	c.	Draw the Histogram and frequency polygon for the following frequency distribution. Mid value of class interval: 2.5 | 7.5 | 12.5 | 17.5 | 22.5 | 27.5 | 32.5 | 37.5 Frequency: 7 | 10 | 20 | 13 | 17 | 10 | 14 | 9	07	L2	CO1
		OR			
Q.2	a.	Calculate mean, media and mode using the below given data: Weight (in kg): 93-97 | 98-102 | 103-107 | 108-112 | 113-117 | 118-122 | 123-127 | 128-132 No. of students: 3 | 5 | 12 | 17 | 14 | 6 | 3 | 1	08	L2	CO1
	b.	From the following data, compute the value of Harmonic mean. Value (x): 10 | 15 | 20 | 25 | 10 | 5 Frequency (f): 25 | 32 | 28 | 48 | 21 | 11	05	L2	CO1
	c.	Data recorded on length of carrots (cms). Calculate the mean deviation and its coefficient length (cms) = 9.2, 9.6, 10.0, 11.0, 12.6, 9.8, 10.2, 9.7, 12.7, 10.6	07	L2	CO1
		Module – 2			
Q.3	a.	From the following data of the ages of husbands and wife x: 36 | 23 | 27 | 28 | 28 | 29 | 30 | 31 | 33 | 35 y: 29 | 18 | 20 | 22 | 27 | 21 | 29 | 27 | 29 | 28 Find the two regression lines and calculate the husband age when the wife is 16-year-old.	07	L2	CO1
	b.	Three judges A, B, C give the following ranks. Find which pair of judges has common approach. A = x: 1 | 6 | 5 | 10 | 3 | 2 | 4 | 9 | 7 | 8 B = y: 3 | 5 | 8 | 4 | 7 | 10 | 2 | 1 | 6 | 9 C = z: 6 | 4 | 9 | 8 | 1 | 2 | 3 | 10 | 5 | 7	07	L3	CO1
	c.	Fit a parabola $y = a + bx + cx^2$ for the data x: 0 | 1 | 2 | 3 | 4 y: 1 | 1.8 | 1.3 | 2.5 | 2.3	06	L3	CO1

<table>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.4</td><td>a.</td><td>The probability that a man will live upto 70 is 0.65 out of 10 men now at the age of 60, find the probability that
(i) At least 7 will live upto 70
(ii) Exactly 9 will live upto 70
(iii) At most 9 will live upto 70</td><td>07</td><td>L2</td><td>CO1</td></tr>
<tr><td></td><td>b.</td><td>Fit a Poisson distribution for the following data and calculate the theoretical frequencies :
<table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>y</td><td>122</td><td>60</td><td>15</td><td>2</td><td>1</td></tr></table></td><td>07</td><td>L3</td><td>CO1</td></tr>
<tr><td></td><td>c.</td><td>In a normal distribution, 31% of the items are under 45 and 8% of the items are over 64. Find the mean and standard deviation of the distribution.
[Given $\phi_\alpha(0.5) = 0.1915$, $\phi_\alpha(1.4) = 0.4192$]</td><td>06</td><td>L3</td><td>CO1</td></tr>
<tr><td colspan="6">Module – 3</td></tr>
<tr><td>Q.5</td><td>a.</td><td>What is Ecological Study? Mention its advantages and disadvantages.</td><td>10</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>b.</td><td>Explain the experimental epidemiology and mention the types of experimental studies.</td><td>10</td><td>L2</td><td>CO2</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.6</td><td>a.</td><td>Explain the concept of Descriptive study and mention its advantages and disadvantages.</td><td>10</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>b.</td><td>Explain the different types of blinding and its importance.</td><td>10</td><td>L2</td><td>CO2</td></tr>
<tr><td colspan="6">Module – 4</td></tr>
<tr><td>Q.7</td><td>a.</td><td>Three varieties A, B and C of Mungbean are tested in a randomized block design with four replications. The plot yield in pounds are as follows:
<table><tr><td>A</td><td>6</td><td>C</td><td>5</td><td>A</td><td>8</td><td>B</td><td>9</td></tr><tr><td>C</td><td>8</td><td>A</td><td>4</td><td>B</td><td>6</td><td>C</td><td>9</td></tr><tr><td>B</td><td>7</td><td>B</td><td>6</td><td>C</td><td>10</td><td>A</td><td>6</td></tr></table>Analyze the experimental yield and state your conclusion.</td><td>10</td><td>L4</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>Present your conclusions after analysis of variance to the following results of the Latin Square design experiment conducted in respect to five Fertilizers, which were used on plots of different fertility.
<table><tr><td>A
16</td><td>B
10</td><td>C
11</td><td>D
9</td><td>E
9</td></tr><tr><td>E
10</td><td>C
9</td><td>A
14</td><td>B
12</td><td>D
11</td></tr><tr><td>B
15</td><td>D
8</td><td>E
8</td><td>C
10</td><td>A
18</td></tr><tr><td>D
12</td><td>E
6</td><td>B
13</td><td>A
13</td><td>C
12</td></tr><tr><td>C
13</td><td>A
11</td><td>D
10</td><td>E
7</td><td>B
14</td></tr></table></td><td>10</td><td>L4</td><td>CO3</td></tr>
</table>

