(25) Seat No: _____ No. of printed pages : 04

Sardar Patel University
External Examination (CBCS)
M. Sc.(Integrated) Vth Semester (Information Technology)
PS05FIIT01 - Operation Research
17th October, Monday - 2016

Time : 10:00 A.M. to 01:00 P.M. **Total Marks :70**

Q.1 Select an appropriate option. **10**

1. Feasible solution satisfies _____.
   [a] only constraints [b] only non-negative restriction
   [c] both [a] and [b] [d] [a],[b] and optimum solution
2. In graphical representation the bounded region is known as _____ region.
   [a] solution [b] feasible solution [c] basic solution [d] optimal
3. The linear function of variables which is to be maximized or minimized is called _____.
   [a] constraints [b] basic requirements
   [c] objective function [d] none of them
4. In the simplex method the variable leaves the basis if the ratio is _____.
   [a] Maximum [b] Minimum [c] 0 [d] None of them
5. The coefficient of artificial variable in the objective function is _____.
   [a] -M [b] +M [c] 0 [d] none of them
6. Number of basic allocation in any row or column in Assignment Problem can be _____.
   [a] exactly one [b] at most one [c] at least one [d] none of them
7. In Assignment Problem the value of decision variable x_{ij} is _____.
   [a] no restriction [b] two or one [c] one or zero [d] none of them
8. _____ operation is carried out on a machine at a time.
   [a] two [b] only one [c] at least one [d] none of them
9. Burst and Merge are types of _____ in networking.
   [a] event [b] activity [c] arrow [d] tools
10. Activity which is completed before starting new activity is called _____.
    [a] dummy [b] predecessor [c] successor [d] none of them

Q.2 Answer the following questions. (Attempt any TEN) **20**

1. Write down any two scopes of operation research.
2. Define [i] Solution [ii] Basic solution.
3. Give any four models of operations research.
4. Define surplus variables.
5. When is Big M method useful ?

(P.T.O.)

6. What is the condition for entering variable in simplex table ?
7. What is Transportation Problem?
8. Give mathematical form of Assignment Problem.
9. What is travelling salesman problem?
10. State Bellman's principle of optimality in dynamic programming.
11. Define two types of events used in network analysis.
12. What is free float and independent float?

Q.3 [a] Write the algorithm to solve LPP using Graphical method for maximization of profit. **5**

[b] A firm manufactures headache pills in two sizes A and B. Size A contains 2 grains of aspirin , 5 grains of bicarbonate and 1 grain of codeine.Size B contains 1 grain of aspirin, 8 grains of bicarbonate and 6 grains of codeine. It is found by users that it requires at least 12 grains of aspirin, 74 grains of bicarbonate and 24 grains of codeine for providing immediate effect. It is required to determine the least number of pills a patient should take to get immediate relief. Formulate the problem as a LPP. **5**

OR

Q.3 [a] A manufacturer has two machines A and B. He manufactures two products P and Q on these two machines. For manufacturing product P he has to use machine A for 3 hours and machine B for 6 hours, and for manufacturing product Q he has to use machine A for 6 hours and machine B for 5 hours. On each unit of P he earns Rs. 14 and on each unit of Q he earns Rs. 10. How many units of P and Q should be manufactured to get the maximum profit? Each machine cannot be used for more than 2100 hours. Formulate the problem as LPP. **5**

[b] Solve the following LPP by graphical method. **5**

Maximize $Z = 2x_1 + 3x_2$

Subject to $x_1 + x_2 \leq 1$

$3x_1 + x_2 \leq 6$

$x_1, x_2 \geq 0$

Q.4 [a] Maximize $Z = 3x_1 + 5x_2$ Subject to $x_1 + x_2 \leq 4$, $3x_1 + 2x_2 \leq 18$, $x_1, x_2 \geq 0$ using simplex method. **5**

[b] Maximize $Z = 3x_1 - x_2$ Subject to $2x_1 + x_2 \geq 2$, $x_1 + 3x_2 \leq 3$, $x_1, x_2 \geq 0$ using the BIG M method. **5**

OR

Q.4 [a] Maximize $Z = 5x_1 + 3x_2$ Subject to $3x_1 + 5x_2 \leq 15$, $5x_1 + 2x_2 \leq 10$, $x_1, x_2 \geq 0$ using simplex method. **5**

[b] Maximize $Z = -2x_1 - 9x_2 - x_3$ **5**
Subject to $x_1 + 4x_2 + 2x_3 \geq 5$, $3x_1 + x_2 + 2x_3 \geq 4$, $x_1, x_2, x_3 \geq 0$
using the BIG M method.

Q.5 [a] Obtain the initial solution to following TP using northwest corner Method. **6**

	D_1	D_2	D_3	D_4	Supply
O_1	6	4	1	5	14
O_2	8	9	2	7	16
O_3	4	3	6	2	5
Dem.	6	10	15	4	

[b] Solve the following assignment problem. **4**

	P	Q	R	S
A	22	30	21	15
B	18	33	9	31
C	44	25	24	21
D	23	30	28	14

OR

Q.5 [a] Solve the following assignment problem so as to minimize the time (in days)required to complete all the task. **6**

person	Task				
	1	2	3	4	5
A	6	5	8	11	16
B	1	13	16	1	10
C	16	11	8	8	8
D	9	14	12	10	16

[b] Give the algorithm of LCM to obtain basic feasible initial solution to Transportation Problem. **4**

Q.6 A small maintenance project consists of the following 12 jobs. **10**

Jobs	Duration in days	Jobs	Duration in days	Jobs	Duration in days
1-2	2	3-5	5	6-10	4
2-3	7	4-6	3	7-9	4
2-4	3	5-8	5	8-9	1
3-4	3	6-7	8	9-10	7

Draw the arrow network of the project. Determine the critical path.

(P.T.O.)

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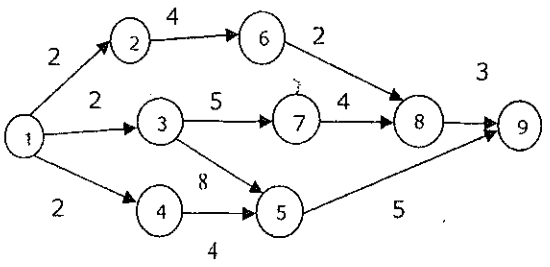
OR

Q.6 [a] In a machine shop 8 different products are being manufactured each requiring time on two different machines A and B are given in the table below: **6**

Product	1	2	3	4	5	6	7	8
Machine-A	30	45	15	20	80	120	65	10
Machine-B	20	30	50	35	35	40	50	20

Find an optimal sequence of processing of different product in order to minimize the total manufctured time for all product. Find total ideal time for two machines and elapsed time.

[b] Write down the procedure to obtain optimum completion time using critical Path method. **4**



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