Roll No. .....
5000 20/40/50/.

N-821

June - July 2019

Bachelor of Business Administration (BBA) Examination

(Full Time) (New) Fourth Semester

BBA-406 : OPERATIONS RESEARCH

Time 3 Hours] [Max. Marks 80

Note : Attempt any three questions from Section A. Each question in this section carries 16 marks. Attempt any two questions from Section B. Each question in this section carries 16 marks.

Section A

1. (a) Define operations research as a decision making science. Give main characteristics of O.R.
   (b) Discuss the scope of O. R.
2. (a) Discuss in brief linear programming as a technique for resource utilization.
   (b) What is meant by feasible solution of an LP problem.
3. (a) Give an algorithm to solve an assignment problem.
   (b) Show that assignment problem is a special case of transportation problem.
4. Explain following terms in PERT / CPM :
   (a) Earliest Time (b) Latest Time (c) Total Activity Time
   (d) Event Slack (e) Critical Activity (f) Critical Path.
5. What is Replacement ? Describe some important replacement situations.

Section B

6. Solve the following L. P. P. :
   Maximize $z = 3x_1 + 5x_2 + 4x_3$
   Subject to :
   $2x_1 + 3x_2 \le 8$; $2x_2 + 5x_3 \le 10$; $3x_1 + 2x_2 + 4x_3 \le 15$ and $x_1, x_2, x_3 \ge 0$.
7. A manufacture wants to ship 22 loads of his product as shown below. The matrix gives kilometers from source of supply to the destinations :

		Destination					
		D_1	D_2	D_3	D_4	D_5	Supply
Source	S_1	5	8	6	6	3	8
	S_2	4	7	7	6	5	5
	S_3	8	4	6	6	4	9
Demand		4	4	5	4	8	

   The shipping cost is Rs. 10 per load per km. What shipping schedule should be used in order to minimize the total transportation cost ?
8. Find the sequence that minimizes the total time required in performing the following jobs on three machines in the order of ABC. Processing time (in hours) are given in the following table

Job	1	2	3	4	5
Machine A	8	10	6	7	11
Machine B	5	6	2	3	4
Machine C	4	9	8	6	5

   Also calculate total elapsed time and idle time for 3 machines.

P. T. O.

9. (a) A firm is considering the replacement of a machine, whose cost price is Rs 12,200 and its scrap value is Rs. 200. From experience the running (maintenance and operating) costs are found to be as follows :

Year	:	1	2	3	4	5	6	7	8
Running Cost (Rs.)	:	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced ?

(b) A department of a company has five employee with five jobs to be performed The time (in hours) that each man takes to perform each job is given in the effectiveness matrix.

		Employees				
		I	II	III	IV	V
Jobs	A	10	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

How should the jobs be allocated, one per employee, so as to minimize the total man hours?