R18

Code No: 153CH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, August/September - 2022
MATHEMATICAL AND STATISTICAL FOUNDATIONS
(Common to CSE(CS), CSE(AIML), CSE(DS))

Time: 3 Hours **Max.Marks:75**

Answer any five questions
All questions carry equal marks

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1.a) Use the Euclidean algorithm to find the following greatest common divisors:
i) (45,75) ; ii) (666,1414).
b) Using Fermat's factorization method, factor the following positive integers:
i) 7709 ; ii) 11021 . [8+7]

2.a) Show that if a, b, m, and n are integers such that $m>0$, $n>0$, n/m, and $a \equiv b \pmod{m}$, then $a \equiv b \pmod{n}$.
b) Find all solutions of each of the following linear congruence.
i) $3x \equiv 2 \pmod{7}$; ii) $17x \equiv 14 \pmod{21}$. [7+8]

3. The grades of a class of 9 students on a midtermreport (x) and on the final examination (y) are as follows:

x	77	50	71	72	81	94	96	99	67
y	82	66	78	34	47	85	99	99	68

a) Estimate the linear regression line.
b) Estimate the final examination grade of a student who received a grade of 85 on the mid term report. [15]

4. A nationwide survey of college seniors by the University of Michigan revealed that almost 70% disapprove of daily pot smoking, according to a report in *Parade*. If 12 seniors are selected at random and asked their opinion, find the probability that the number who disapprove of smoking pot daily is
a) anywhere from 7 to 9;
b) at most 5;
c) not less than 8. [15]

5.a) The loaves of rye bread distributed to local stores by a certain bakery have an average length of 30 centimetres and a standard deviation of 2 centimetres. Assuming that the lengths are normally distributed,
What percentage of the loaves are
i) Longer than 31.7 centimetres.
ii) Between 29.3 and 33.5 centimetres in length.
iii) Shorter than 25.5 centimetres.
b) Explain about t-distribution. [9+6]

6.a) State the Central limit theorem.

b) For an F -distribution, find

i) $F_{0.05}$ with $v_1 = 7$ and $v_2 = 15$;

ii) $F_{0.01}$ with $v_1 = 24$ and $v_2 = 19$;

iii) $F_{0.95}$ with $v_1 = 19$ and $v_2 = 24$;

iv) $F_{0.99}$ with $v_1 = 28$ and $v_2 = 12$. [5+10]

7.a) Scholastic Aptitude Test (SAT) Mathematics scores of a random sample of 500 high school seniors in the state of Texas are collected, and the sample mean and standard deviation are found to be 501 and 112, respectively. Find a 99% confidence intervalon the mean SAT Mathematics score for seniors in the state of Texas.

b) A survey of 1000 students found that 274 choseprofessional baseball team A as their favourite team. In a similar survey involving 760 students, 240 of them chose team A as their favorite. Compute 95% confidenceinterval for the difference between the proportions of students favoring team A in the two surveys. [8+7]

8.a) Explain the Markov process.

b) Write about the Transition Probability and Transition Probability Matrix. [7+8]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, March - 2022
MATHEMATICAL AND STATISTICAL FOUNDATIONS
(Common to CSE(CS), CSE(AIML), CSE(DS))

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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1.a) Find x if possible such that $4x \equiv 2(\text{mod}\,6)$, $3x \equiv 5(\text{mod}\,8)$

$2x \equiv 5(\text{mod}\,7)$

$3x \equiv 4(\text{mod}\,8)$

b) Solve $8x \equiv 13(\text{mod}\,29)$ [15]

2.a) A continuous Random variable has the p.d.f $f(x) = \begin{cases} Kx^2 & If\ 0 < x < 3 \\ 0 & otherwise \end{cases}$. Determine:

i) K ii) The mean iii) Variance.

b) Ten coins are thrown simultaneously. Find the probability of getting
i) At least 1 head ii) At least seven heads. [7+8]

3.a) In a distribution exactly normal 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution.

b) Five measurements of the tar content of a certain kind of cigarette yielded 14.5, 14.2, 14.4, 14.3 and 14.6 mg per cigarette. Show that the difference between the mean of this sample $\bar{x} = 14.4$ and the average tat claimed by the manufacture $\mu = 14.0$ is significant $\alpha = .05$.

[7+8]

4. Among 64 off springs of a certain cross between guinea pigs 34 were red, 10 were black and 20 were white. According to the genetic model these numbers should be in the ratio $9:3:4$. Are the data consistent with model at 5% level? [15]

5. A professor has three pet questions, one of which occurs on every test he gives. He never uses the same question twice in successive examinations. If he used the question no1, he tosses a coin and uses the question no.2. If he uses the question no. 2, he tosses two coins and use the question no. 3, if both are heads. If he uses the question no 3, he tosses three coins and use the question no. 1, if all are heads. In long run which question does he use most often and with how much frequency is it used. [15]

6.a) Solve $4x \equiv 2(\text{mod}\,6)$, $3x \equiv 5(\text{mod}\,8)$

b) Solve $9x \equiv 12(\text{mod}\,16)$

[7+8]

7.a) A continuous Random variable has the p.d.f $f(x) = \begin{cases} \frac{1}{2}(x+1), & -1 \le x \le 1 \\ 0 & otherwise \end{cases}$. Determine:

i) $P(2 \le x \le 4)$ ii) The mean iii) Variance.

b) If the variance of a Poisson variate is 3. Find the probability that

i) $P(x=0)$ ii) $P(1 \le x < 4)$ [7+8]

8. A study of passage of English text to find a vowel followed by a vowel or a consonant followed by a consonant or a vowel reveal the following transition probability matrix $\begin{bmatrix} 0.12 & 0.88 \\ 0.54 & 0.46 \end{bmatrix}$. Find the percentage of letters in the text book which are expected to be vowels. [15]

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