

Total No. of printed pages = 10

63/2 (SEM-2) MBA 2.7 (N/O)

2022

MANAGEMENT STUDIES

(Theory Paper)

Paper Code : MBA 2.7 (New)

(Operations Research)

Full Marks—70

Time—Three hours

The figures in the margin indicate full marks
for the questions.

1. Answer any *five* of the following questions :

2×5=10

- (a) How does Operations Research assist management in decision making ?
- (b) What is meant by feasible solution of an LP problem ?
- (c) What is meant by unbalanced transportation problem ?
- (d) State goal programming.

[Turn over

- (e) What is an unbalanced assignment problem ?
- (f) Why is CPM/PERT a popular and widely applied project scheduling technique ?
- (g) Why are dummy activities used in a CPM/PERT network ?

2. Answer any *four* of the following questions :

5×4=20

- (a) Explain briefly the application of Operations Research. 5
- (b) What are the advantages and limitations of LP model ? 3+2=5
- (c) What is degeneracy in transportation problem ? How is a transportation problem solved when demand and supply are not equal ? 2+3=5
- (d) How would you deal with assignment problem where objective function is to be maximized ? 5
- (e) What are the essential characteristics of linear programming model ? 5
- (f) What are the similarities and differences between Transportation problem and Assignment problem ? 3+2=5

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- (g) Draw the network from the following activity and find the critical path and total duration of project.

Activity	Duration (days)
1-2	5
1-3	3
1-4	6
2-3	8
2-5	7
3-5	2
4-5	6

3. Answer any *four* of the following questions :

7×4=28

- (a) Briefly describe the scope of Operations Research. 7
- (b) Solve LPP by Graphical Method : 7

Maximize $Z = 3x_1 + 2x_2$

Subject to constraints

$x_1 \leq 4$

$x_1 + 3x_2 \leq 15$

$2x_1 + x_2 \leq 10$

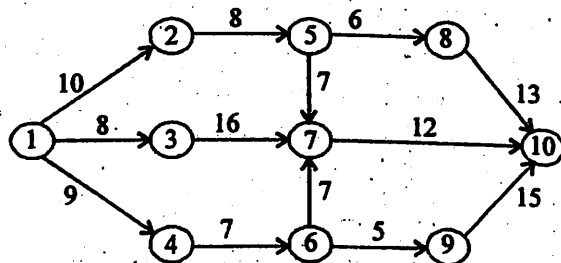
and

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

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[Turn over

- (c) Determine the early start and late start in respect of all node points and identify critical path for the following network : 7



- (d) Find the initial basic feasible solution by using North-West Corner Rule 7

W					
F	W1	W2	W3	W4	Factory Capacity
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Warehouse Requirement	5	8	7	14	

- (e) Describe the assignment problem giving a suitable example. Give two areas of its application. 5+2=7
- (f) Discuss the applications of Linear programming in any functional areas of management. Using suitable example from business or industry. 7

4. Answer the following question :

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British Airport Authority's Terminal 5 Project at Heathrow Airport

British Airport Authority's (BAA) terminal five (T5) at Heathrow Airport in London, completed in March, 2008, was one of Europe's largest construction projects taking 5.5 years to complete the construction and 60,000 people. Located between two runways in a space equal in size to Hyde Park in London, T5 has the largest single-span roof in Europe—made up of six sections and requiring 10 months to lift into place—and 11 miles of baggage conveyor belt. The facility, which cost 4.3 billion British pounds to build, provides Heathrow (and British Airways) with 47 additional aircraft stands and increases Heathrow's capacity by 35 million annual passengers. For the first time in a project of this size and complexity, off-site prefabrication was used extensively. This involved assembling components in off-site modules (2,800 in all) and then transporting them to the building site where they were bolted together, thus reducing on-site construction time and disruption and construction traffic at the airport. Key clients worked collaboratively through integrated teams.

A Web-based system was created to provide an effective communication vehicle for all project participants so that they could collaborate

effectively. The Internet enabled the diverse off-site project module manufacturers in Dover and Scotland to be coordinated through a database system, or "virtual factory." The supply of material, equipment, and workflows could all be monitored through one integrated system.

All project participants could see when modules were in production, completed, delivered, and stored. The database system included a "lessons learned" component where lessons learned were recorded for all participants to see and learn from. The system was especially important for planning and coordinating deliveries between suppliers because of the high volume of deliveries and the limited on-site space involved. The modules in particular required wide-load deliveries and roads had to be closed for delivery. The collaborative nature of this project combined with the "virtual factory" Web-based computer system facilitated the performance of the integrated project teams resulting in a reduction in construction times, a safer working environment, and better quality.

Question :

Discuss some of the unique problems that you think might exist for a project like this one that involves a facility with daily, heavy public usage.

(Theory Paper)

Paper Code : MBA 2.7 (Old)

(Operations Research)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

1. All questions are compulsory : 2×5=10
 - (a) How does Operations Research assist management in decision making ?
 - (b) What is meant by feasible solution of an LP problem ?
 - (c) What is meant by unbalanced transportation problem ?
 - (d) State Goal programming.
 - (e) What is an unbalanced assignment problem ?

2. Answer any five of the following questions :

4×5=20

- (a) Explain briefly the application of Operations Research. 4
- (b) What are the advantages and limitations of LP model ? 2+2=4
- (c) How is a transportation problem solved when demand and supply are not equal ? 4
- (d) How would you deal with assignment problem where objective function is to be maximized ? 4
- (e) What are the essential characteristics of Linear Programming model ? 4
- (f) What are the similarities and differences between Transportation problem and Assignment problem. 4
- (g) Draw the network from the following activity and find the critical path and total duration of project : 4

Activity	Duration (days)
1-2	5
1-3	3
1-4	6
2-3	8
2-5	7
3-5	2
4-5	6

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3. Answer any five of the following questions :

8×5=40

- (a) Briefly describe the scope of Operations Research. 8
- (b) Solve the Linear Programming Problem by Graphical Method :
Maximize $Z = 3x_1 + 2x_2$
Subject to constraints
- x_1 4
 $x_1 + 3x_2$ 15
 $2x_1 + x_2$ 10
- and $x_1 \geq 0, x_2 \geq 0$. 8
- (c) Describe with the help of a diagram, the procedure to arrive at the critical path in a PERT network : 8
- (d) Find the initial basic feasible solution by using North-West Corner Rule 8

W →					
F ↓	W1	W2	W3	W4	Factory Capacity
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Warehouse Requirement	5	8	7	14	

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[Turn over

(e) Describe the assignment problem giving a suitable example. Give two areas of its application. $6+2=8$

(f) Discuss the applications of Linear Programming in any functional areas of management with suitable example from business or industry. 8

(g) Explain the use of transportation problem in business and industry using suitable examples. 8