CBCS SCHEME

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15BT41

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Biostatistics and Biomodelling

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Construct a histogram and an ogive for the following data : **(08 Marks)**

Output (units per worker)	500 - 510	510 - 520	520 - 530	530 - 540	540 - 550	550 - 560	560 - 570
No. of workers	8	18	23	37	47	26	16

b. The percentage of water in the body of a species of fish and their frequency is given in the table below. Calculate the quartile deviation (Q). **(08 Marks)**

Percentage of water in fishes	16-21	21-26	26-31	31-36	36-41	41-46	46-51	51-56	56-61	61-66
No. of fishes	4	3	8	9	14	3	3	2	2	2

OR

2 a. The following frequency distribution gives the weight (gms) of mangoes of a particular variety. Calculate the mean deviation and its coefficient for the following data : **(08 Marks)**

Weight in gms	410-420	420-430	430-440	440-450	450-460	460-470	470-480
No. of mangoes	14	20	42	54	45	18	7

b. The scores of two golfers for 10 rounds each are :

A	58	59	60	54	65	66	52	75	69	52
B	84	56	92	65	86	78	44	54	78	68

Who may be regarded as the most consistent player? **(08 Marks)**

Module-2

3 a. Find the coefficient of rank correlation from the data given below showing the marks of 10 students in mathematics and physics. **(08 Marks)**

Mathematics	8	36	98	25	75	82	92	62	65	35
Physics	84	51	91	60	68	62	86	58	35	49

b. Fit a parabola $y = a + bx + cx^2$ to the following data : **(08 Marks)**

x	1	2	3	4	5	6	7	8	9
y	2	6	7	8	10	11	11	10	9

OR

4 a. Find the coefficient of correlation and equations of regression lines given that : **(08 Marks)**

Heights of fathers	65	66	67	68	69	70	71
Heights of sons	67	68	66	69	72	72	69

b. Define Correlation and give the significance of $-1 \le \gamma \le 1$. Establish the formula.

$$r = \frac{\sigma_x^2 + \sigma_y^2 - \sigma_{(x-y)}^2}{2\sigma_x\sigma_y}.$$ **(08 Marks)**

Module-3

5 a. State and prove the Baye's theorem. **(08 Marks)**

b. Three students X, Y, Z write an examination. Their chances of passing are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that i) all of them pass ii) atleast one of them pass and iii) atleast two of them pass. **(08 Marks)**

OR

6 a. The probability of conducting an examination on time is 95% if there is no delay in admissions and 60% if there is a delay. If the probability that there will be a delay in admissions is 20%, find the probability of holding the examination on time. **(08 Marks)**

b. Give an account of the applications of probability in field of Biology. Add a note on Hardy – Weinberg law with reference to the dominant , recessive and hybrid genotypes. **(08 Marks)**

Module-4

7 a. The number of telephone lines busy at an instant of time is a binomial variate with probability 0.2. If at an instant 10 lines are chosen at random, what is the probability that i) 5 lines are busy ii) at most 2 lines are busy iii) all lines are busy? **(08 Marks)**

b. The mean weight of 500 students at a certain school is 50 kgs and the standard deviation is 6 kgs. Assuming that the weights are normally distributed, find the expected number of students weighing i) between 40 and 50 kgs and ii) more than 60 kgs, given that A(1.6667) = 0.4525, where **(08 Marks)**

$$A(z) = \frac{1}{2\pi} \int_0^z e^{(-\frac{1}{2})z^2} dz$$

OR

8 a. The length of a telephone conversation has an exponential distribution with the mean of 3 minutes. Find the probability that a call i) ends in less than 3 minutes ii) takes between 3 and 5 minutes. **(08 Marks)**

b. The probability that an individual suffers a bad reaction from a certain injection is 0.001. Using Poisson distribution, determine the probability that out of 2000 individuals , i) exactly 3 ii) more than 2 will suffer a bad reaction. **(08 Marks)**

Module-5

9 a. What is Single blind and double blind experiment? Also mention the limitations of biological experiments. **(08 Marks)**

b. Discuss briefly the effects and problems associated with cigarette smoking and lung cancer. **(08 Marks)**

OR

10 a. Explain the microbial growth in a chemostat, with suitable equations and mention any three industrial applications. **(08 Marks)**

b. Derive the relation between infectives I(t) and susceptible S(t) of epidemics model for the condition that no population is removed. **(08 Marks)**

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