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FOURTH SEMESTER B.TECH. (AUTOMOBILE ENGINEERING) END SEMESTER EXAMINATIONS, JUNE 2022

SUBJECT: ENGINEERING MATHEMATICS IV [MAT 2252]

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.

| end in a draw. They agree to play a tournament consisting of 3 games. Find the | ne probability | 3M |
|--|---|---|
| | - | 3M |
| N(40,36) and $N(45,9)$ respectively. If the electronic device is to be used | for 45 hours | 4M |
| $f(x, y) = \begin{cases} \frac{15}{12}x(2 - x - y), & 0 \le x \le 1, \ 0 \le y \le 1 \\ 0, & elsewhere \end{cases}$ Compute conditional join | • | 3M |
| | $\frac{-x^2}{2}$, X>0. | 3M |
| Fit a parabola for the following data and estimate the value of y at x=3.5. | | 4M |
| | | |
| | bility that the | 3M |
| Solve using Graphical method | | |
| $Maximize \ z = 10x + 15y$ | | |
| | | 3M |
| $2x + 4y \le 50$ | | |
| $x + y \ge 0$ $x, y \ge 0$ | | |
| | end in a draw. They agree to play a tournament consisting of 3 games. Find th that i) 2 games end in a draw ii) A and B win alternatively, iii) B wins atleas Find the mean and variance of Gamma distribution by defining its probabilit function. Suppose that life length of two electronic device say D_1 and D_2 have N(40,36) and $N(45,9)$ respectively. If the electronic device is to be used period, which device is to be preferred? If it is to be used for 48 hours p device is to be preferred? The joint density function of (x, y) is $f(x, y) = \begin{cases} \frac{15}{12}x(2-x-y), & 0 \le x \le 1, & 0 \le y \le 1\\ 0, & elsewhere \end{cases}$ Compute conditional join $0, & elsewhere \end{cases}$ Gensity function of x given y. Find the mean and variance of a random variable A with the pdf $f(x) = xe^{-1}$ Fit a parabola for the following data and estimate the value of y at x=3.5. $\boxed{x 1 2 3 4 6 8}$ y 2.4 3 3.6 4 5 6 If a random variable k is uniformly distributed over $(0, 5)$, what is the proba roots of the equation $4x^2 + 4xk + k + 2 = 0$ are real? Solve using Graphical method $Maximize \ z = 10x + 15y$ $Subject \ to \ 2x + y \le 26$ $-x + y \le 5$ | Suppose that life length of two electronic device say D_1 and D_2 have distributions $N(40,36)$ and $N(45,9)$ respectively. If the electronic device is to be used for 45 hours period, which device is to be preferred? If it is to be used for 48 hours period, which device is to be preferred? The joint density function of (x, y) is given by $f(x, y) = \begin{cases} \frac{15}{12}x(2-x-y), & 0 \le x \le 1, & 0 \le y \le 1 \\ 0, & elsewhere \end{cases}$ Compute conditional joint probability density function of x given y. Find the mean and variance of a random variable A with the pdf $f(x) = xe^{-\frac{x^2}{2}}$, X>0. Fit a parabola for the following data and estimate the value of y at x=3.5. $\boxed{x 1 2 3 4 6 8}{y 2.4 3 3.6 4 5 6}$ If a random variable k is uniformly distributed over (0, 5), what is the probability that the roots of the equation $4x^2 + 4xk + k + 2 = 0$ are real? Solve using Graphical method $Maximize \ z = 10x + 15y$ $Subject \ to \ 2x + y \le 26$ $2x + 4y \le 56$ $-x + y \le 5$ |

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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

