Code No: NR310206 **NR**

III B.Tech I Semester Supplementary Examinations, November 2006
OPTIMIZATION TECHNIQUES
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Determine the maximum and minimum values of the function: [8]
$12x^5$-$45x^4$+$40x^3$+5

   (b) A d.c. generator has internal resistance of R ohms and develops an open circuit voltage of 'V' volts. Find the value of load resistance 'r' for which the power developed by the generator will be maximum. [8]

2. (a) State and explain the necessary and sufficient conditions for existence of relative optima in case of multivariable optimization with constraints. [8]

   (b) Find the dimensions of a rectangular parallelepiped with largest volume whose sides are parallel to the coordinate planes, to be inscribed in the ellipsoid. [8]

3. (a) State and explain the standard form of LPP. [8]

   (b) Explain the significance of slack, surplus and artificial variables of LPP. [8]

4. Show that the following LPP has unbounded solution [16]

$$\text{maximize } Z = 3x_1 + 2x_2$$
$$\text{subject to } x_1 - x_2 \leq 1$$
$$3x_1 - 2x_2 \leq 6$$
$$x_1, x_2 \geq 0$$

5. (a) If all the sources are emptied and all the destinations are filled, show that $\sum a_i = \sum b_j$ is a necessary and sufficient condition for the existence of a feasible solution to a transportation problem [8]

   (b) Prove that there are only m+n-1 independent equations in a transportation problem, m and n being the no. of origins and destinations and that any one equation can be dropped as the redundant equation. [8]

6. Draw the flowchart of Powell's method. Explain about each block. [16]

7. Consider the problem:

   Minimize $f(x_1, x_2) = (x_1 - 1)^2 + (x_2 - 2)^2$

   Subject to $2x_1 - x_2 = 0$

   and $x_1 \leq 10$

   Construct ϕ_K function according to the interior penalty function approach and complete the minimization of ϕ_K. [16]

8. Determine the value of u_1, u_2, u_3 so as to maximize $(u_1.u_2.u_3)$, Subject to, $u_1 + u_2 + u_3 = 10$ and $u_1, u_2, u_3 \geq 0$

[16]

⋆ ⋆ ⋆ ⋆ ⋆