7. (a) Discuss direct ı method. Also write the characteri of direct search method.

(b) State the ne ıry and sufficient conditions fc he unconstrained minimum of the tion.

8. (a) Explain com onal method in Dynamic Progra ıg with example.

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

Maximise : $f(x_2, x_2)$ $\varsigma_1 + 8\ x_2$

Subject to

$2x_1 + x_2 \leq 2$

$3x_1 + 2x_2 \leq$

$x_2 \leq 10,$

$x_1, x_2 \geq 0.$

Roll No. .....

22221

M. Tech. 1st Semester Mechanical Engg. (Machine Design) Examination– December, 2016

NUMERICAL ANALYSIS AND OPTIMIZATION

Paper : M-801-A

Time : 3 hours ***Max. Marks : 100***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

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

1. (a) Solve the system

$$9x - 2y + z = 50$$
$$x + 5y - 3z = 18$$
$$-2x + 2y + 7z = 19$$

by using Gauss elimination method

(b) Determine eigen value and the corresponding eigen vector of the matrix. by Jacobi Method

$$A = \begin{bmatrix} & & 1 \\ 2 & 0 & \\ & & 5 \end{bmatrix}$$

2. (a) Find the cubic es to fit the data and evaluate y (1.5 y' (3)

x :	1		3	4
y :	1		5	11

(b) Given f(0) = -1) = 0, f (3) = 0, f (5) = –248 f (6) = 0 a 9) = 13104, find f (x).

3. (a) Derive the d ves formulae using forward differ formula and hence find the first econd derivatives of f(x) at 1.1 if

x :	1.0	1.2		1.6	1.8	2.0
f(x) :	0	0.128	0	1.296	2.432	4.00

(b) Evaluate $\int_0^4 e^x$

Given e = 2.7 = 7.39, e^3 = 20.09, e^4 = 54.6

by (i) Trapezoida

(ii) Simpson's

4. Use Milne's Method to find y (0.3) from

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

Find the initial values y (-0.1), y (0.1) and y (0.2) by using Taylor's series method.

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

$$\frac{dy}{dx} = x + |\sqrt{y}|, \text{ with initial conditions}$$

y = 1 at x = 0, for the range $0 \le x \le 0.6$ in steps of 0.2,

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

(i) Optimisation and Engg applicaiton of Optimisation

(ii) Kuhn Tucker conditions

(iii) Application of Dynamic Programming

(iv) Difference between constrained and unconstrained optimisation techniques

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

Subject to $-x^2_1 + x_2 \le 2$

$3x_1 + x_2 \le 12$

By using Kuhn-Tucker conditions