CBCS Scheme

USN ☐☐☐☐☐☐☐☐☐☐ **15BT41**

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Biostatistics and Biomodeling

Time: 3 hrs. Max. Marks: 80

Note: *1. Answer any FIVE full questions, choosing one full question from each module.*
2. Statistical Tables are permitted.

Module-1

1 a. Draw ogives for the following data : **(05 Marks)**

Class	140-150	150-160	160-170	170-180	180-190	190-200
Freq	4	6	10	18	9	3

   b. The following frequency distribution gives the number of chillies per plant. Calculate the mean deviation and coefficient of mean deviation from the mean from the number of chillies per plant. **(05 Marks)**

No. of chillies/plant	10-16	17-23	24-30	31-37	38-44	45-51
No. of plant	8	10	23	29	18	12

   c. Find standard deviation and coefficient of variation from the following data : **(06 Marks)**

Height (inches)	60-62	63-65	66-68	69-71	72-74
Frequency	5	18	42	27	8

OR

2 a. Define skewness and its types. Using Quartiles find coefficient of skewness from the following data : **(08 Marks)**

Variable	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f	12	16	26	38	22	15	7	4

   b. Compute the coefficient of kurtosis based on the following data and analize. **(08 Marks)**

X	4.5	14.5	24.5	34.5	44.5	54.5	64.5	74.5	84.5	94.5
f	1	5	12	22	17	9	4	3	1	1

Module-2

3 a. What is correlation? Describe different types of correlation. **(05 Marks)**

   b. The following are the marks of 8 students in chemistry and biology. Find he coefficient of rank correlation. **(05 Marks)**

Marks in chemistry	25	43	27	35	54	61	37	45
Marks in Biology	35	47	20	37	63	54	28	40

   c. Fit a linear equation of the type y = a + bx to the following data : **(06 Marks)**

   Body mass X : 100 110 120 140 160 165 170
   Brain mass Y : 20   30   35   38   40   44   48

OR

4 a. The following data gives the length of fish in centimeters and weight in Lbs. calculates correlation coefficient r. **(05 Marks)**

Length (cm)	10	15	20	25	30
Weight (Lb)	2	4	6	9	9

   b. Obtain the regression line y on x for the following data : **(05 Marks)**

x	0	1	2	3	4	5	6
y	14	13	11	9	8	5	3

c. Fit a curve of the type $y = ae^{bx}$ to the following data   (06 Marks)

x	5	15	20	30	35	40
y	10	14	25	40	50	62

Module-3

5 a. State and prove Baye's theorem.   (05 Marks)
   b. What is Hardy-Weinberg law?   (05 Marks)
   c. Find the value of K, expectation and variance from the following probability distribution.

x	8	12	16	20	24
P(x)	k/8	k/6	$\frac{3k}{8}$	$\frac{k}{4}$	$\frac{k}{12}$

   (06 Marks)

OR

6 a. Of a cigarette smoking population 70% are men and 30% are women. 10% of these men and 20% of women have lung cancer. What is the probability that a person seen smoking having a lung cancer will be a man?   (05 Marks)
   b. Explain Wahlund's principle.   (05 Marks)
   c. A random variable x has probability density function,

$$f(x) = \begin{cases} kx^2, & 0 < x < 3 \\ 0, & \text{other wise} \end{cases}$$

   Find k, $p(1 \le x \le 2)$, men and variance.   (06 Marks)

Module-4

7 a. The incidence of an occupational disease in an industry is such that workers have 20% chance of suffering from it. What is the probability that out of 6 workers i) 4 or more will suffering from the disease ii) atleast two will suffer.   (05 Marks)
   b. The duration of a telephone conversation has been found to have an exponential distribution with mean 3 mins. Find the probability that the conversation may last i) more than 1 min ii) less than 3 mins.   (05 Marks)
   c. Certain tubes manufactured by accompany have mean life time of 800hrs and standard deviation of 60hrs. Find the probability that a randomly selected tubes taken from the group will have a mean life of i) between 790hrs and 810 hrs ii) less than 785 hrs.
   (Given, $\phi(0.167) = 0.0636$, $\phi(0.25) = 0.0987$)   (06 Marks)

OR

8 a. The mean number of bacteria per milliliter of a liquid is known to be 3.9. assuming that the number of bacteria follows a Poisson distribution, find the probability that, 1ml of liquid there be i) no bacteria   ii) 4 bacteria   iii) less than 3 bacteria.   (05 Marks)
   b. Find mean and variance of binomial distribution.   (05 Marks)
   c. In a Binomial distribution 7% of the items are under 35 and 89% are under 63. Find mean and variance (Given, $\phi(1.48) = 0.4306$, $\phi(1.23) = 0.3907$)   (06 Marks)

Module-5

9 a. Two samples are drawn from two normal populations. From the following data test whether the two samples have the same variance at 5% level of significance.

Sample 1	60	65	71	74	76	82	85	87	-	-
Sample 2	61	66	67	85	78	63	85	86	88	91

   [$F_{tab} = 3.68$ at 5% for d.f. (9,7)]   (08 Marks)

b. Two researches adopted different sampling techniques while investigating the some group of students to find the number of students falling in different intelligence levels. The results are follows.

Researcher	No. of students in each level			
	Below average	Average	Above Avg	Genius
X	86	60	44	10
Y	40	33	25	2

Would you say that the intelligence level of the students depend on the sampling technique? (Take $\chi^2_{tab} = 7.82$ for d.f = 3 for 5% level). **(08 Marks)**

OR

10 a. Write short notes on :
   i) Commensalisms
   ii) Mutualism
   iii) Predation
   iv) Mutation **(08 Marks)**

b. What is Chemostat? Explain Microbial growth in Chemostat. **(08 Marks)**

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