

R18

Code No: 153CH

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

- 1.a) Find x if possible such that $4x \equiv 2 \pmod{6}$
 $2x \equiv 5 \pmod{7}$
 $3x \equiv 4 \pmod{8}$
b) Solve $8x \equiv 13 \pmod{29}$ [15]

- 2.a) A continuous Random variable has the p.d.f $f(x) = \begin{cases} Kx^2 & \text{If } 0 < x < 3 \\ 0 & \text{otherwise} \end{cases}$. 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 tar 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 no.1, 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 $4x \equiv 2 \pmod{6}$
 $3x \equiv 5 \pmod{8}$
b) Solve $9x \equiv 12 \pmod{16}$ [7+8]

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

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b) i) $P(2 \leq x \leq 4)$ ii) The mean iii) Variance
If the variance of a Poisson variate is 3. Find the probability that
i) $P(x=0)$ ii) $P(1 \leq x < 4)$ [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

AG $\begin{bmatrix} 0.12 & 0.88 \\ 0.54 & 0.46 \end{bmatrix}$ AG AG AG AG AG A
vowels. [15]

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