Roll No……..….. **Total No. of Printed Pages: 2**
Total No. of Questions: [09]

Business Administration (BBA-MBA Integrated) (Semester – 4th)
OPERATION RESEARCH
Subject Code: BMBAS1405
Paper ID: [20390123]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1 Attempt the following:

a. Discuss assumptions underlying a sequencing problem.
b. What is Operation Research? Comment on the growing importance of OR in business decision.
c. Find the Maximum value of
   $Z = 10\ X_1 + 6\ X_2$ subject to
   $5\ X_1 + 3\ X_2 \leq 30$
   $X_1 + 2\ X_2 \leq 18$
   $X_1, X_2 \geq 0$
   By Graphical Method.
d. A farmer has 1000 acres of land on which he can grow corn, Wheat or Soyabean. Each acres of Corn cost Rs. 100 for preparation, require 7 Men days of week & yields a profit of Rs 30.An acre of wheat costs Rs. 120 to prepare, require 10 men days of work & yields profit of Rs. 40.An acre of soyabean costs of Rs. 70 to prepare, require 8 men days of works yields a profit of Rs. 20. If the farmer has Rs. 1,00,000 for preparation & can count on 8,000men days of work. Form a Linear programming Problem.
e. Describe a transportation table.
f. Explain the Method of Solving a Maximization Assignment Method.
g. What is "no passing" role in a sequencing Algorithm?
h. For the game with following Pay Off Matrix, determine the optimum strategies & value of game is

$$\begin{array}{c} \\ P_1 \end{array} \begin{array}{c} \begin{array}{cccc} P_2 & & & \end{array} \\ \begin{bmatrix} 5 & 1 & 3 & 4 \end{bmatrix} \end{array}$$

i. What do you understand by
   a. Queue length
   b. Traffic intensity
j. Describe various types of Replacement situations.

Section – B **(5 marks each)**

Q2 Discuss different elements of Queueing System.

Q3 A book binder has one binding machine and manuscripts of 7 different books. The time required for performing printing and bindings operations for different books as shown below:

Book	1	2	3	4	5	6	7
Printing time hours	20	90	80	20	120	15	65
Binding time hours	25	60	75	30	90	35	50

Decide the optimum sequence of processing of books in order to minimize the total time required to bring out all the books.

Q4 Find solution of Processing 5 jobs through 4 machines problem

Job	1	2	3	4	5
Machine 1	11	13	9	16	17
Machine 2	4	3	5	2	6
Machine 3	8	7	5	8	4
Machine 4	15	8	13	9	12

Q5 Solve the following transportation Problem.

Destination

Origin	D_1	D_2	D_3	D_4	Availability
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Requirement	20	40	30	10	

Q6 Solve the Following Game

Player B

Player A	(I)	(II)	(III)	(IV)
(I)	3	2	4	0
(II)	3	4	2	4
(III)	4	2	4	0
(IV)	0	4	0	8

Section – C **(10 marks each)**

Q7 Write and discuss with example algorithm for sequencing problem of n jobs and m machines.

Q8 Discuss various classification schemes of Models in Operation Research.

Q9 A car serving station has 3 stalls, where service can be offered simultaneously. The car wait in such a way that when a stall become vacant, the car at the head of the line pulls up to it. The station can accommodate at most 4 cars waiting 7 in station, at one time. The arrival pattern is poisson with a mean of one car per minute during peak hours. The service time is exponential with the mean 6 minutes. Find the average numbers of cars in service station during peak hours, the average waiting time and the average no. of cars per hour that cannot be entre the station because of full capacity.