

F.Y. B. SC. (Computer Science) SEM –II (CBCS - 2016 COURSE) :
SUMMER - 2019

SUBJECT : ELECTIVE – I: COMPUTER ORIENTED STATISTICAL TECHNIQUES – II

Day : Saturday

Time : 03.00 PM TO 06.00 PM

Date : 27/04/2019

S-2019-1084

Max. Marks : 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of logarithmic tables, statistical tables and pocket calculator is **ALLOWED**.

Q.1 A) Choose the correct alternative for: [06]

- a) Relative Complement of A with respect to B is _____.
i) $A \cap B'$ ii) $A' \cup B$ iii) $A' \cap B$ iv) $(A \cap B)'$
- b) In the simultaneous tossing of two fair coins, the probability of having at least one head is _____.
i) 0.5 ii) 0.25 iii) 0.75 iv) 1
- c) If A and B are independent event with $P(A) = 0.4$ and $P(B) = 0.25$ then $P(A \cup B)$ is _____.
i) 0.65 ii) 0.55 iii) 1 iv) 0.1
- d) If $X \sim B(n_1, p)$, $Y \sim B(n_2, p)$ and X and Y are independent, then the distribution of $X + Y$ is _____.
i) $B(n_1 + n_2, p)$ ii) $B(n_1 + n_2, q)$
ii) $B(n_1 + n_2, 2p)$ iv) $B(n_1 + n_2, 2q)$
- e) $X \sim B(n, p)$ tends to poisson (m) distribution if _____.
i) $n \rightarrow \infty$ and $p \rightarrow \frac{1}{2}$ iii) $n \rightarrow \infty$ and $p \rightarrow 0$
ii) $n \rightarrow 0$ and $p \rightarrow \infty$ iv) $n \rightarrow \infty, p \rightarrow 0$ and $m = np$
- f) Accepting H_0 when it is false leads to _____.
i) Type I error iii) Type II error
ii) Both type I and type II errors iv) None of the type of error

B) State whether each of the following is True or False: [06]

- a) For Poisson distribution mean is less than variance.
- b) Normal distribution satisfies additive property.
- c) A statistic is a function of known parameter.
- d) Chi-square test for goodness of fit is always left tailed test.
- e) A discrete sample space must contain a finite number of elements.
- f) If A' and B' are independent, then A and B are independent.

Q.2 Attempt ANY THREE of the following: [12]

- a) State real life situations where Poisson distribution is used.
- b) Let A and B be two events defined on sample space Ω .
If $P(A) = 0.8$, $P(B) = x$, $P(A \cup B) = 0.9$, find x.
i) when A and B are independent.
ii) when A and B are mutually exclusive.

P.T.O.

- c) 20% bolts produced by a machine are defective. Determine the probability that out of 4 bolts chosen at random.
- at most 2 bolts will be defective.
 - at least 1 bolt will be defective.
- d) A manufacturer of submersible pumps claims that at most 30% of the pumps require repairing within the first 5 years of operation. If a random sample to 120 of these pumps, 47 pumps required repairing. Test the hypothesis $H_0 : P = 0.30$ against $H_1 : P \neq 0.30$ at 5% L.O.S.

Q.3 Attempt **ANY FOUR** of the following: **[12]**

- Define Poisson distribution and state its additive property.
- State some practical situations in which use of exponential distribution is appropriate.
- Obtain the expected value of number of heads when three fair coins are tossed simultaneously.
- For the following probability density function of continuous random variable X , determine c and then find $E(X)$.

$$f(x) = \begin{cases} cx(1-x)^2 & ; 0 \leq x \leq 1 \\ 0 & ; \text{otherwise} \end{cases}$$

- Let $X \sim B(n, p)$. If $E(X) = 18$ and $\text{Var}(X) = 12$, find n and p .

Q.4 Attempt **ANY TWO** of the following: **[12]**

- Define each of the following:
 - Alternative hypothesis
 - Parameter
 - Sample.
- Number of road accidents on a highway during a month follows a Poisson distribution with mean 5. Find the probability that in certain month number of accidents on the highway will:
 - less than 3.
 - between 3 and 5.
- The distribution function of discrete random variable X is given below:

X	1	2	3	4	5	6	7	8
F(x)	0.08	0.12	0.23	0.37	0.48	0.62	0.85	1

- Find the probability distribution of X .
- Obtain probability distribution of $Y = X - 4$. Also find mode of Y .

Q.5 Attempt **ANY TWO** of the following: **[12]**

- Explain step-wise test procedure for testing $H_0 : P = P_0$ against $H_1 : P \neq P_0$ for a large sample at α % level of significance.
- The following information is collected on two characters:

Eye colour of father	Eye colour of son	
	Black	Brown
Black	23	15
Brown	15	47

Test whether eye colour of son is associated with eye colour of father. Use 1% l.o.s.

- State the properties of Normal distribution.

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