

F.Y. B. SC. (Computer Science) SEM –II (CBCS - 2016 COURSE) :
WINTER - 2018

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

Day : Saturday
Date : 20/10/2018

W-2018-0908

Time : 03.00 PM TO 06.00 PM
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) The sample space corresponding to the experiment five seeds are planted and total number of seeds germinated are recorded after a week is _____.
i) (0, 5) ii) {0, 1, 2, 3, 4, 5} iii) {1, 2, 3, 4, 5} iv) [0, 5]
- b) If A and B are two mutually exclusive event defined on sample space Ω , then $P(A \cup B)$ is _____.
i) $P(A) + P(B) - P(A \cap B)$ iii) $P(A) - P(B)$
ii) $P(A) + P(B)$ iv) $P(A) \cdot P(B)$
- c) For two events A and B, if $P(A) = P(A|B) = 0.25$ and $P(B|A) = 0.5$ then
i) A and B are mutually exclusive events iii) A is subset of B
ii) A and B are independent iv) $P(A' | B) \neq 0.75$
- d) If a random variable X has binomial distribution with parameters n and p then
i) Mean < variance ii) Mean > variance
iii) Mean = variance iv) Mean \leq variance
- e) If $X \sim P(m)$ then
i) Mean > variance iii) Mean = 2 variance
ii) Mean < variance iv) Mean = variance
- f) Rejecting H_0 when it is true leads to
i) Type I error iii) Both type I and type II errors
ii) Type II error iv) None of the type of error

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

- a) If X and Y are independent Poisson random variables then $X - Y$ is also a Poisson random variable.
- b) Normal distribution is symmetric about variance.
- c) Statistic is a function of sample values involving unknown population parameter.
- d) Chi-square test for goodness of fit is always right tailed test.
- e) It is impossible to define an impossible event.
- f) A discrete random variable cannot take negative values.

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

- a) If A and B be two events defined on a sample space Ω then show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.
- b) The probability distribution of a discrete random variable X is

$$p(x) = \frac{x}{10}, \quad x = 0, 1, 2, 3, 4$$
$$= 0, \quad \text{otherwise}$$

Find $E(x)$ and $\text{Var}(x)$.

P.T.O.

- c) If the probability that any person of 60 years, will die within a year is 0.05. Determine the probability that out of 7 persons of 60 years.
- exactly one will be die
 - at least one will be die
- d) Let X is a discrete random variable with probability distribution
- $$p(x) = kx \quad ; \quad x = 1, 2, 3$$
- $$= 0 \quad ; \quad \text{otherwise}$$
- Find k . Also find mode and median.

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

- Define Binomial distribution and state its additive property.
- Define exponential distribution and state its mean and variance.
- Obtain the expectation of a random variable X for the following probability distribution

X	0	1	2	3
$P(X = x)$	0.1	0.3	0.4	0.2

- If A and B are independent events with $P(A) = 0.6$, $P(B) = 0.4$, then find $P(A' \cap B')$, $P(A \cup B)$.
- Define expectation and variance of discrete random variable.

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

- Define each of the following:
 - Statistic
 - Standard error of statistic
 - Level of significance
- The average number of misprints per page of a book is 1.5. Assuming the distribution of number of misprints per page of a book be Poisson, find:
 - the probability that the page is free from misprints.
 - number of pages containing more than one misprints in a book of 900 pages.
- The sample of 900 ball bearings is found to have average weight of 12.5 gm. Can we assume that a sample is coming from a population with mean 13 gm and standard deviation 1 gm? Use 5% L.O.S.

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

- Explain step-wise test procedure for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$ for a large sample at α % level of significance.
- Describe the χ^2 - test for goodness of fit.
- Let $X \sim N(100, 64)$. Find :
 - $P(X < 110)$
 - $P(X > 80)$
 - $P(104 < X < 114)$

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