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.

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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

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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

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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.

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