

Total No. of Questions : 4]

SEAT No. :

P5128

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[5823]-108

F.Y. B.Sc. (Computer Science)

STATISTICS

CSST - 112 : Mathematical Statistics (Paper - II)

(2019 Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable scientific calculator and statistical tables is allowed.
- 4) Symbols and abbreviations have their usual meaning.

Q1) Attempt each of the following :

[1 each]

A) Fill in the blanks :

- i) Suppose A and B are two independent events defined on sample space then  $P(A \cap B) = \underline{\hspace{2cm}}$ .
- ii) The variance of geometric distribution with parameter 'p' is  $\underline{\hspace{2cm}}$ .

B) Choose the most appropriate alternative for each of the following : [1 each]

- i) The probability that there are 53 Sundays in randomly chosen leap year is

a)  $\frac{2}{7}$

b)  $\frac{1}{14}$

c)  $\frac{1}{28}$

d)  $\frac{1}{7}$

- ii) If x is a continuous random variable with distribution function F(x) then which of the following is NOT true?

- a) F(x) is non-negative function of x
- b) F(x) is non-decreasing function of x
- c) F(x) is right continuous function of x
- d) F(x) is step function of x

- iii) If x is a discrete random variable with  $E(x) = 3$  then  $E(2x + 5) = \underline{\hspace{2cm}}$

a) 3

b) 6

c) 11

d) 12

P.T.O.

**Q2) Attempt any Two of the following :**

**[2 × 5 = 10]**

- A) Explain the terms :
- Non-deterministic experiments
  - Addition principle of counting
- B) Define each of the following :
- Sure event
  - Mutually exclusive events
  - Conditional probability
  - Sample space
  - Mathematical expectation of discrete random variable (r.v.) X
- C) The software gives 4 digit numbers by using digits 0-9 at random. Assuming that no digit is repeated, find the probability that,
- The number is greater than 5000.
  - The number is divisible by 5.

**Q3) Attempt any Two of the following :**

**[2 × 5 = 10]**

- A) Explain the term independent events. Also show that, if A and B are independent events then
- $A^c$  and B are also independent.
  - $A^c$  and  $B^c$  are also independent.
- B) Following is the probability mass function of a discrete r.v. X :

X	0	1	2	3	4
P(x)	0.2	0.15	0.3	0.25	0.1

Find :

- $P[X \text{ is even}]$
  - distribution function of X.
  - mode of X.
- C) Define discrete uniform distribution. State its mean and variance. Also give two real life situations where the distribution is applicable.

**Q4) Attempt any One of the following :**

- A) i) State each of the following : [6]
- 1) Poisson approximation to binomial distribution
  - 2) Additive property of Poisson distribution
  - 3) Bayes' theorem
- ii) The probability density function of a continuous r.v. X is : [4]
- $$f(x) = k(4x - 2x^2), 0 \leq x \leq 2$$
- $$= 0, \quad \text{otherwise}$$
- Find :
- 1) the value of k.
  - 2) E(X).
- B) i) Define binomial distribution. State its mean and variance. Also state Bernoulli distribution as particular case of binomial distribution. [5]
- ii) A shooter is hitting at a target. The probability of hitting a target at any shoot is 0.6. What is the probability that he will hit the target on 5<sup>th</sup> attempt for the first time? Also obtain expected number of shoots required to hit the target for the first time. [5]

