## Lo

Enrollment No: Exam Seat No: $\qquad$

## C.U.SHAH UNIVERSITY

 Winter Examination-2018Subject Name: Operation Research
Subject Code: 5CS03WOR1
Branch: M.Sc.IT. (WebTech)
Semester : 3 Date : 04/12/2018 Time : 02:30 To 05:30 Marks :70

## Instructions:

(1) Use of Programmable calculator and any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

## SECTION-I

## Q-1 Attempt the Following questions

1 What is OR? 1
2 Write full Form of LPP 1
3 What is slack variable and Artificial variable? 2
4 What is Degeneracy in Transportation problem? 2
5 What is Optimality check? 1

## Q-2 Attempt all questions

1 Solve following LP Problem Using Graphical Method $\operatorname{Max} \mathrm{Z}=15 \mathrm{X}_{1}+10 \mathrm{X}_{2}$

$$
\begin{array}{ll}
\text { Subject to } & 4 \mathrm{x}_{1}+6 \mathrm{x}_{2} \leq 360 \\
& 3 \mathrm{x}_{1}+0 \mathrm{x}_{2} \leq 180 \\
& 0 \mathrm{x}_{1}+5 \mathrm{x}_{2} \leq 200
\end{array}
$$

and $\mathrm{x}_{1}, \mathrm{x}_{2} \geq 0$
2 Use the Simplex Method to solve the Following L.P Problem
Maximize $Z=3 \times 1+5 \times 2+4 \times 3$
Subject to Constraints $2 \times 1+3 \times 2 \leq 8$

$$
\begin{aligned}
& 2 \times 2+5 \times 3 \leq 10 \\
& 3 \times 1+2 \times 2+4 \times 3 \leq 15 \\
& \quad \times 1, \times 2, \times 3 \geq 0
\end{aligned}
$$

OR
Q-2 Attempt all questions
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1 Solve following LP Problem Using Simplex Method
Max $\mathrm{Z}=3 \mathrm{X}_{1}+2 \mathrm{X}_{2}$
Subject to $\mathrm{x}_{1}+\mathrm{x}_{2} \leq 4$
$x_{1}-x_{2} \leq 2$ and $x_{1}, x_{2} \geq 0$
2 Write the Algorithm Steps for simplex Method
Q-3
Attempt all questions
1 Apply MODI method and obtain basic feasible solution by VAM

|  | I | II | III | IV | Supply |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A | $\mathbf{5}$ | $\mathbf{2}$ | $\mathbf{4}$ | $\mathbf{3}$ | 22 |
| B | $\mathbf{4}$ | $\mathbf{8}$ | $\mathbf{1}$ | $\mathbf{6}$ | 15 |
| C | 4 | 6 | 7 | 5 | 8 |
| Requirement | 7 | $\mathbf{1 2}$ | 17 | 9 |  |

Find Initial Solution Using NWCM,LCM, \& VAM Method

|  | D1 | D2 | D3 | D4 | Supply |
| :--- | :--- | :--- | :--- | :--- | :--- |
| S1 | 19 | 30 | 50 | 10 | 7 |
| S2 | 70 | 30 | 40 | 60 | 9 |
| S3 | 40 | 8 | 70 | 20 | 18 |
| Demand | 5 | 8 | 7 | 14 | 34 |

OR
Q-3 1 Five Men are available to different five jobs find assignment the minimize
the

| Job <br> Men | I | II | III | IV | V |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A | 2 | 9 | 2 | 7 | 1 |
| B | 6 | 8 | 7 | 6 | 1 |
| C | 4 | 6 | 5 | 3 | 1 |
| D | 4 | 2 | 7 | 3 | 1 |
| E | 5 | 3 | 9 | 5 | 1 |

2 Write Advantage and disadvantages of Linear Programming

SECTION-II

## Q-4

Attempt the Following questions
1 What is Feasible Solution?
2 Write the full form of PERT\& CPM 2
3 What is Decision variables \& objective Function 2
4 Full Form of AOA \& AON 2

Q-5
Attempt all questions
1 Obtain the optimal feasible solution by MODI Method

|  | W1 | W2 | W3 | Supply |
| :---: | :---: | :---: | :---: | :---: |
| F1 | 16 | 20 | 12 | $\mathbf{2 0 0}$ |
| F2 | $\mathbf{1 4}$ | $\mathbf{8}$ | $\mathbf{1 8}$ | $\mathbf{1 6 0}$ |
| F3 | 26 | 24 | 16 | $\mathbf{9 0}$ |
| Demand | $\mathbf{1 8 0}$ | $\mathbf{1 2 0}$ | $\mathbf{1 5 0}$ |  |

Initial Basic Feasible
Solution obtained by

## NWCM.

2 Describe the transportation problem with its general mathematical formulation
OR
Q-5 1 Give the mathematical formulation of an assignment problem.

2

| Man <br> Job | I | II | III | IV | V |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A | 10 | $\mathbf{5}$ | 13 | 15 | 16 |
| B | 3 | 9 | 18 | 13 | 6 |
| C | 10 | 7 | 2 | 2 | 2 |
| D | 7 | 11 | 9 | 7 | 12 |
| E | 7 | 9 | 10 | 4 | 12 |

Department of company has five job with five man find total man hours to minimize the total time.

## Q-6 Attempt all questions

1 A Research and development department break up is as follows

| Job | Immediate <br> Predecessor | Time <br> (Days) | Job | Immediate <br> Predecessor | Time <br> (Days) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A | --- | $\mathbf{5}$ | F | D | $\mathbf{2}$ |
| B | A | 7 | G | C | $\mathbf{1}$ |
| C | B | $\mathbf{2}$ | H | E,F | $\mathbf{3}$ |
| D | B | $\mathbf{3}$ | I | G,H | $\mathbf{1 0}$ |
| E | C | $\mathbf{1}$ |  |  |  |

(1) Draw
the arrow diagram.
(2) Identify the critical path and find the total project duration.

2 Explain events and Activities with suitable example.
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## Q-6 Attempt all Questions

1 Following table is given calculate the total estimation time, critical path, total and free float for each non critical activity.

| Activity | Duration | Predecessor | Activity | Duration | Predecessor |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A | $\mathbf{6}$ | -- | G | $\mathbf{2}$ | -- |
| B | $\mathbf{4}$ | A | H | $\mathbf{1 0}$ | G |
| C | 7 | B | I | $\mathbf{6}$ | J,H |
| D | $\mathbf{2}$ | A | J | $\mathbf{1 3}$ | -- |
| E | $\mathbf{4}$ | D | K | $\mathbf{9}$ | A |
| F | $\mathbf{1 0}$ | E | L | $\mathbf{3}$ | C,K |
|  |  |  | M | $\mathbf{5}$ | I,L |

2 Discuss Errors and Dummies in Network.


