

APJ Abdul Kalam Technological University

Ernakulam II Cluster

Second Semester M.Tech Degree Examination April 2018

**05ME6402 - ADVANCED OPERATIONS RESEARCH**

Time : 3 hrs

Max. Marks: 60

I.

Use a simplex tableau to solve the Linear Programming problem

Maximise the objective function  $Z = f(x,y) = 12x + 16y$

Subject to constrains

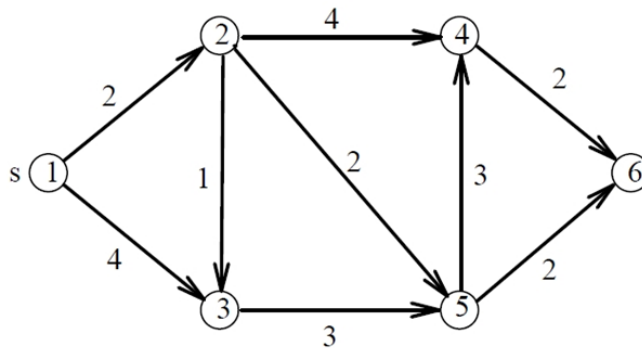
$$10x + 20y \leq 120$$

$$8x + 6y \leq 80$$

$$x \geq 0, y \geq 0$$

12 Marks

II. Find the shortest directed path from 1 to 6.



12 Marks

III. A 4-ton vessel can be loaded with one or more items. The following table gives the unit weights in tons, the unit revenue in thousands of rupees for item i. How should the vessel be loaded to maximize the total return?

PTO

Item	Weight	Revenue
1	1	30
2	2	60
3	3	80

18 Marks

OR

- IV. Rini Roadways has four types of packages A,B,C and D to be carried in their parcel van. The bulk density of each package is different. As per the company's rules, the packages fall under different categories of freight classification and therefore the revenue per unit of each package also varies. Data regarding the weights and the expected revenue for each package are available. Determine the number of each package that would maximize the revenue, given that the capacity of the van is limited to 17000kg.

Type of package	Weight/unit	Unit cost (Rs)
A	1000	1000
B	3000	500
C	4000	700
D	6000	1100

18 Marks

- V. Minimize  $f = x_1^2 + 2x_2^2 + 3x_3^2$ ,  
subject to the constraints

$$g_1 = x_1 - x_2 - 2x_3 \leq 12$$

$$g_2 = x_1 + 2x_2 - 3x_3 \leq 8 \text{ using Kuhn-Tucker conditions.}$$

18 Marks

OR

- VI. Obtain the necessary and sufficient conditions for the optimum solution of the following NLPP.

$$\text{Minimize } Z = f(x_1, x_2) = 3e^{2x_1+1} + 2e^{x_2+5}$$

subject to constraints

$$x_1 + x_2 = 7$$

$$x_1, x_2 \geq 0$$

18 Marks