DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD - 402 103
Supplementary Winter Semester Examination, 2019

SY

B.Tech. in Computer Engineering — **Semester: IV**
Subject: Probability and Statistics[BTCOC402] — **Marks: 60**
Date:28/11/2019 — **Time: 3 Hr.**

Instructions to the Students:

1. Each question carries 12 marks.
2. Attempt any **FIVE** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part 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.** **[12]**

A) A committee of 12 is to be formed from 9 women and 8 men. In how many ways this can be done if at least five women have to be included in a committee? In how many of these committees.
(a) The women are in majority?
(b) The men are in majority?

B) How many arrangements of the letters of the word 'BENGALI' can be made
(i) if the vowels are never together
(ii) if the vowels are to occupy only odd places

C) In bolt factory, machines A, B and C manufacture respectively 25%, 35% and 40% of the total. Of their output 5, 4, 2 percent are known to be defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probabilities that it was manufactured by
(i) machine A
(ii) machine B or C

Que. 2 **Attempt the following questions.** **[12]**

A)

Let X be a discrete random variable with the following PMF

$$P_X(k) = \begin{cases} 0.1 & \text{for } k=0 \\ 0.4 & \text{for } k=1 \\ 0.3 & \text{for } k=2 \\ 0.2 & \text{for } k=3 \\ 0 & \text{otherwise} \end{cases}$$

(a) Find E(X).
(b) Find var(X).
(c) If $Y = (X-2)^2$, find E(Y).

B) The random variable X has a range of {0, 1, 2} and the random variable Y has a range of {1, 2}. The joint distribution of X and Y is given by the following table:

x	y	P(X=x, Y=y)
0	1	0.2
0	2	0.1
1	1	0.0
1	2	0.2
2	1	0.3
2	2	0.2

(i) Write down tables for the marginal distributions of X and of Y
(ii) Write down a table for the conditional distribution of X given that Y= 2
(iii) Compute E(X) and E(Y)

Que. 3 Attempt any TWO of the following questions. **[12]**

A) A (blindfolded) marksman finds that on the average he hits the target 4 times out of 5. If he fires 4 shots, what is the probability of
(i) more than 2 hits?
(ii) at least 3 misses?

B) Vehicles pass through a junction on a busy road at an average rate of 300 per hour.
i. Find the probability that none passes in a given minute.
ii. What is the expected number passing in two minutes?
iii. Find the probability that this expected number actually pass through in a given two-minute period.

C) Time taken by the crew, of a company, to construct a small bridge is a normal variate with mean 400 labour hours and standard deviation of 100 labour hours.
i.) What is the probability that bridge gets constructed between 350 to 450 labour hours?
ii.) If company promises to construct the bridge in 450 labour hours or less and agrees to pay penalty of Rs. 100 for each labour hour spent in excess of 450, what is the probability that a company pays a penalty of at least Rs. 2000?

Que. 4 Attempt the following questions. **[12]**

A) Calculate a Spearman rank-order correlation on data without any ties we will use the following data:

	Marks									
English	56	75	45	71	62	64	58	80	76	61
Maths	66	70	40	60	65	56	59	77	67	63

B) The table below shows the number of absences x, in a Calculus course and the final exam grade y, for 7 students. Find the correlation coefficient and interpret your result.

x	1	0	2	6	4	3	3
y	95	90	90	55	70	80	85

54

Que. 5 Attempt the following questions. **[12]**

A) The values of y and their corresponding values of y are shown in the table below

x	0	1	2	3	4
y	2	3	5	4	6

a) Find the least square regression line $y = ax + b$.

b) Estimate the value of y when $x = 10$.

B) The data about the sales and advertisement expenditure of a firm is given below:

	Sales	Advertisement Expenditure
Mean	40	6
Standard Deviation	10	1.5

Coefficient of correlation, r = 0.9

(i) Estimate the likely sales for a proposed advertisement expenditure of Rs. 10 Cr.

(ii) What should be the advertisement expenditure if the firm proposes a sales target of 60 crores of rupees?

Que. 6 Solve the following. **[12]**

A) A full-time PhD 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 PhD. 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 a α=0.05, is the dean correct?

B)

i.) We have a medicine that is being manufactured and each pill is supposed to have 14 milligrams of the active ingredient. What are our null and alternative hypotheses?

ii.) The school principal wants to test if it is true what teachers say – that high school juniors use the computer an average3.2 hours a day. What are our null and alternative hypotheses?

iii.) If the difference between the hypothesized population mean and the mean of the sample is large, we _____ the null hypothesis. If the difference between the hypothesized population mean and the mean of the sample is small, we _____ the null hypothesis.

####Paper End####