B. Tech. SEM -II (Computer Science & Business Systems) (CBCS 2018 Course) : SUMMER - 2019

SUBJECT : STATISTICS - II

Day : Friday
Date : 24/05/2019

S-2019-2520

Time : 10.00 AM To 01.00 PM
Max. Marks: 60

N.B.:

1) All questions are **COMPULSORY**.
2) Use of non-programmable calculator is **ALLOWED**.
3) Figures to the right indicate **FULL** marks.
4) Assume suitable data if **NECESSARY**.

Q.1 The table shows the corresponding values of three variables X_1, X_2 and X_3 . Find the least square regression equation of X_3 on X_1 and X_2 . Estimate X_3 when $X_1 = 10$ and $X_2 = 6$. **(10)**

X_1	3	5	6	8	12	14
X_2	16	10	7	4	3	2
X_3	90	72	54	42	30	12

OR

Q.1 Perform a two-way ANOVA on the data given below. **(10)**

Plots of land	Treatment			
	A	B	C	D
I	38	40	41	39
II	45	42	49	36
III	40	38	42	42

(Given : for (3,6) d.f. $F_{0.05} = 4.76$ and for (2,6) d.f. $F_{0.05} = 5.14$)

Q.2 Led (x_1, x_2, --- x_n) be a random sample of a Poisson's random variable with unknown parameter λ . Determine the maximum likelihood estimators of λ. **(10)**

OR

Q.2 What are criteria for Good Estimates? Discuss. **(10)**

Q.3 Let X_1, X_2 be a random sample of size 2, from the Poisson's distribution $f(X_1; \lambda) = \frac{\lambda^{X_1} e^{-\lambda}}{X_1!}$. Show that $T = X_1 + X_2$ is sufficient statistic. **(10)**

OR

Q.3 Let X_1, X_2, --- X_n be a random sample from distribution with mean 0 and variance θ, $\theta > 0$, Show that $T = X_1$ is not a complete statistic for θ, but $T_1 = X_1^2$ is complete statistic for θ. **(10)**

Q.4 Suppose a manufacturer of memory chips observes that the probability of a chip failure is $p = 0.05$. A new procedure is introduced to improve the design of chips. To test this new procedure, 200 chips could be produced using this new procedure and tested. Let random variable X denote the number of these 200 chips that fail. Let. **(10)**

$H_0 : p = 0.05$ (no change hypothesis)

$H_1 : p = 0.02$ (Improvement hypothesis)

Our rule is we would reject the new procedure if $X > 5$.

Find the probability of a Type - II error.

OR

P.T.O.

Q.4 In a simple binary communication system, during every T seconds, one of two possible signals $s_0(t)$ and $s_1(t)$ is transmitted. Our two hypothesis are: **(10)**

H_0 : $s_0(t)$ was transmitted.

H_1 : $s_1(t)$ was transmitted.

We assume that :

$s_0(t) = 0$ and $s_1(t) = 1, \quad 0 < t < T$

The communication channel adds noise $n(t)$, which is a zero-mean normal random process with variance 1 . Let $x(t)$ represent the received signal : $x(t) = s_i(t) + n(t), \ i = 0, 1$. We observe the received signal x(t) at some instant during each signaling interval. Suppose that we received an observation $x = 0.6$. Using the Maximum likelihood test, determine which signal is transmitted. Also find P_I.

(Given : $\phi(0.5) = 0.6915$ and $\phi(-0.5) = 0.3085$)

Q.5 Two interviewers ranked 12 candidates (A to L) for the position. The results from most preferred to least preferred are: **(10)**

Interviewer 1: A B C D E F G H I J K L

Interviewer 2: A B D C F E H G J I L K

Calculate Kendall Tau Correlation.

OR

Q.5 A typing school claims that in a 6 weeks intensive course, it can train students to type, on the average, at least 60 words per minute. A random sample of 15 of these students are given below: **(10)**

Test the hypothesis that typing speed of graduates is at least 60 words per minute using Sign Test.

Student	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Words per minute	81	76	53	71	66	59	88	73	80	66	58	70	60	56	55

Q.6 **a)** Write an R program to create Four vectors namely Patient id, Age, Diabetes, and status. Put these Four vectors into Data frame. **(05)**

b) Write the commands in R to create Class, Object and Function. **(05)**

OR

Q.6 **a)** Write an R program to print the values in vectors using the While loop. **(05)**

b) Write the command in R console to update the Third element of the list and Display the resultant list. **(05)**

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