K18P 0054

Reg. No. : .....

Name : .....

Fifth Semester M.C.A. Degree (Regular/Supplementary/Improvement) Examination, January 2018
(2014 Admission Onwards)
Elective – III : MCA5E09 : OPERATIONS RESEARCH

Time : 3 Hours

Max. Marks : 80

Instructions : *Answer **any ten** questions from Part – **A**. **Each** question carries **3** marks. Answer **all** questions from Part – **B**. **Each** question carries **10** marks.*

PART – A

Answer **any ten** questions. **Each** question carries **3** marks.

1. What is linear programming ? Explain briefly the dual of a LPP.
2. Define artificial variable. What are the methods used to solve an LPP involving artificial variables ?
3. When does degeneracy happen in transportation problem ?
4. What is an unbalanced assignment problem ? Give example.
5. How does a Travelling Salesman Problem differ from a routine assignment model ?
6. List the applications of Dynamic programming problem.
7. Explain, briefly branch and bound method.
8. What is a sequencing problem ? Give example.

P.T.O.

9. What is an event ? How will you represent an event in a network diagram ?

10. Explain the basic difference between PERT and CPM.

11. List the main characteristics of a queuing system.

12. Write the classification of stochastic process.

PART – B

Answer **all** questions. **Each** question carries **10** marks.

13. a) A company produces two different products, A and B and makes a profit of ₹ 40 and ₹ 30 per unit respectively. The production process has a capacity of 30000 man-hours. It takes 3 hours to produce one unit of A and one hour to produce one unit of B. The market survey indicates that the maximum number of units of product A that can be sold is 8000 and those of B is 12000. Formulate the problem and solve it by graphical method.

OR

b) Use simplex method to solve the LPP

Min. $Z = x_2 - 3x_3 + 2x_5$

Subject to $3x_2 - x_3 + 2x_5 \leq 7$

$-2x_2 + 4x_3 \leq 12$

$-4x_2 + 3x_3 + 8x_5 \leq 10$

$x_2, x_3, x_5 \geq 0$

14. a) Write down the dual of the following LPP and solve it

Max. $Z = 4x_1 + 2x_2$

Subject to $x_1 + x_2 \geq 3$

$x_1 - x_2 \geq 2$

$x_1, x_2 \geq 0$

OR

b) i) Mention the applications of LPP. 4

ii) Find the initial basic feasible solution for the following transportation problem by VAM. 6

		Destination				
		D_1	D_2	D_3	D_4	Supply
Origin	O_1	11	13	17	14	250
	O_2	16	18	14	10	300
	O_3	21	24	13	10	400
	Demand	200	225	275	250	950

15. a) Use Branch-and-Bound techniques to solve the following IPP

Max. $Z = 7x_1 + 9x_2$

Subject to $-x_1 + 3x_2 \leq 6$

$7x_1 + x_2 \leq 35$

$0 \leq x_1, x_2 \leq 7$

and x_1, x_2 are integers.

OR

b) Solve the IPP by cutting plane method.

Max. $Z = 7x_1 + 9x_2$

Subject to $-x_1 + 3x_2 \leq 6$

$7x_1 + x_2 \leq 35$

$x_1 \geq 0, x_2 \geq 0$ and integers.

16. a) i) Write a short note on sequencing problem. 4

ii) A small maintenance project consist of the following jobs, whose precedence relationships are given below : 6

Job	1–2	1–3	2–3	2–5	3–4	3–6	4–5	4–6	5–6	6–7
Duration (days)	15	15	3	5	8	12	1	14	3	14

a) Draw an arrow diagram representing the project.

b) Find the total float for each activity.

c) Find the critical path and the total project duration.

OR

b) Four jobs 1, 2, 3 and 4 are to be processed on each of the fire machines A, B, C, D and E in the order ABCDE. Find the total minimum elapsed time if no passing of jobs is permitted. Also find the idle time for each machine.

Machines	Jobs			
	1	2	3	4
A	7	6	5	8
B	5	6	4	3
C	2	4	5	3
D	3	5	6	2
E	9	10	8	6

17. a) Explain with suitable examples the classification states of Markov Chain.

OR

b) Write short notes on classification of queuing model and the basic structure of queuing model.