## POLYTECHNIC, B.E/B.TECH, M.E/M.TECH, MBA, MCA & SCHOOL

Notes
Syllabus
Question Papers
Results and Many more...

Available @

www.binils.com

minimum acres	of special	V	THE TANK	96 B W	- 612	HA	-15
Reg. No.:							

Question Paper Code: 30902

M.E./M.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022

First Semester

Power Systems Engineering

MA 4107 - APPLIED MATHEMATICS FOR POWER SYSTEMS ENGINEERS

(Regulations 2021)

Time: Three hours

Maximum: 100 marks

Answer ALL questions.

PART A —  $(10 \times 2 = 20 \text{ marks})$ 

1. What is the condition for a generalized eigen vectors.

## 2. Determine whether $A = \begin{bmatrix} 3 & 1 & 1 \\ 2 & 2 & 4 \\ 1 & 1 & 1 \end{bmatrix}$ is similar to $B = \begin{bmatrix} 2 & 1 & 1 \\ 3 & 0 & 1 \\ 4 & 2 & 1 \end{bmatrix}$

- Define the dirac delta function in Laplace transform.
- 4. If L[f(t), s] = F(S), then prove that  $L[e^{at}f(t); s] = F(S-a)$ .
- Define energy Signals and power signals in Fourier trigonometric series.
- Explain the periodic function in Fourier trigonometric series.
- Define feasible solution in LPP.
- Determine the initial basic feasible solution for the following transportation problem by using the north-west corner rule.

	$D_1$	$\mathbb{D}_2$	$D_3$	$D_4$	
O <sub>1</sub>	6	4	1	5	14
$O_2$	8	9	2	7	16
$O_3$	4	3	6	2	5
0.5	6	10	15	4	35

## POLYTECHNIC, B.E/B.TECH, M.E/M.TECH, MBA, MCA & SCHOOL

Notes Syllabus Question Papers Results and Many more...

Available @

www.binils.com

- Write down the general non-linear programming problem in matrix notation.
- Write down the necessary conditions for a maximum or minimum of objective function in non-linear programming problems.

PART B — 
$$(5 \times 13 = 65 \text{ marks})$$

11. (a) Find a Canonical basis for the given matrix

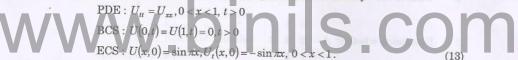
$$A = \begin{bmatrix} 3 & 2 & 0 & 1 \\ 0 & 3 & 0 & 0 \\ 0 & 0 & 3 & -1 \\ 0 & 0 & 0 & 3 \end{bmatrix}. \tag{13}$$

Or

(b) Construct a QR decomposition for the given matrix

$$A = \begin{bmatrix} 25 & -131 & -86 \\ 11 & -41 & -18 \\ -4 & 28 & 0 \end{bmatrix}. \tag{13}$$

12. (a) Solve the initial boundary value problem described by



Or

- (b) An infinitely long string having one end at x=0 is initially at rest on the x-axis. The end x=0 undergoes a periodic transverse displacement described by  $A_o \sin wt, t>0$ . Find the displacement of any point on the string at any time t.
- 13. (a) Calculate the average power of the periodic signal (Period J =2) for  $f(t)=2\cos 5\pi t+\sin 6\pi t$ 
  - (i) Using a time domain analysis.
  - (ii) Using a frequency domain analysis.

(13)

Or

(b) Find a generalized Fourier Series expansions of the function f(x) = 1, 0 < x < 1, interms of the eigen function of  $y'' + \lambda y = 0$ ; 0 < x < 1, y(0) = 0,  $y(1) + y^{1}(1) = 0$ . (13)

2

30902

## POLYTECHNIC, B.E/B.TECH, M.E/M.TECH, MBA, MCA & SCHOOL

Notes Syllabus Question Papers Results and Many more...

Available @

www.binils.com

(13)

14. (a) Use Big-M-Method to solve the following LPP.

Max 
$$Z = 2x_1 + x_2 + x_3$$

Subject to the constraints

$$4x_1 + 6x_2 + 3x_3 \le 8; \ 3x_1 - 6x_2 - 4x_3 \le 1.$$

$$2x_1 + 3x_2 - 5x_3 \ge 4$$
; where  $x_1, x_2, x_3 \ge 0$ .

Consider the problems of assigning five jobs to five persons. The assignment costs are given as follows.

Jobs

Determine the optimum assignment schedule.

15. (a) Solve the non-linear programming problem:

Optimize  $A = 4x_1^2 + 2x_2^2 + x_3^2 - 4x_1x_2$ 

Subject to the constraints:

to the constraints:  $x_3 = 15, \ 2x_1 - x_2 + 2x_3 = 20 \text{ where } x_1, x_2, x_3 \ge 0$ 

Solve the following non-linear programming problem

Maximize  $Z = 3.6x_1 - 0.4x_1^2 + 1.6x_2 - 0.2x_2^2$ 

Subject to the constraints:

$$2x_1+x_2 \leq 10; x_1,x_2 \geq 0\,.$$

(13)

16. (a) Find the generalized inverse of

$$A = \begin{bmatrix} 2 & 2 & -2 \\ 2 & 2 & -2 \\ -2 & -2 & 6 \end{bmatrix}$$

(b) Use Two-Phase Simple method to solve the following L.P.P.

Minimize  $Z = -2x_1 - x_2$ 

Subject to the constrains  $x_1 + x_2 \ge 2$ ,  $x_1 + x_2 \le 4$ ,  $x_1, x_2 \ge 0$ .

3

30902