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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.

P.T.O.

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

Height (x) :	100	150	200	250	300	350
Distance (y) :	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 :

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

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

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

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

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

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

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

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

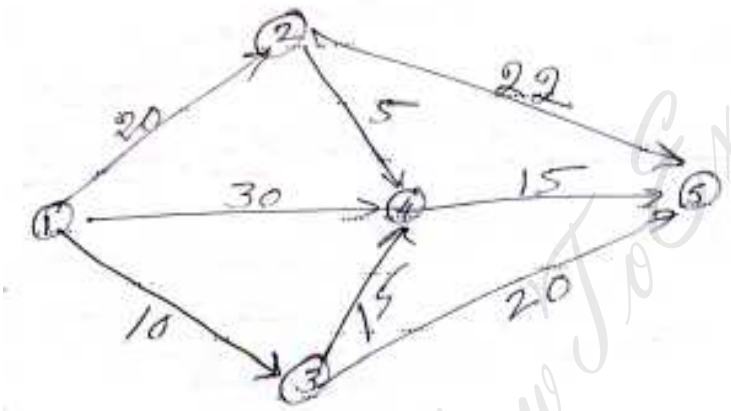
16. A mobile company manufactures two models. Daily capacity of Model A is 150 and that of Model B is 160. For the type A the unit uses 16 discrete components and for type B 21 discrete components. The maximum daily availability of components is 1020. The profit per model A and B are Rs. 250 and Rs. 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_1	D_2	D_3	D_4	D_5	Supply
O_1	7	7	10	5	11	45
O_2	4	3	5	6	13	90
O_3	9	8	6	7	5	95
O_4	12	13	10	6	3	75
O_5	5	4	5	6	12	05
Demand	**20**	**80**	**50**	**75**	**85**	

. **(10×6=60 Marks)**