DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE-RAIGAD-402103

Summer Semester Examination, 2022

B.Tech. Computer Engineering /CSE/ CSE(AI&ML).

Semester: IV Max. Marks: 60

Subject: Probability Theory & Random Processes/Probability and Statistics [BTBS404]

Date: 24/08/2022 Time: 3.45 Hrs

Instructions to the Student:

1. Each question carries 12 marks
2. All Questions are compulsory
3. Illustrate your answers with neat sketches diagram etc. wherever necessary.
4. If some pare or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Marks

Que: 1 Attempt any TWO of the following questions. [12]

A] i) What is the chance that a non-leap year should have fifty three Sundays?

ii) Urn A contains 5 red and 3 white memory chips; the urn B contains 2 red and 6 white memory chips. If a chip is drawn from each box what is the probability that they are both of the same colour?

B] A committee of 4 persons is to be appointed from 3 officers of the production department, 4 officers of the purchase department, 2 officers of the sales department and 1 chartered accountant. Find the probability of the committee in the following manner:

i) There must be one from each category.
ii) It should have at least one from the purchase department.
iii) The chartered accountant must be in the committee

C] In a certain college 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the students. If a student is selected at random and is found to be studying mathematics, find the probability that the student is a (i) girl and (ii) a boy.

Que: 2 Attempt any TWO of the following questions. [12]

A] i) A continuous random variable has the probability density function $f(x)f(x)$ as

$$f(x) = \begin{cases} ke^{-x}, & x > 0 \\ 0, & elsewhere \end{cases}$$

Determine the constant k k.

ii) Obtain the probability distribution of X, the number of heads in three tosses of a coin. Also find the expected number of heads appearing when a fair coin is tossed three times.

B] Fit a Binomial distribution to the following observation:

x	0	1	2	3	4	5
f	2	14	20	34	22	8

C] Sacks of sugar packed by an atomic loader having an average weight of 100 kg with standard deviation 0.250 kg. Assuming normal distribution find chance of sack get weighing less than 99.5 kg. (Given: $A(2) = 0.4772$ $A(2) = 0.4772$)

Que: 3 Attempt the following questions. [12]

A] From the following data, calculate the rank correlation coefficient by Karl Pearson's method

x	6	2	10	4	8
y	9	11	?	8	7

Arithmetic means of X and Y series are 6 and 8 respectively.

B] From the following table, calculate the coefficient of correlation by Karl Pearson's method

x	48	33	40	9	16	16	65	24	16	57
y	13	13	24	6	15	4	20	9	6	19

Que: 4 Attempt the following questions. [12]

A] Obtain the least square regression line of y on x for the following data.

x_i	6	2	10	4	8
y_i	9	11	5	8	7

Also, obtain an estimate of y which should correspond on the average to $x = 5.$ $x = 5.$

B] The equation of two lines are $2x = 8 - 3y2x = 8 - 3y$ and $2y = 5 - x$ $2y = 5 - x$. Find the mean values of x and y. Find the value of correlation coefficient.

Que: 5 Attempt the following questions. [12]

A] i) A die was thrown 6000 times and a throw of 5 or 6 was obtained 3240 times. On the assumption of random throwing, do the data indicate an unbiased die?

ii) There are 30% and 25% respectively of faired haired people in the two large populations. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations?

B] A full-time Ph.D. students received an average salary of $12,837 according to U.S. Department of Education. The dean of graduate studies at a large state University feels that Ph.D. students in his state earn more than this. He surveys 44 randomly selected students and finds their average salary is $14,445 with a standard deviation of $150. With $\alpha = 0.05,$ $\alpha = 0.05,$ is the dean correct?