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Reg. No. : .....

Name : .....

**Third Semester M.C.A. Degree Examination, May 2009**

**06.303 : NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES**

Time : 3 Hours

Max. Marks : 100

**PART – A**

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

1. What are Inherent errors and Truncation errors in numerical calculations ?
2. Find the root of the equation  $xe^x - 3 = 0$ , lies between 1 and 2, by False – Position.
3. How to find the  $\sqrt[3]{5}$  by iteration ?
4. What is difference between objectives and constraints ?
5. Explain the artificial variable technique.
6. Define canonical form.
7. What is basic feasible solution ?
8. Explain significance of duality in linear programming application.
9. What is slack and surplus variables ?
10. Explain dual simplex method. **(10×4=40 Marks)**

**PART – B**

Answer **any two** questions from **each** Module. **Each** question carries **10** marks.

**Module – I**

11. a) Find positive root of the equation  $ne^x = 1$  between 0 and 1.  
b) Evaluate root of the equation  $x = e^{-2x}$  by Newton – Raphson method.

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12. a) Derive Newton's backward difference interpolation formula.  
 b) Some values of "x" and  $\log_{10}(x)$  are (300, 2.4771), (304, 2.4829), (305, 2.4843) and (307, 2.4871). Find  $\log_{10}(301)$ .
13. The table gives distances in nautical miles of the visible Horizon for the given heights in feet above earth's surface

<b>Height (x)</b>	:	100	150	200	250	300	350
<b>Distance (y)</b>	:	10.63	13.03	15.04	16.81	18.42	19.9

Find values of "y" when  $x = 218$  and  $360$  ft.

### Module – II

14. Maximize  $x_1 + 3x_2 + 3x_3 - x_4$

Subject to constraints :

$$x_1 + 2x_2 + 3x_3 = 15$$

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

$$x_1 + 2x_2 + x_3 + x_4 = 10 \text{ where } x_1, x_2, x_3 \text{ and } x_4 \text{ are all positive.}$$

15. Using the Duality method of solution,  
 Maximize  $Z = 5x_1 - 2x_2 + 3x_3$   
 such that

$$2x_1 + 2x_2 - x_3 \geq 2$$

$$3x_1 - 4x_2 \leq 3$$

$$x_2 + 2x_3 \leq 5 \text{ and}$$

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

16. A mobile company manufactures two models. Daily capacity of Model A is 150 and that of Model B is 160. For the type A the unit uses 16 discrete components and for type B 21 discrete components. The maximum daily availability of components is 1020. The profit per model A and B are Rs. 250 and Rs. 300 respectively. Formulate the problem as LPP and solve by graphically to find optimum daily production.

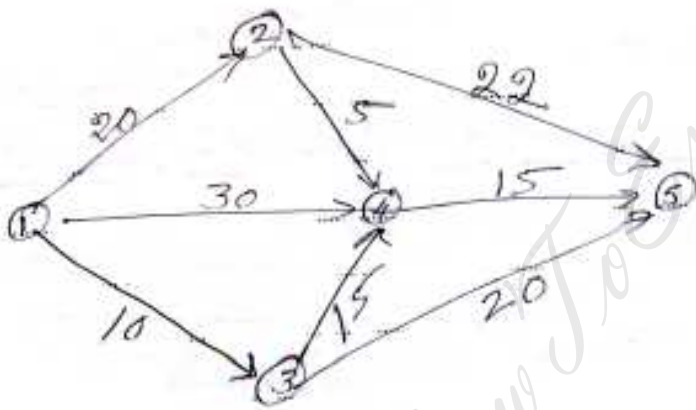


**Module – III**

17. Solve the Assignment problem.

	I	II	III	IV	V
A	8	4	2	6	1
B	0	9	5	5	4
C	3	8	9	2	6
D	4	3	1	0	3
E	9	5	8	9	5

18. For the transport network find the maximum flow :



19. Find an initial basic feasible solution to the following transportation problem. Also show that this solution is the optimum solution.

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	D <sub>5</sub>	Supply
O <sub>1</sub>	7	7	10	5	11	45
O <sub>2</sub>	4	3	5	6	13	90
O <sub>3</sub>	9	8	6	7	5	95
O <sub>4</sub>	12	13	10	6	3	75
O <sub>5</sub>	5	4	5	6	12	05
<b>Demand</b>	<b>20</b>	<b>80</b>	<b>50</b>	<b>75</b>	<b>85</b>	

**(10×6=60 Marks)**