K17P 0209

Reg. No. : .....

Name : .....

Fifth Semester M.C.A. Degree (Regular) Examination, January 2017
(2014 Admission)
Elective – III : MCA 5E09 : OPERATIONS RESEARCH

Time : 3 Hours Max. Marks : 80

Instructions : 1) *Answer **any ten** questions from Part – **A**. **Each** question carries **3** marks.*
2) *Answer **all** questions from Part – **B**. **Each** question carries **10** marks.*

PART – A

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

1. Write down the standard form of a LPP.
2. What is the difference between basic solution and basic feasible solution ?
3. What are slack and surplus variables ?
4. Briefly explain the duality in LPP.
5. Define :
   i) an assignment problem
   ii) unbalanced transportation problem.
6. List the characteristics of dynamic programming problem.
7. Explain briefly the branch and bound method.
8. What is an event and how will you represent an event in a network diagram ?
9. Explain the difference between PERT and CPM.
10. What do you mean by dummy activity ? Why it is used in networking ?
11. Write the components of a queuing system.
12. Define Markov chain. Give an example. **(10×3=30)**

P.T.O.

PART – B

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

13. a) Solve the following problem by Big-M method :

Max. $z = x_1 + 2x_2 + 3x_3 - x_4$

Subject to $x_1 + 2x_2 + 3x_3 = 15$

$2x_1 + x_2 + 5x_3 = 20$

$x_1 + 2x_2 + x_3 + x_4 = 10$

and $x_1, x_2, x_3, x_4 \geq 0$.

OR

b) Solve the following by two-phase simplex method :

Minimize $z = x_1 + x_2$

Subject to $2x_1 + x_2 \geq 4$, $x_1 + 7x_2 \geq 7$ and $x_1, x_2 \geq 0$.

14. a) Use dual simplex to solve :

Min. $z = 3x_1 + x_2$

Subject to $x_1 + x_2 \geq 1$

$2x_1 + 3x_2 \geq 2$

x_1 and $x_2 \geq 0$.

OR

b) The owner of a small machine shop has four mechanics available to assign jobs for the day. Five jobs are offered with expected profit for each mechanic on each jobs, which are as follows :

		Job				
		A	B	C	D	E
Machine	1	62	78	50	111	82
	2	71	84	61	73	59
	3	87	92	111	71	81
	4	48	64	87	77	80

By using the assignment method, find the assignment of mechanics to the job that will result in maximum profit. Which job should be declined ?

15. a) 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.

OR

b) Use Branch-and-Bound technique 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.

16. a) Use the graphical method to minimize the time needed to process the following jobs on the machines shown, that is, for each machine find the job that should be done first. Also calculate the total elapsed time to complete both the jobs.

Job 1	Sequence of machine	A	B	C	D	E
	Time	3	4	2	6	2
Job 2	Sequence of machine	B	C	A	D	E
	Time	5	4	3	2	6

OR

b) The following table shows the jobs of a project with their duration in days. Draw the network and determine the critical path. Also calculate all the floats.

Jobs	1–2	1–3	1–4	2–5	3–7	4–6	5–7	5–8	6–7	6–9	7–10	8–10	9–10	10–11	11–12
Duration	10	8	9	8	16	7	7	7	8	5	12	10	15	8	5

17. a) i) Briefly explain the queuing model (M/M/I) (∞/FCFS) (Birth and death model). 5

ii) Explain the classification of stochastic process. 5

OR

b) i) Briefly explain the classification of queuing model. 4

ii) In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that inter-arrival time and service time distribution follows an exponential distribution with an average of 30 minutes, calculate the following :

a) The mean queue size.

b) The probability that queue size exceeds 10.

c) If the input of the train increases to an average of 33 per day, what will be the changes in a) and b). 6

(5×10=50)