Please check that this question paper contains 9 questions and 3 printed pages within first ten minutes.

[Total No. of Questions: 09]   [Total No. of Pages: 03]

Uni. Roll No. ....

Program: B.Tech. (Batch 2018 onward)

Semester: 3rd

Name of Subject: Engineering Mathematics-III (Prob & Stats)

Subject Code: BSEE-101

Paper ID: 16062

Scientific calculator is allowed

Statistical Tables (normal and chi square) are allowed to use

Time Allowed: 03 Hours   **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory

2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice

3) Any missing data may be assumed appropriately

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Part – A   **[Marks: 02 each]**

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Q1.

a) If A and B are independent events, then what can you say about $\bar{A}$ and $\bar{B}$?

b) Define critical value (at given level of significance). What are the critical values for testing (two tail test) large samples at 5% and 1% level of significance?

c) If P(A) = 5/7, P(B) = 3/7 and P(A $\cup$ B) = 6/7, then find $P(A \cap B)$.

d) If $f(x) = \begin{cases} \dfrac{x^2}{18}, -3 < x < 3 \\ 0, elsewhere \end{cases}$, Find P(0<x<1)

e) Write the equations of two lines of regression. What is the point of intersection of these lines?

f) A bag contains 5 white, 6 red and 7 green balls. 3 balls are drawn at random. Find the probability of 1 white, 1 red and 1 green ball.

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Part – B   **[Marks: 04 each]**

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Q2. In a ball factory, machines A, B and C manufacture 60%, 25% and 15% respectively of the total production and it is given that these machines produce 1%, 2% and 1%

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defective balls. A ball is chosen at random from the total production and it was found to be defective. Find the probability that it was manufactured by machine A.

Q3. Fatima and John appear in an interview for two vacancies in the same post. The probability of Fatima's selection is 1/7 and that of John's selection is 1/5. What is the probability that (i) both of them will be selected? (ii) None of them will be selected?

Q4. Find $E(X)$, $E(X^2)$ and $E[(2X+1)^2]$ where probability distribution of random variable X is as follows:

X	-3	6	9
P(X=x)	1/6	1/2	1/3

Q5. In a Statistics examination the mean score was 78 with S.D. 10. Determine the probability of students getting score between 93 and 62.

Q6. Use the method of least squares to fit a curve and use it to fit straight line $y = a + bx$, to the data given in the table

x	1	2	3	4	5
y	14	27	40	55	68

Q7. Two random samples of sizes 1000 and 2000 farms gave average yields of 2000 kg and 2050 kg respectively. The variance of wheat farms in the country may be taken as 100 kg. Examine whether the two samples differ significantly in yield?

Part – C   **[Marks: 12 each]**

Q8. If $f(x) = \begin{cases} cx, x = 1,2,3,4,5 \\ 0, elsewhere \end{cases}$ is p.d.f of random variable X, find the value of c. Hence find the distribution function F(x).

OR

A two dimensional random variable (X,Y) has the distribution given by $f(x,y) = \dfrac{1}{27}(2x + y)$, where x and y can assume the integral values 0,1,2 only. Then

(i) Find the joint probability distribution of X and Y.

(ii) Find marginal probability distribution functions of X and Y.

(iii) $P(X<2,Y>1)$

(iv) $P(X=1/Y=2)$

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Q9. Records taken of the number of male and female births in 800 families having four children each is as given in the table. Test whether the data is consistent with the hypothesis

No of male Births	0	1	2	3	4
No of families	32	178	290	236	94

that the Binomial law holds and the chance of male birth is equal to female birth.

OR

Find out coefficient of rank correlation for the following data:

X	10	15	15	20	18	16	15
Y	16	18	16	20	20	18	12

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