(ii) Optimizati ıl Engineering application of Optimizati

(iii) Differen tween constrained and unconstrai ptimization techniques

(iv) Applicatic ynamic Programming

7. (a) State the necess ıd sufficient conditions for the unconstraine imum of the function.

(b) Use Dynamic F mming approach to solve the LPP :

Maximize : $f(x = 50x_1 + 100x_2$

Subject to :

$10x \leq 2500,$

$4x_1 \leq 2000,$

$x_1 + \leq 450,$

$x_1, :$

8. Minimize : $z = f(x_1, (x_1-3)^2 + (x_2-8)^2$

Subject to : $-x_1^2 \leq 2$

$3x_1 \leq 12$

By using Kuhn - r conditions

M. Tech. 1st Semester Mechanical Engg.

Machine Design

Examination, December–2017

Paper–M–801–A

Numerical analysis and Optimization

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any **five** questions. All questions carry equal marks.*

1. (a) Solve the system :

$2x + 2y + z = 12$

$3x + 2y + 2z = 8$

$5x + 10y - 8z = 10$

by using Gauss elimination method

(b) Determine the largest eigen value and the corresponding eigen vector of the matrix.

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

2. (a) Given the va

x	5	11	13	17
f(x)	150	1452	2366	5209

Evaluate f(9 sing

(i) Lagran ormula

(ii) Newto ided difference formula

(b) Fit a straight by the method of least squares, to the follow ata :

x	1	2	4	5
y	14	27	55	68

3. (a) Find f′(8) fi e following data :

x	3	11	27	34
f(x)	–13	899	17315	35606

(b) Given that :

x	4.0	4.4	4.6	4.8	5.0	5.2
log x	1.3863	1.4816	1.5261	1.5686	1.6094	1.6487

Evaluate :

$\int_{4.0}^{5.2} \log x \, dx$

(i) Trapez ule

(ii) Simps le

4. (a) Using modified Euler's method, obtain a solution of the equation

$\frac{dy}{dx} = 2 + \sqrt{xy}$, with initial conditions y = 1 when x = 1 at x = 2 in steps of 0.2.

(b) Using Runge-Kutta method, compute y (0.2) and y (0.4) from

$\frac{dy}{dx} = 3x + \frac{1}{2} y$, y (0) = 1

5. (a) Find the cubic splines to fit the data evaluate y (1.5) and y′ (3)

x	1	2	3	4
y	1	2	5	11

(b) Given that

x	1.96	1.98	2.00	2.02	2.04
f(x)	0.7825	0.7739	0.7651	0.7563	0.7473

find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 1.96

6. (a) What is a multistage decision problem ? What are the types of multistage decision problem ?

(b) Write short notes on any *two* of the following :

(i) Non Linear programming problems