PC – 364 CV-19

M.A./M.SC Mathematics (3rd SEM.)
Examination December 2020
Paper – V
Operation Research-I

Time:Three Hours] **[Maximum Marks-080**
[Minimum Passing Marks-29

नोट : दोनो खण्डों से निर्देशानुसार उत्तर दीजिए। प्रश्नो के अंक उनके दाहिनी ओर अंकित है।
Note : Answer From Both the Section as Directed. The Figures in the right-hand margin indicate marks.

Section-A

Q.1 Answer the following question:- 1X10

i- A feasible solution to a linear programming problem----------.
ii- must satisfy all the constraints of the problem simultaneously.
iii- must be a corner point of the feasible region.
iv- The optimize of the network analysis is to----------.
a- Minimize total project duration
b- Minimize total project cost.
c- Minimize production delays, interruption and conflicts.
d- Maximize total project duration.

v- In a linear programming problem functions to be maximized or minimized are called----------.
a- Constraints b- Objective function
c- Basics solution d- feasible solution

vi- Key element is also known as----------.
a- Slack b- Surplus
c- Artificial d- Pivot

vii- The solution to a transportation problem with in sources and n destination is fearible if the number of allocations----------.
a- m+n b- mn
c- m-n d- m+n-I

viii- An assignment problem is a particular case of ----------.
a- Transportation problem b- Assignment problem
c- Gravelling salesman problem d- Replacement problem

ix- A activity which does not consume neither any resource not time is know as----------.
a- Predecessor activity b- Successor activity
c- Dummy activity d- Activity

x- Graphical method is also known as----------.
a- Simplex method b- Dual Simplex method
c- Big M Method d- Search Approach method

xi- The method used to solve linear programming problem without use of the artificial variable is called----------.
a- Simplex method b- Big M Method
c- Dual Simplex method d- Graphical method

xii- Operations research is the application of ----------methods to arrive at the optimal solution to the problems.
a- Economical b- Scientific
c- A and B both d- Artistic

2- Answer all question:- 2X5

a- Write phases of operations research.

b- Define artificial variables.

c- Define dual problem.

d- What is network

e- Write the types for formulation of linear programming problem.

Section-B

Answer the following questions:- 12X5

3- State and prove fundamental theorem of linear programming problem.

Or

Solve the following problem by simplex method.

Max $Z = 2x_1 + 4x_2 + x_3$

s.t. $x_1 + 2x_2 \leq 4$

$2x_1 + x_2 \leq 3$

$x_2 + 4x_3 \leq 3$

And $x_1 x_2,\ x_3 \geq 0$

4- Solve the following problem by 'Big M' method:

Max $Z = 5x_1 + 6x_2$

s.t. $2x_1 + 5x_2 \geq 1500$

$3x_1 + x_2 \geq 1200$

And $x_1\, x_2 \geq 0$

Or

Write the dual of the following L.P. problem:

Max $Z = 4x_1 + 5x_2 - 3x_3$

Subject to $x_1 + x_2 + x_3 = 22$

$3x_1 + 5x_2 - 2x_3 \leq 65$

$x_1 + 7x_2 + 4x_3 \geq 120$

And $x_1, x_2 \geq 0$, and x_3 is unrestricted

5- Solve the following transportation problem

Destinations

						Supply
Sources	S_1	19	30	50	10	7
	S_2	70	30	40	60	9
	S_3	40	08	70	20	18
Demand		5	8	7	14	

Or

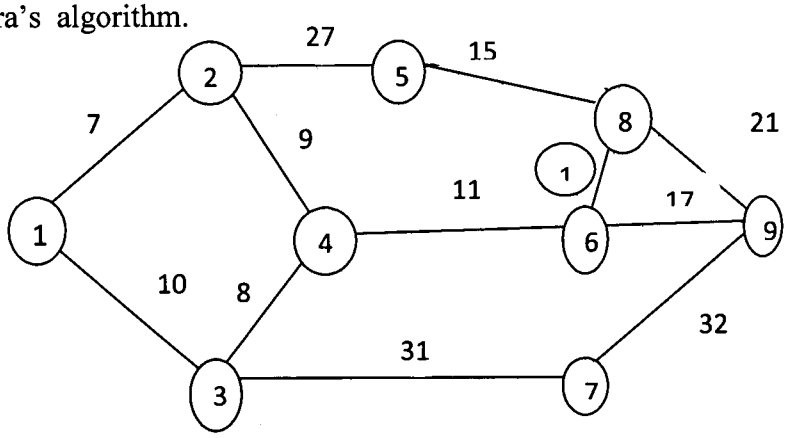
A company is faced with the problem of assigning five jobs to five machine , each Job must be dove on only one machine. The cost of process in each Job on each machine is gives below (in Rs.)

Machines

Machines

Jobs		M_1	M_2	M_3	M_4	M_5
	J_1	7	5	9	8	11
	J_2	9	12	7	11	10
	J_3	8	5	4	6	9
	J_4	7	3	6	9	5
	J_5	4	6	7	5	11

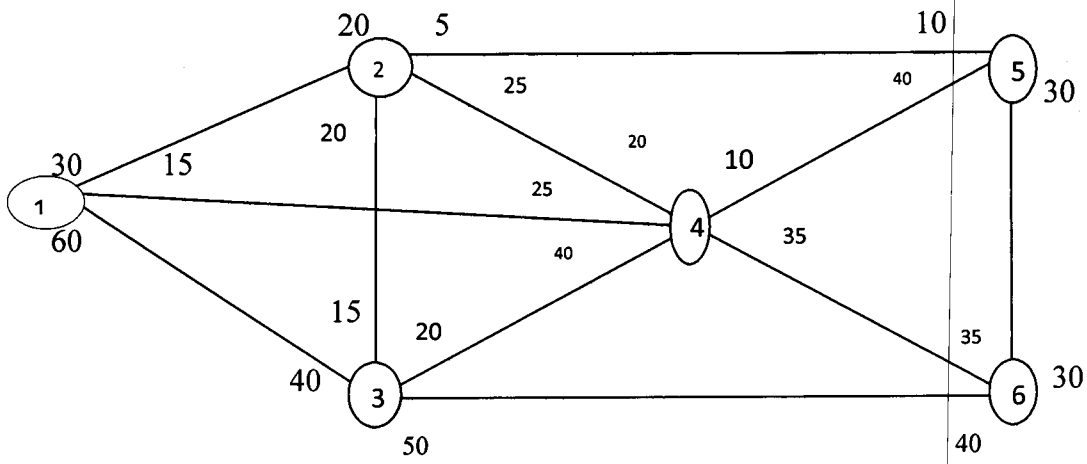
6- find the shortest path from node 1 to 9 of the distance network shown in the following figure using Dijkstra's algorithm.



Distance Network

Or

Consider the pipe network shown in the following figure. Showing the flow capacities cities between various pairs of locations in both ways. Find the maximal flow node 1 to node 6



Network showing pipe capacities

7- for the following linear programming problem.

Max Z= $(3-6\lambda)x_1 + +(2-2\lambda)x_2 + (5+5\lambda)x_3$

s.t. $x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460$

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

Find the range of λ over which the solution remains basic feasible and optimal

Or

A project schedule has the following characteristics:-

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time (days)	4	1	1	1	6	5	4	8	1	2	5	7

From the above information,

i. Construct a network diagram.
ii. Compete eastiert event time and latest event time.
iii. Determine the critical path and total project duration.
iv. Compute total, free and Independent float for each activity.