F.Y. B. SC. (COMPUTER SCIENCE) SEM –II (CBCS - 2016 COURSE) : WINTER - 2017

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

Day : Friday
Date : 03/11/2017

W-2017-0714

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) 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) The sample space corresponding to the experiment "six seeds are planted and total number of seeds germinated are recorded after a week" is _____.

i) (0, 6) **iii)** {1, 2, 3, 4, , 6}
ii) {0, 1, 2, 3, 4, 5, 6} **iv)** [0, 5]

b) For a sample space $\Omega = \{w_1, w_2, w_3, w_4\}$, $P(w_1) = \frac{1}{8} = P(w_2)$, $P(w_3) = k$, $P(w_4) = \frac{3}{8}$. For what value of K will this be a probability model?

i) 0 **ii)** 1 **iii)** −1 **iv)** $\frac{3}{8}$

c) If X and Y are two random variables (r.v.) measuring the numbers on the uppermost faces of two dice when rolled then P(X = Y) is _____.

i) $\frac{1}{2}$ **ii)** $\frac{1}{6}$ **iii)** $\frac{1}{24}$ **iv)** $\frac{1}{36}$

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) $B(n_1 + n_2, p)$ **iii)** $B(n_1 + n_2, q)$
ii) $B(n_1 + n_2, 2p)$ **iv)** $B(n_1 + n_2, 2q)$

e) A r.v. X satisfy the lack of memory property follow:

i) Binomial distribution **iii)** Exponential distribution
ii) Poisson distribution **iv)** Normal distribution

f) Rejecting H_0 when it is true leads to _____.

i) Type I error **iii)** Both type I and type II error
ii) Type II error **iv)** None of the type of error

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

a) The classical approach to the probability assumes that all possible outcomes of an experiment are independent.

b) A continuous r.v. takes all possible values in a given range.

c) A statistics is a function of unknown parameter.

d) The mean and variance of Poisson distribution are same.

e) Normal distribution is symmetric about mean.

f) Level of significance lies between −1 to 1.

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

a) If A and B are two events defined on sample space Ω then, using axiomatic approach, show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

P.T.O.

b) If $X \sim B(n, p)$, find $E(X)$.

c) If $X \sim N(5, 16)$ then find: **i)** $P(3 < X < 7)$ **ii)** $P(|X| > 6)$.

d) A sample of 256 bricks has mean weight of 2.12 kg. with standard deviation of 0.56 kg. Test the hypothesis that the sample come from a population with mean weight of 2kg. at 5% level of significance (l.o.s.)

Q.3 Attempt **ANY FOUR** of the following:

a) Define random sample and standard error with illustration.

b) Define exponential distribution. State its mean and variance.

c) A family consists of 3 children. Write the sample space and the following events:
i) Elder is boy **ii)** Eldest is a boy and youngest is a girl.

d) Suppose A and B are two events defined on Ω. If $P(A) = 0.8$, $P(A \cup B) = 0.9$ and $P(B) = x$. find the value of x if A and B are:
i) Independent **ii)** Mutually exclusive

e) Suppose $X \sim B(n, p)$:
i) If $E(X) = 6$, $Var(X) = 4.2$, find n and p.
ii) Is possible to have $E(X) = 3$ and $Var(X) = 5$? Justify.

Q.4 Attempt **ANY TWO** of the following:

a) State the properties of Normal Distribution.

b) The number of cars crossing a bridge during a certain interval has approximately a Poisson distribution with mean 4. Find the probability that during a randomly chosen interval of time:
i) No car will cross the bridge.
ii) At least 3 cars will cross the bridge.
iii) At most 5 cars will cross the bridge.

c) In order to start new S.T bus to a certain remote village it is required to get the average fare of ₹ 400 daily. A random sample of 21 days revealed that the average daily collection of fare from the passengers was ₹ 390 with standard deviation ₹ 40. Do these data support the demand of people for starting new bus to the village at 5% *l*.o.s.

Q.5 Attempt **ANY TWO** of the following:

a) Explain the test procedure for testing the null hypothesis $H_0 : P = P_0$ against the alternative hypothesis.
i) $H_0 : P \neq P_0$ **ii)** $H_1 : P > P_0$ **iii)** $H_1 : P < P_0$

b) The following table shows the classification of 200 workers in a factory according to the disciplinary action taken by the management and their promotional experience.

Disciplinary	Promotional experience	
	Promoted	Not promoted
Non offenders	100	258
Offender	42	800

Test whether the promotional experience is independent of disciplinary action at 5% *l*.o.s.

c) Let $\Omega = \{a, b, c, d, e, f, g, h\}$. A function P on Ω defines a probability model by assigning probabilities in the following manner.

Element	a	b	c	d	e	f	g	h
Probability	0.1	0.2	0.15	0.05	0.25	0.1	0.1	0.05

Determine the following conditional probability of:
i) {a, b, c} given {b, c, e, f} **iii)** {a, f, g, h} given {g}
ii) {c, d, g, h} given {b, c, h}

* * * *