| | | 8 | | | 0 articles. | | |
|---|--|---|--|--|--|--|--|
| Weight (in grams) | 0 -10 | 10-20 | 20-30 | 30-40 | 40 - 50 | 5 - 60 | 4 M |
| No of articles | 14 | 17 | 22 | 26 | 23 | 18 | |
| 35%, and 40% real and found to be a manufactured by | espectively of lefective. It i A, B, C are | f the total pr s believed th usually defe | roduct. A bo nat 5%, 4%, ective. What | olt is chosen and 2% resp | at random pectively of | from product f the products | 3M |
| - | | | | | | | 3 M |
| positive constant | s such that a | +b = 1, then | | | | | 4 M |
| | | | | | | | 3 M |
| Let \overline{X} and s^2 be the mean and variance of a random sample of size 25 from the distribution | | | | | | | 3M |
| Use Big M method | od to solve Iaximize P = ubject to x - -2 | $= -3x + y + z$ $-2y + z \le 11$ $4x + y + 2z \ge 1$ | | | | | 4 M |
| | (in grams) No of articles In a bolt manufactorial of the second | In a bolt manufacturing factor 35%, and 40% respectively of and found to be defective. It is manufactured by A, B, C are bolt selected was manufactured Two independent random variable tal positive constants such that a show that $m_2 = m_1(2m_1 + 16m_1)$ If $X = m_1(2m_1 + 16m_2)$ If $X = m_1(2m_1 + 16m_2)$ If $X = m_1(2m_1 + 16m_2)$ Let \overline{X} and s^2 be the mean and N (3,100). Evaluate $Pr\{0 < 16m_2)$ Use Big M method to solve $Maximize P = Subject to x - 40m_2$ | (in grams)No of articles14 articles17 articles18 articles19 and found to be defective. It is believed the manufactured by A, B, C are usually defected bolt selected was manufactured by maching10 Two independent random variable X and respectively. Find the correlation coefficient if X is a random variable taking values of positive constants such that $a+b=1$, then show that $m_2 = m_1(2m_1 + 1)$.11 If $X \sim N(\mu, \sigma^2)$, then show that $Z = \frac{X-\mu}{\sigma} \sim$ Let \overline{X} and s^2 be the mean and variance of N (3,100). Evaluate $Pr\{0 < \overline{X} < 6$, 55 Use Big M method to solveMaximize $P = -3x + y + z \leq$ Subject to $x - 2y + z \leq 11$ | In a bolt manufacturing factory, there are 3 machines 35%, and 40% respectively of the total product. A bo and found to be defective. It is believed that 5%, 4%, manufactured by A, B, C are usually defective. What bolt selected was manufactured by machine C? Two independent random variable X and Y have mark respectively. Find the correlation coefficient between If X is a random variable taking values 0, 1, 2,, a positive constants such that $a+b = 1$, then (i) Find mg show that $m_2 = m_1(2m_1 + 1)$. If $X \sim N(\mu, \sigma^2)$, then show that $Z = \frac{X-\mu}{\sigma} \sim N(0,1)$ and Let \overline{X} and s^2 be the mean and variance of a random sa N (3,100). Evaluate $Pr\{0 < \overline{X} < 6$, $55.2 < s^2 <$ Use Big M method to solve Maximize P = -3x + y + z $Subject to x - 2y + z \le 11$ $-4x + y + 2z \ge 3$ | in grams)in grams)No of articles14 17172226In a bolt manufacturing factory, there are 3 machines A, B, C. Th 35%, and 40% respectively of the total product. A bolt is chosen and found to be defective. It is believed that 5%, 4%, and 2% resp manufactured by A, B, C are usually defective. What is the prob bolt selected was manufactured by machine C?Two independent random variable X and Y have mean 6 and 9 respectively. Find the correlation coefficient between U = 4X-3YIf X is a random variable taking values 0, 1, 2, and $P(X) =$ positive constants such that $a+b = 1$, then (i) Find mgf. (ii) If $E(x)$ show that $m_2 = m_1(2m_1 + 1)$.If $X \sim N(\mu, \sigma^2)$, then show that $Z = \frac{X-\mu}{\sigma} \sim N(0,1)$ and $Y = Z^2 \sim \chi$ Let \overline{X} and s^2 be the mean and variance of a random sample of size N (3,100). Evaluate $Pr\{0 < \overline{X} < 6$, $55.2 < s^2 < 145.6\}$.Use Big M method to solveMaximize $P = -3x + y + z$ Subject to $x - 2y + z \leq 11$ $-4x + y + 2z \geq 3$ | inininingrams)inininNo of1417222623In a bolt manufacturing factory, there are 3 machines A, B, C. The machine product a bolt is chosen at random and found to be defective. It is believed that 5%, 4%, and 2% respectively of manufactured by A, B, C are usually defective. What is the probability that bolt selected was manufactured by machine C?Two independent random variable X and Y have mean 6 and 9 and varian respectively. Find the correlation coefficient between U = 4X-3Y and V = XIf X is a random variable taking values 0, 1, 2, and $P(X) = ab^x$, wher positive constants such that $a+b = 1$, then (i) Find mgf. (ii) If $E(X) = m_1$, E show that $m_2 = m_1(2m_1 + 1)$.If $X \sim N(\mu, \sigma^2)$, then show that $Z = \frac{X-\mu}{\sigma} \sim N(0,1)$ and $Y = Z^2 \sim \chi^2(1)$.Let \bar{X} and s^2 be the mean and variance of a random sample of size 25 from the N (3,100). Evaluate $Pr\{0 < \bar{X} < 6, 55.2 < s^2 < 145.6\}$.Use Big M method to solve $Maximize P = -3x + y + z$ $Subject to x - 2y + z \le 11-4x + y + 2z \ge 3$ | (in grams) $ < |