B.Sc. 5th Semester (General) Examination 2020 (CBCS)

Subject Statistics

Paper - DSE I

Time: 2 Hours **Full Marks:40**

The figures in the margin indicate full marks.
Candidates are requested to give their answers in their own words.
The notations and symbols have their usual meanings.

(Probability and Probability Distribution)

Answer any ***eight*** questions: 8 x 5 = 40

1. Define probability density function (pdf) and cumulative distribution function (cdf) of a continuous random variable with example.
2. Let the random variable X has the pdf

   f(x)= $\begin{cases} cx(2-x), 0 \le x \le 2 \\ 0, otherwise \end{cases}$

   Find c. Obtain $F(1), P\left(X > \frac{1}{2}\right)$ *and* $P\left(\frac{1}{2} \le X \le 1\right)$.
3. Let X and Y be two continuous random variables having joint probability density function

$$f(x,y) = \begin{cases} 1 - \frac{x}{3} - \frac{y}{3}, 0 \le x \le 2, 0 \le y \le 1 \\ 0, otherwise. \end{cases}$$

   Obtain the marginal densities of X and Y. Also find E(XY).

4. Find the expected gain of Ram, if he gains Rs. 32/-from Madhu for obtaining at most one head and loses Rs. 8/-to Madhu otherwise when he tosses one unbiased coin thrice.
5. Define moment generating function. Explain how moments can be obtained using this function.
6. Obtain the mean and the variance of a Uniform distribution with parameters (a,b). Also find the r^{th} order raw moment of the distribution.
7. For a normal distribution obtain the mean and the variance.

8. Show that for a normal distribution mean=median=mode.

9. Obtain the moment generating function of a gamma distribution.

10. Write down the pdf of a bivariate normal distribution $BN\left(\mu_x, \mu_y, \sigma_x^2, \sigma_y^2; \rho\right)$. Also write the pdf of the marginal distribution of X and the conditional pdf of Y given X=x.

OR

(Time Series Analysis)

Answer ***any eight*** questions: 8 x 5 = 40

1. Define a time series and give three examples.
2. What are the adjustments needed in a time series before using it for analysis.
3. Explain the secular trend of a time series and describe the moving average method for determining trend.
4. Distinguish between seasonal variation and cyclical fluctuation of a time series.
5. Describe the method of simple averages in determining seasonal variation in a time series.
6. Using a multiplicative model discuss the ratio to trend method.
7. Discuss the effect of elimination of trend on other components of a time series.
8. Illustrate how a stationary time series may show temporal patterns.
9. Check about the autoregressive model of order two.
10. Discuss about the three forms of forecast function.