FACULTY OF SCIENCE

Code No. 3037

B.Sc. II-Semester (CBCS) Examination, May / June 2019

Subject : Statistics

Paper – II : Probability Distribution

Time : 3 Hours

Max. Marks: 80

PART – A (5 x 4 = 20 Marks)
(Short Answer Type)
Note : Answer any FIVE of the following questions.

1. Find the mean and variance of the following uniform distribution which is obtained by tossing a die:
$$f(x) = \frac{1}{6} \quad , \quad x = 1, 2, 3, 4, 5, 6$$
$$\qquad 0 \quad , \quad otherwise$$

2. Determine the Binomial Distribution for which the mean is 4 and variance is 3. Also find its mode.

3. Derive the Moment Generating function of a Poisson Distribution.

4. Find the mean of Negative Binomial Distribution.

5. The Random variable 'X' is Normally Distributed with mean $\mu = 30$ and standard Deviation $\sigma = 4$. Find (i) $P(X < 40)$ (ii) $P(X \geq 21)$
[You are given that (i) area between 0 and 2.5 is 0.4938. (ii) area between 0 and 2.25 is 0.4878].

6. Derive the mean of an Exponential Distribution.

7. Find the moment generating function of Gamma Distribution.

8. State any two properties of Cauchy Distribution.

PART – B (4 x 15 = 60 Marks)
(Essay Answer Type)
Note: Answer ALL the questions.

9. (a) Derive first three central moments of a Binomial Distribution.

OR

(b) Obtain the Moment Generating function of a Poisson Distribution and hence calculate mean and variance from it.

10. (a) A taxi cab company has 12 Maruti Swift cars and 8 Tata Indica cars. If 5 of these cars are in workshop for repair and Swift car is likely to be in for repairs as Indica car, what is the probability that.

(i) Out of 5 cars, x of them are Swift cars in workshop for repairs.

(ii) All the 5 are of the same make.

(iii) Find the expected value of x i.e. E(x).

OR

(b) Stating the conditions, prove that Poisson Distribution as a limiting case of the Negative Binomial Distribution.

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11 (a) Show that for a Normal
Distribution.
Q.D : M.D : S.D : 10 : 12 : 15

                                    OR

(b) In Hyderabad Metro trains arrive at a station at 15 minutes interval starting at
5 a.m. If a passenger comes to a station at a time that is uniformly distributed
between 9 a.m. and 9.30 a.m., find the probability that the passenger has to wait
for the train for
(i) Less than 6 minutes
(ii) more than 10 minutes
(iii) also find the mean and variance of waiting time.

12 (a) Derive the mean and variance of
   (i) Beta Distribution of first kind   (ii) Gamma Distribution
                                    OR
(b) A component has an exponential time to its failure distribution with the mean of
10,000 hours.
   (i) What is the probability that it will fail by 15,000 hours given that component is
       already seen in operation for its mean life time.
   (ii) What is the probability that it operates for another 5, 000 hours given that it is
        operation at 15,000 hours.
   (iii) Also find the variance of the failure time.