

[Total No. of Questions - 9] [Total No. of Printed Pages - 4]

Dec.-23-0497

ME-604 (Operation Research)

B.Tech. 6th (CBCS)

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt one question each from section A, B, C and D. Question No. 9 is compulsory. Any missing data may be assumed appropriately.

SECTION - A

1. Answer all the questions.
 - (a) What is the objective of developing OR models?
 - (b) How does the Mathematical Model achieve its purpose?
 - (c) There are always many OR models which are developed for implantation, but failed. What could be the causes?
 - (d) What is the importance of data collection in Operation Research Modelling?
 - (e) What is the importance of Degeneracy in building OR Models? (5×2=10)
2. Answer all the questions.
 - (a) Can you treat Operation Research as a customized Decision making process with respect to each organization?
 - (b) In which spheres of Organization Operation Research contribute?
 - (c) Will there be always mathematical 'objective function' in all OR models? Justify.

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- (d) What is difference among Operations Research and Operations Management?
- (e) Does degeneracy exist among all OR models? (5×2=10)

SECTION - B

3. Solve the following LP problem using graphical or suitable technique

Maximize $Z = 3x_1 + 2x_2$ subject to constraints $x_1 + x_2 \leq 4$,
 $x_1 - x_2 \leq 2$, $x_1, x_2 \geq 0$. (10)

4. A company has factories A, B and C which supply warehouses at D, E, F and G. monthly factory capacities are 250, 300 and 400 units respectively for regular production. If overtime production is utilized, factories A and B can produce 50 and 75 additional units respectively at overtime incremental costs of Rs. 4 and Rs. 5 respectively. The current warehouse requirements are 200, 225, 275 and 300 units respectively. Unit transportation costs (in Rs.) from factories to the warehouses are as below:

	D	E	F	G
A	11	13	17	14
B	16	18	14	10
C	21	24	13	10

Determine the optimum distribution for this company to minimize costs. (10)

SECTION - C

5. (a) How Queuing Theory differs in philosophy with respect to Game Theory? Explain. (6)

[P.T.O.]

- (b) On an average, 5 customers reach a barber's shop every hour. Determining the probability that exactly 2 customers will reach in a 30-minute period, assuming that the arrivals follow Poisson distribution. (4)
6. Solve the following game by suitable technique to find out value of game:

		Player B			
		15	5	4	10
Player A	12	2	10	11	
	16	3	5	14	
	17	3	4	12	

(10)

SECTION - D

7. Consider a project consisting of the following jobs.

Job	Predecessor	Times in days
A	-	15
B	-	10
C	A, B	10
D	A, B	10
E	B	5
F	D, E	5
G	C, F	20
H	D, E	10
I	G, H	15

Determine the following -

- a. the earliest and latest expected completion times of each event.

- b. the critical path.
- c. calculate floats for each activity. (10)
8. Attempt all the questions.

The following network diagram represents activities associated with a project:

Activities	1-2	1-3	1-4	2-5	4-6	3-7	5-7	6-7	7-8
Optimistic time to	6	12	22	17	12	18	8	8	4
Pessimistic time t_p	12	21	38	22	24	26	14	10	6
Most likely time t_m	9	18	32	16	18	14	10	8	4

Determine the following -

- a. expected completion time of each activity.
- b. the earliest and latest expected completion times of each event.
- c. the critical path.
- d. calculate floats for each activity. (10)

SECTION - E (Compulsory)

9. Answer all the questions.
- (a) What are the different steps of methodology of Operation Research? Explain all of them.
- (b) What is the importance of degeneracy in Linear Programming Models? How is it addressed?
- (c) What are the different methods used in Transportation Problem? Explain all of them by assuming a problem of your choice.
- (d) What is a saddle point in Game Theory? How is it calculated?
- (e) What is the difference among total float, free float and independent float? How are they calculated? (5×4=20)