

F.Y. B. SC. (COMPUTER SCIENCE) SEM –II (CBCS - 2016

COURSE) : SUMMER - 2018

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

Day : Monday
Date : 23/04/2018

Time : 03.00 PM TO 06.00 PM
Max. Marks : 60

S-2018-0806

N.B.:

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

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

- a) Given that $P(A) = 0.5$, $P(B) = 0.4$, $P(A \cap B) = 0.3$, what is $P(A \cup B)$?
i) 0.6 ii) 0.4 iii) 0.3 iv) 0.5
- b) If A and B are independent events with $P(A) = 0.4$, $P(B) = 0.5$, the $P(A|B)$ is _____.
i) 0.2 ii) 0.4 iii) 0.5 iv) None of these
- c) If random variable X has binomial distribution with parameters n and p, then _____.
i) Mean < Variance iii) Mean = Variance
ii) Mean > Variance iv) Mean \leq Variance
- d) If $X \rightarrow$ Poisson (3), then the standard deviation is _____.
i) 3 ii) 9 iii) $\sqrt{3}$ iv) None of these
- e) A random variable X has an exponential distribution with mean 4. Hence, variance of the distribution is _____.
i) 2 ii) 4 iii) 16 iv) 8
- f) If $P(A) = 0.6$, then $P(A')$ is _____.
i) 0.6 ii) 0.4 iii) 0.5 iv) 0.3

B) State whether the following statements are true or false: [06]

- a) Exponential distribution cannot be used as life time distribution.
- b) A and A' from partition of Ω .
- c) If $B \subset A$, then $P(A|B) = 1$.
- d) Poisson distribution does not satisfies additive property.
- e) Bernoulli trial is a random experiment which has only two outcomes.
- f) A discrete random variable cannot take negative values.

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

- a) Let $X \rightarrow B(n, p)$, find n and p if:
i) $E(X) = 12$, $\text{Var}(X) = 6$ ii) $E(X) = 4$, $S.D.(X) = \sqrt{3}$
- b) Let A and B be two events connected with a random experiment such that $P(A) = 0.4$, $P(B) = 0.6$, $P(A \cup B) = 0.8$. find $P(A' \cap B)$, $P(A \cap B)$, $P(A' \cap B')$

P.T.O.

- c) Explain χ^2 – test of goodness of fit.
- d) A random variable X follows normal distribution with mean 100 and standard deviation 5. Find the probability that the value of X lies between 80 to 110.

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

- a) For the following probability density function of continuous r.v. X, determine 'c'. Also find E(X)

$$f(x) = cx(1-x)^2, \quad 0 \leq x \leq 1$$

$$= 0, \quad \text{otherwise}$$

- b) Define the following terms:
 i) Null hypothesis ii) Level of significance
- c) Give three real life situations where binomial distribution is experienced.
- d) If X follows Poisson (m) such that, $P(X = 1) = 2P(X = 2)$, find mean and variance of X.
- e) Write down the sample space and state the type of sample space for the experiment "Twenty seeds are planted and total number of seeds germinated are recorded after a week".

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

- a) A random variable X has the following probability distribution.

X	0	1	2	3	4	5	6
P(X = x)	k	3k	5k	7k	9k	11k	13k

Find : i) k ii) $P(X \geq 2)$ and $P(0 < X < 5)$.

- b) State and prove the addition theorem of probability concerning two events A and B.

- c) Let X be a discrete r.v. with p.m.f.

$$P(X = x) = \frac{x}{15} \quad ; \quad \text{for } x = 1, 2, 3, 4, 5$$

$$= 0 \quad ; \quad \text{otherwise}$$

Find E(X) and Var (2X – 3).

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

- a) Define cumulative distribution function (c.d.f.) of a discrete r.v. and state its properties.

- b) The mean and variance of marks in statistics (X) are 60 and 25 respectively. Find mean and variance of

i) $Y = \frac{X - 60}{5}$ ii) $W = \frac{X - 50}{10}$

- c) A company producing spark plugs claimed that there would be 10% defective spark plugs. When a sample of 1000 was taken 124 were found defective. Test correctness of company's claim.

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