Government College of Engineering, Amravati
(An Autonomous Institute of Government of Maharashtra)

Eighth Semester B. Tech. (Computer Science and Engineering)

Summer – 2016

Course Code: Operation Research and Management

Course Name: CSU801

Time: 2 Hrs. 30 Min.   **Max. Marks: 60**

Instructions to Candidate
1) All questions are compulsory.
2) Assume suitable data wherever necessary and clearly state the assumptions made.
3) Diagrams/sketches should be given wherever necessary.
4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
5) Figures to the right indicate full marks.

1 (a) Mention and elaborate the applications and limitations of Operation Research   4m

(b) A project has the following time schedule with Activity(A) and Duration (D) in months   8m

A	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
D	2	2	1	4	8	5	3	1	5	4	3

(i) Construct PERT network and compute Total Float, Free Float and Independent Float for each activity
(ii) Critical Path and its duration

(iii) Find the minimum number of cranes the project must have for its activities 2-5, 3-7 and 8-9 without delaying the project. Then, is there any change required in the PERT network? If so indicate the same.

2   **Solve any two:**

(a) Use two phase simplex method to solve the LPP: 6m
Maximize $z = 5x_1 + 8x_2$; Subject to $3x_1 + 2x_2 >= 3$;
$x_1 + 4x_2 >= 4$; $x_1 + x_2 <= 5$; $x_1, x_2 >= 0$

(b) Write the dual of the following LP and solve it by   6m
dual simplex method: Minimize $z = x_1 + x_2$;
Subject to $2x_1 + x_2 >= 2$; $-x_1 - x_2 >= 1$; $x_1, x_2 >= 0$

(c) Solve the LPP by Simplex Method: 6m
Maximize $Z = 3x_1 + 4x_2 + x_3 + 7x_4$
Subject to $8x_1 + 3x_2 + 4x_3 + x_4 \le 7$,
$2x_1 + 6x_2 + x_3 + 5x_4 \le 3$, $x_1 + 4x_2 + 5x_3 + 2x_4 \le 8$ and
$x_1, x_2, x_3, x_4 \ge 0$

3   **Solve any two:**

(a) Determine the basic feasible solution to the below   6m
given transportation problem using Northwest,
Least Cost, and Vogel's Approximation.

	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	

(b) Define Dynamic Programming? Why it is needed?   6m
Write its applications and characteristics.

(c) In the assignment problem given below using   6m
Hungarian Method find the optimal solution.

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(a) Solv
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(b) Exp
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(c) A ta
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(a) Sol
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	JOBS		
Person	1	2	3
1	7	3	5
2	2	2	1
3	6	5	3
4	3	4	7

4   **Solve any two:**

(a) Determine the optimal solution for the following   6m
NLPP and check whether it maximizes or
minimizes the objective function,
Optimize $Z = x_1^2 - 10x_1 + x_2^2 - 6x_2 + x_3^2 - 4x_3$
Subject to: $x_1 + x_2 + x_3 = 7$, $x_1, x_2, x_3 \geq 0$

(b) Explain Regret function versus loss function with   6m
suitable example.

(c) A taxi owner estimates from his past record that the   6m
cost per year for operating a taxi whose purchase
price when new is Rs.60,000 are given below:

Age	1	2	3	4	5
Operating Cost	10000	12000	15000	18000	20000

If the resale value decreases by 10% of purchase
price each year, what is that best replacement
policy if after 5 years the operating cost is 6000 x k
where k=6,7,8,9,10?

5   Solve:

(a) Find the sequence that minimizes the total elapsed   6m
time required to complete the tasks

Tasks	A	B	C	D	E	F	G
M1	3	8	7	4	9	8	7
M2	4	3	2	5	1	4	3
M3	6	7	5	11	5	6	12

(b) A book binder has one printing press, one binding machine, and the manuscripts of a number of different books. The time required to perform the printing and binding operations for each books are shown below. Determine the order in which books should be processed, in order to minimize the total time required to turn out all the books.

6m

Books	1	2	3	4	5	6
Printing time(hr)	30	120	50	20	90	110
Binding time(hr)	80	100	90	60	30	10