U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Medical Electronics Engineering **Duration: 3 hrs.**
Course Code: 22MD6PE2CD **Max Marks: 100**
Course: CLINICAL DATA ANALYTICS

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Find the median and the mean deviation about the median for the given data: {9, 10, 12, 16, 17, 17, 18, 20}	CO1	PO3	06
	b)	Find the sample variance of the following data: {7, 11, 15, 18, 36, 43}	CO1	PO3	06
	c)	Number of patients and their age admitted in a hospital ward is as shown in the table given below. Calculate relative frequency for the age of patients between 30 and 59. **Class interval** / **Frequency** 10-19 / 4 20-29 / 66 30-39 / 47 40-49 / 36 50-59 / 12 60-69 / 4	CO1	PO3	08
		OR			
2	a)	Calculate the mean for grouped data given below. **Range** / **Frequency** 1-20 / 5 21-40 / 25 41-60 / 37 61-80 / 23 81-100 / 8	CO1	PO3	06
	b)	Consider the following data for two samples of human males. Identify the statistical parameter which will help to conclude on whether weight of 25 year old male is variable or 11 year old male.	CO1	PO3	06

	Sample1	Sample2
Age in years	25	11
Mean Weight in pounds	145	80
Standard Deviation	10 pounds	10 pounds

Give significance of the statistical parameter used for the analysis?

	c)	Construct box and whisker plot for the data given below which indicates the ordered diameters in cm of the neoplasms removed from the breast of 20 women with pure sarcomas.	***CO1***	***PO3***	**08**

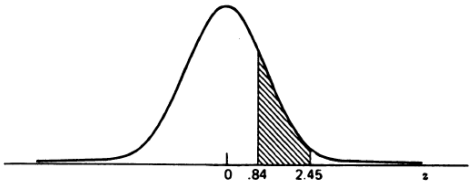
0.5	1.2	2.1	2.5	2.5	3.0	3.8	4.0	4.2	4.5	5.0
5.0	5.0	5.0	6.0	6.5	7.0	8.0	9.5	13.0		

		UNIT - II			
3	a)	Probability disctribution of no. of prescription and nonpresription drugs used during pregnancy among the subjects is given below.	***CO1***	***PO3***	**06**

No. of drugs (x)	P(X=x)
0	0.3405
1	0.3228
2	0.1895
3	0.0832
4	0.0373
5	0.0139
6	0.0067
7	0.0036
8	0.0014
9	0.0007
10	0.0002
12	0.0002

i. What is the probability that a randomly selected women will be one who used three prescription and nonprescription drugs?
ii. What is the probability that a randomly selected women used either one or two drugs?
iii. What is the probability that a woman picked at random will be one who used 2 or fewer drugs?

	b)	Consider that 30% of a certain population are immune to some disease. If a random sample of size 10 is selected from this population, what is the probability that it will contain exactly four immune persons?	***CO2***	***PO3***	**04**
	c)	In a study of suicides researchers found that the monthly disctribution of adolescent suicides closely followed a Poisson distribution with $\lambda=2.75$. i. Find the probability that a randomly selected month will be one in which three adolecent suicides occurred.	***CO3***	***PO3***	**06**

			ii. What is the probability that a randomly selected future month will be one in which either three or four suicides will occur?			
		d)	For the given standard normal distribution find P(0.84≤ z ≤ 2.45). 	***CO2***	***PO3***	**04**
			UNIT - III			
	4	a)	In a certain large population cranial length is approximately normally distributed with a mean of 185.6mm and standard deviation of 12.7mm. What is the probability that a random sample from this of size 10 from this population will have a mean greater than 190?	***CO2***	***PO3***	**10**
		b)	In a certain population of teenagers 10% of the boys are obese. If the same proportion of girls in the population are obese, what is the probability that a random sample of 250 boys and 200 girls will yield a value of $\hat{p}_1 - \hat{p}_2 \geq 0.06$.	***CO2***	***PO3***	**10**
			OR			
	5	a)	In a certain population of women, 90% entering their third trimester of pregnancy have had some parental care. If a random sample of size 200 is drawn from this population, what will be the probability that the sample proportion who had some parental care will be less than 0.85.	***CO2***	***PO3***	**10**
		b)	Assume that, in a population-1 the proportion of heavy users of illegal drugs is 50% while in the population-2 it is 33%. What is the probability that the samples of size 100 drawn from each of the population will yield the value of distribution of the difference between sample population as large as 30%.	***CO2***	***PO3***	**10**
			UNIT - IV			
	6	a)	Researchers wish to identify whether mean BMI of the population from the sample drawn is not 35. 14 adult males participated in this study and their data below is indicative of the volumes of lymph collected for kinetic and metabolic studies.	***CO3***	***PO3***	**10**

Subject	BMI	Subject	BMI	Subject	BMI
1	23	6	21	11	23
2	25	7	23	12	26
3	21	8	24	13	31
4	37	9	32	14	45
5	39	10	57		

<table>
<tr><td></td><td></td><td>b)</td><td>The researchers wish to know if the data collected provide the sufficient evidence to indicate a difference in mean serum uric acid levels between normal and individuals with Down's syndrome. The data consists of 12 subjects with Down's syndrome and 15 normal subjects. Means are $\widehat{x1}$= 4.5mg/100ml and $\widehat{x2}$= 3.4 mg/100ml</td><td>CO3</td><td>PO3</td><td>10</td></tr>
<tr><td></td><td></td><td></td><td>UNIT - V</td><td></td><td></td><td></td></tr>
<tr><td></td><td>7</td><td>a)</td><td>What is meant by regression? Mention its types in detail. And explain the procedure of linear regression analysis method.</td><td>CO4</td><td>PO3</td><td>08</td></tr>
<tr><td></td><td></td><td>b)</td><td>Find the correlation between gestational age at birth, measured in weeks, and birth weight, measured in grams for the following data.
<table>
<tr><th>Infant ID #</th><th>Gestational Age (weeks)</th><th>Birth Weight (grams)</th></tr>
<tr><td>1</td><td>34.7</td><td>1895</td></tr>
<tr><td>2</td><td>36.0</td><td>2030</td></tr>
<tr><td>3</td><td>29.3</td><td>1440</td></tr>
<tr><td>4</td><td>40.1</td><td>2835</td></tr>
<tr><td>5</td><td>35.7</td><td>3090</td></tr>
<tr><td>6</td><td>42.4</td><td>3827</td></tr>
<tr><td>7</td><td>40.3</td><td>3260</td></tr>
<tr><td>8</td><td>37.3</td><td>2690</td></tr>
<tr><td>9</td><td>40.9</td><td>3285</td></tr>
<tr><td>10</td><td>38.3</td><td>2920</td></tr>
<tr><td>11</td><td>38.5</td><td>3430</td></tr>
<tr><td>12</td><td>41.4</td><td>3657</td></tr>
<tr><td>13</td><td>39.7</td><td>3685</td></tr>
<tr><td>14</td><td>39.7</td><td>3345</td></tr>
<tr><td>15</td><td>41.1</td><td>3260</td></tr>
<tr><td>16</td><td>38.0</td><td>2680</td></tr>
<tr><td>17</td><td>38.7</td><td>2005</td></tr>
</table></td><td>CO4s</td><td>PO3</td><td>12</td></tr>
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