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(Printed Pages 4)

Roll No. \_\_\_\_\_

**19/1221**

**बी.ए./बी.एस.सी. (भाग-I) परीक्षा, 2019**

**B.A./B.Sc. (Part-I) Examination, 2019**

**STATISTICS**

**द्वितीय प्रश्न-पत्र**

**Second Paper**

**(Probability Distributions and Numerical Analysis)**

**Time : Three Hours**

**Maximum Marks : 50**

**Note:** Answer **five** questions in all. Question **No.1** is **compulsory**. Answer **one** question from each unit. All questions carry equal marks.

**Note:** The answers to short answer type questions should not exceed 200 words and the answers to long answer type questions should not exceed 500 words.

1. Answer the following questions:  $1 \times 10 = 10$
- (i) If X is a bino  $(n,p)$  variate, obtain the distribution of  $(n-x)$ .

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- (ii) If X has a Poisson distribution such that  $P[X=0]=P[X=1]$ , find  $P[X \geq 2 | X \leq 4]$ .
- (iii) Give an example (with Justification) of a distribution, when X and  $(-X)$  both have same distribution.
- (iv) What is meant by 'degree of freedom'?
- (v) What are the assumptions of t-distribution?
- (vi) Write down the p.d.f. of a bivariate normal distribution.
- (vii) Prove that  $\left(\frac{\Delta^2}{E}\right)x^3 = 6x$
- (viii) Find the third divided difference  $f(3,4,5,6)$ , where  $f(x)=x^3-x$ .
- (ix) A particle is moving on a parabolic path. Give your choice (with justification) for calculating the area covered between the path and x-axis.
- (x) Show that  $D = \frac{1}{h}(\Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \dots)$   
(with usual notations).

**Unit-I**

2. What is normal distribution? State and prove some of its important properties. 2+8=10

**OR**

3. What is geometric distribution? State the physical conditions (assumptions) for the occurrence of this distribution. Also obtain the mean, median and mode of this distribution.

2+2+6=10

**Unit-II**

4. Define F-distribution. Let X be a F(m,n) variate and Y be a f(n,m) variate, then show that for all a

(i)  $P[X \geq a] = P[Y \leq (1/a)]$

(ii)  $P[X \leq a] = 1 - P[Y \leq 1/a]$ . 2+4+4=10

**OR**

5. Define  $\chi^2$ -distribution. What are its applications? A die is thrown 54 times and the following results were obtained.

Value on face (X)	1	2	3	4	5	6
Frequency (O)	12	9	10	6	10	7

Discuss the steps for testing the unbiasedness of die, at  $\alpha=0.05$ .

(Given  $\chi^2_5(0.05)=11.1$ ) 2+2+6=10

**Unit-III**

6. Define forward difference operator. Derive its relationships with 2+4+4=10

- (i) backward difference operator and
- (ii) divided difference operator.

**OR**

7. What do you understand by central difference interpolation? State and prove the Stirling's formula for this. Hence, find  $y_{28}$  for the following data: 2+4+4=10

x	20	30	40	50
y	512	439	346	243

**Unit-IV**

8. What is numerical integration? Derive the Weddle's formula. Hence, compute  $\int_0^4 x dx$  and compare your result with the exact value.

2+4+3+1=10

**OR**

9. Find the first and second derivatives of the following function at  $x=1.2$  10

x	1	2	3	4	5
y	0	1	5	6	8