A   Reg. No. : ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

Question Paper Code: 94022

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Fourth Semester

Electronics and Communication Engineering

19UMA422 - Probability and Statistics

(Regulations 2019)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The rth moment about origin is   CO6-U

   (a) $\mu(X)$ (b) $\mu(X^2)$ (c) $\mu(X^r)$ (d) None of the above

2. The limiting form of a Binomial distribution is   CO6-U

   (a)Exponential   (b) Poisson   (c) Normal   (d) None of the above

3. Large sample size is _____   CO6-U

   (a) 30   (b) >30   (c) < 30   (d) none of the above

4. The degrees of freedom for the sample size n= 25 in t test is _____.   CO6-U

   (a) 20   (b) 22   (c) 24   (d) 26

5. Choose the correction factor_____   CO6- U

   (a) T^2N (b) T/N   (c) T^2/N (d) TN

6. SSE for Latin square design is   CO6-U

   (a) TSS-SSC-SSR   (b) TSS-SSC   (c) 0   (d) TSS-SSC-SSR-SSK

7. If the Random Process {X(t)} with mean has Auto correlation function   CO4-App
   $R(\tau) = 16 + 9e^{-|\tau|}$ Then the Variance of the process is

   (a) 16   (b)25   (c) 6   (d) 9

8. Autocorrelation function is maximum at $\tau =$ CO6-U

   (a) 0   (b) 1   (c) -1   (d) ∞

9. The system is said to be stable if   CO6-U

   (a) $\int_{-\infty}^{\infty} h(t)\ dt\ <\infty$ (b) $\int_{-\infty}^{\infty} h(t)\ dt\ >\infty$ (c) $\int_{-\infty}^{\infty} h(t)\ dt\ >0$ (d) None of the above

10. The average power of the auto correlation function is $R_{xx(\tau)}=3e^{-3|\tau|}$ CO6-U

    (a) 3   (b) 6   (c) 2   (d) 0

PART – B (5 x 2= 10Marks)

11. The mean and standard deviation of the binomial distribution 20 and 4   CO1-App
    respectively, Calculate the value of the parameter 'n'.

12. A sample of size 10 has mean 58, standard deviation 18.4 and population   mean   CO2-App
    50, Compute the calculated value of 't' distribution.

13. What are the basic principles in the design of experiment?   CO6-U

14. State any two properties of an auto correlation function   CO6-U

15. If μ_x =o then compute the value of μ_y CO5-App

PART – C (5 x 16= 80Marks)

16. (a) (i) Obtain the Correlation coefficient for the following heights (in   CO1-App   (8)
    inches) of fathers X and their sons Y.

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

    (ii) The number of monthly breakdowns of a computer is a R.V.   CO1-App   (8)
    having a Poisson distribution with mean equal to 1.8. Find the
    Probability that his computer will function for a month (a)Without a
    breakdown (b) With only one breakdown (c) With at least one
    breakdown

    Or

    (b) (i) State and Prove the memory less property for an Exponential   CO1- App   (8)
    distribution

    (ii) In a large consignment of electric bulbs 10 % are defective. A   CO1- App   (8)
    random sample 20 bulbs are taken for inspection. Find the probability
    that   (a) all are good bulbs (b) exactly three defective bulbs.

94021

17. (a) Two researchers A and B adopted different techniques while rating CO2-App (16) the student's level. Identify the Sampling distribution; Can you say that the techniques adopted by them are significant?

Researchers	Below Average	Average	Above Average	Genius	Total
A	40	33	25	2	100
B	86	60	44	10	200
Total	126	93	69	12	300

Or

(b) Two independent samples of sizes 9 and 7 from a normal population CO2 -Ana (16) had the following values of the variables.

Sample I	18	13	12	15	12	14	16	14	15
Sample II	16	19	13	16	18	13	15		

Identify the sampling distribution, Do the estimates of the population variance differ significantly.

18. (a) A completely randomized design experiment with 10 plots and 3 CO3-Ana (16) treatments gave the following results:

Plot No	1	2	3	4	5	6	7	8	9	10
Treatment	A	B	C	A	C	C	A	B	A	B
Yield	5	4	3	7	5	1	3	4	1	7

Or

(b) The following is a Latin square of a design, when four varieties of CO3-Ana (16) seeds are being tested, Analyze the given data Set up the analysis of variance table and State your conclusion.

A 105	B 95	C 125	D 115
C115	D 125	A 105	B 105
D 115	C 95	B 105	A 115
B 95	A 135	D 95	C 115

94021

19. (a) (i) If the auto correlation function of the random binary transmission   CO4-App   (8)
is given by $R_{XX}(\tau) = \begin{cases} 1 - |\tau| & ; |\tau| \le 1 \\ 0 & ; |\tau| \ge 1 \end{cases}$ Compute the Power

spectral density function.

(ii) Using the properties of auto correlation function, compute the   CO4-App   (8)

Mean , Mean Square value and Variance of $R_{xx}(\tau) = \dfrac{25\tau^2 + 36}{4 + 6.25\tau^2}$

Or

(b) If the power spectral density of a continuous process is   CO4-App   (16)

$S_{xx}(\omega) = \dfrac{10\,\omega^2 + 35}{(\omega^2 + 4)(\omega^2 + 9)}$, Compute the auto correlation function and

the mean   square value of the process

20. (a) A random process X (t) is the input to a linear system whose impulse   CO5-App   (16)
response is h(t) = 2e^{-t} ; t $\ge$ 0. If theinput auto correlation function of
the process is $R_{xx(\tau)} = e^{-2|\tau|}$ Compute the power spectral density and
auto correlation function of the output process.

Or

(b) If the input to a time invariant stable linear system is a wide sense   CO5-App   (16)
stationary process. Prove that the output will also be a wide sense
stationary process

94021