

Unique paper code : **32371101**
Name of the course : **B. Sc (H) Statistics under CBCS**
Name/Title of the paper : **Descriptive Statistics**
Semester : **I**
Duration : **3 hours**
Maximum marks : **75**

Instructions for candidates

Attempt any **four** questions. All questions carry equal marks.

| Q1. Obtain the m.g.f of a random variable X having p.d.f

$$f(x) = \begin{cases} x & \text{for } 0 \leq x \leq 1 \\ 2-x & \text{for } 1 \leq x \leq 2 \\ 0 & \text{elsewhere} \end{cases}$$

Find first four moments about origin. Hence find mean, standard deviation, coefficient of skewness and coefficient of kurtosis. Interpret your result also.

| Q2. The probability density function of a random variable X is given by

$$f(x) = \frac{1}{\pi(1+x^2)}, -\infty \leq x \leq \infty.$$

If random variable X is transformed to a random variable Y by means of transformation $Y = \tan^{-1}(X)$ and further random variable Y by means of transformation $U = -2\log Y$. Find probability density function of random variable U.

| Q3. Four identical tickets marked 1, 2, 3 and 123 respectively are put in an urn and one is drawn at random.

Let A_i denote the event that the number i appears on the drawn ticket, $i=1, 2, 3$.

- (i) Are A_1 and A_2 independent?
- (ii) Comment on the independence of events A_1, A_2 and A_3 .

| Q4. There are two bags A and B. A contains 4 white and 2 black balls and B contains 2 white and 4 black balls. One of the two bags is selected at random and two balls are drawn from it without replacement.

- (i) Find the probability that the balls drawn are 1 black and 1 white.
- (ii) Given that 1 black and 1 white ball are drawn, what is the probability that bag A was used to draw the balls?

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| Q5. If X and Y are two random variables having joint p.d.f

$$f(x,y) = \begin{cases} 1/8 (6-x-y) & ; \text{ for } 0 \leq x \leq 2, 2 \leq y \leq 4 \\ 0 & ; \text{ elsewhere} \end{cases}$$

Find

- (i) marginal p.d.f of X. Hence find mean of X.
- (ii) conditional p.d.f of $(Y | X=1)$.

Also comment on independence of X and Y.

Q6.

In a university examination, 100 children took three tests A, B and C. 40 passed the first, 39 passed the second and 48 passed the third test. 10 children passed all the three teststests, and 21 children failed all the three tests. 9 children passed the first two and failed the third and 19 failed the first two and passed the third.

- (i) Find how many children passed at least two tests.
- (ii) For the question asked, ertain-some of the given frequencies are not necessary. Which are they?

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