OR

Q.8 **a.** An experiment was conducted on the yield of potatoes in a Randomized block design with four replications. Analyze the data and conclude the results. **10** **L4** **CO3**

Block	Treatment Combinations			
(1)	(1) 23	K 25	P 22	KP 38
(2)	P 40	(1) 26	K 36	KP 38
(3)	(1) 29	K 20	KP 30	P 20
(4)	KP 34	K 31	P 24	(1) 28

b. Analyze and interpret the following statistics concerning output of wheat per field obtained as a result of experiment conducted to test four varieties of wheat viz., A, B, C, D under a Latin – Square design. **10** **L4** **CO3**

C 25	B 23	A 20	D 20
A 19	D 19	C 21	B 18
B 19	A 14	D 17	C 20
D 17	C 20	B 21	A 15

Module – 5

Q.9 **a.** Explain the following terms : **06** **L1** **CO3**
i) Sampling distribution
ii) Testing of hypothesis
iii) Type I and Type II error

b. One type of aircraft is found to develop engine trouble in 5 flights out of a total of 100 and another type in 7 flights out of a total 200 flights. Is there a significant difference in the two types of aircrafts so far as engine defects are concerned? Test at 5% significance level. **07** **L3** **CO3**

c. Five dice were thrown 96 times and the numbers 1, 2 or 3 appearing on the face of the dice follows the frequency distribution as below. **07** **L3** **CO3**

No. of dice showing 1, 2 or 3	5	4	3	2	1	0
Frequency	7	19	35	24	8	3

Test the hypothesis that the data follows a Binomial distribution.
($\chi^2_{0.05} = 11.07$ for 5 df)

OR

Q.10 **a.** Explain the following terms : **02** **L1** **CO3**
(i) Null Hypothesis
(ii) Alternative Hypothesis

	b.	For the following data, test the hypothesis that the median measure in population X is less than the median measure in population Y, using the Mann - Whitney U-test using $\alpha = 0.05$ for $n_1 = 4$, $n_2 = 7$ at 5% level of significance is 4.	**08**	**L4**	**CO3**

X	60	45	23	32			
Y	10	25	20	54	32	65	8

	c.	Three different kinds of food are tested on three groups of rats for 5 weeks. The objective is to check the difference in mean weight (in grams) of the rats per week. Apply one way ANOVA using a 0.05 significance level to the following data:	**10**	**L3**	**CO3**

Food 1	8	12	19	8	6	11
Food 2	4	5	4	6	9	7
Food 3	11	8	7	13	7	9

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