



Reg. No. :

Name :

Fifth Semester B.Tech. Degree Examination, November 2013
(2008 Scheme)

08.501 – ENGINEERING MATHEMATICS – IV (CMPU)

Time: 3 Hours

Max. Marks : 100

PART – A



Answer **all** questions. **Each** question carries **4** marks.

1. Find the mean and variance of Binomial-distribution.
2. If $f(x) = \begin{cases} k(10-x)x^2, & 0 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$ is a pdf find k.
3. A random variable X has a uniform distribution over $(-3, 3)$ compute
 - i) $P[X < 2]$
 - ii) $P(|X| < 2)$
4. Convert the equation $y = ax + bx^2$ to a linear form and write the corresponding normal equations to fit it.
5. Show that $2\gamma \sigma_x \sigma_y = \sigma_x^2 + \sigma_y^2 - \sigma_{x-y}^2$.
6. Define parameter, statistic, point estimate interval estimate.
7. Define slack variables, surplus variables, basic solutions, basic feasible solutions.
8. Find all basic solutions and basic feasible solutions for

$$2x_1 + 6x_2 + 2x_3 + x_4 = 3$$

$$6x_1 + 4x_2 + 4x_3 + 6x_4 = 2$$



9. Construct the dual of $\text{Max } Z = 3x_1 + 17x_2 + 9x_3$

Subject to $x_1 - x_2 + x_3 \geq 3$

$-3x_1 + 2x_2 \leq 1$

and $x_1, x_2, x_3 \geq 0$

10. Write the relationship between primal and dual problems.

PART – B

Answer **one** question from **each** Module. **Each** question carries **20** marks.

Module – I

11. a) The pdf of X is given by $P(x) = y_0 e^{-|x|}$, $-\infty < x < \infty$. Find \bar{X} and σ .

b) Fit a Poisson distribution to the following data :

$x: 0 \quad 1 \quad 2 \quad 3 \quad 4$

$y: 122 \quad 60 \quad 15 \quad 2 \quad 1$

c) In a certain examination the percentage of candidates passing and getting distinctions were 45 and 9 respectively. Evaluate the average marks obtained by the candidate, the minimum pass and distinction marks being 40 and 75 respectively, use normal distribution.

12. a) The probability that a man aged 40 years of age will be alive 30 years hence is $\frac{2}{3}$. Find the probability that out of 5 men aged 40 (i) all fine men (ii) at least one man (iii) at most 3 men will be alive 30 years hence.

b) Find K , mean and variance of the normal distribution $f(x) = ke^{-\frac{1}{8}(x^2+8x+16)}$.

c) If X is uniformly distributed random variable with mean 1 and variance $\frac{4}{3}$ find $P(X < 0)$.



Module – II

13. a) Fit a parabola by the method of least squares to the following data :

x : 1 2 3 4 5

y : 5 12 26 60 97

b) Find the correlation coefficient and the two regression line equations for the following data :

x : 20 22 25 26 27 23

y : 31 29 32 37 35 34



c) Find the rank correlation for the data :

x : 78 89 69 97 59 57 79 68 83 64

y : 125 137 156 107 112 118 123 138 115 122

14. a) Find the two regression lines from the following data :

x : 16 12 18 4 3 10 5 12

y : 87 88 89 68 78 80 75 83

b) Find a second degree curve for the following data :

x : 1 2 3 4 5

y : 3 9 13 21 31

c) Calculate the rank correlation from the following data :

Ranks in x : 1 2 3 4 5 6 7

Ranks in y : 4 3 1 2 6 5 7



Module – III

15. a) Solve graphically :

$$\text{Maximize } Z = 4x_1 + 10x_2$$

$$\text{Subject to } 12x_1 + 6x_2 \leq 30$$

$$4x_1 + 10x_2 \leq 20$$

$$2x_1 + 3x_2 \leq 9$$

$$x_1, x_2 \geq 0$$

b) Use Big-M method to solve the following L.P.P.

$$\text{Maximize } Z = x_1 + 2x_2 + 3x_3 - x_4$$

$$\text{Subject to } x_1 + 2x_2 + 3x_3 = 15$$

$$2x_1 + x_2 + 5x_3 = 20$$

$$x_1 + 2x_2 + x_3 + x_4 = 10$$

$$x_1, x_2, x_3, x_4 \geq 0$$

c) Write the dual of $\text{Max } z = x_1 - 2x_2 + 3x_3$

$$\text{Subject to } -2x_1 + x_2 + 3x_3 = 2$$

$$2x_1 + 3x_2 + 4x_3 = 1$$

$$\text{Where } x_1, x_2, x_3 \geq 0$$

16. a) Solve the following L.P.P.

$$\text{Maximize } Z = 4x_1 + 10x_2$$

$$\text{Subject to } 5x_1 + 3x_2 \leq 15$$

$$2x_1 + 5x_2 \leq 10$$

$$x_1, x_2 \geq 0$$

b) Solve the following L.P.P.

$$\text{Minimize } Z = 4x_1 + x_2$$

$$\text{Subject to } 3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 4 \text{ and } x_1, x_2 \geq 0$$

c) Prove that the dual of the dual is primal.