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Total No. of Pages : 02

Total No. of Questions : 08

**M.Tech. (CSE) (Sem.-3)**  
**OPERATIONS RESEARCH**  
**Subject Code : MTOE-303-18**  
**M.Code : 76514**  
**Date of Examination : 18-05-2023**

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

1. a) What is the concept of Operations Research? Write a detailed note on its development.  
b) Define an OR model. Give examples from industry and business to explain the use of models.
2. a) A garment manufacturer has a production line making two styles of shirts. Style I requires 200 grams of cotton thread, 300 grams of dacron thread, and 300 grams of linen thread. Style II requires 200 grams of cotton thread, 200 grams of dacron thread, and 100 grams of linen thread. The manufacturer makes net profit Rs.19.50 on Style I and Rs.15.90 on Style II. He has in hand inventory of 24 kg of cotton thread, 26 grams of dacron thread, and 22 grams of linen thread. His immediate problem is to determine a production schedule, given the current inventory to make a maximum profit. Formulate LPP model.  
b) Write a detailed note on deterministic inventory Models.
3. Write a detailed note on the following :  
a) Discuss dynamic programming application to business and develop the recursive relation used in dynamic programming formulation.  
b) Sensitivity analysis in linear programming
4. Explain the following :  
a) Parametric programming  
b) Geometric programming.

5. A manufacturing company processes 6 different jobs on two machines A and B. Number of units of each job and its processing times on A and B are given in table. Find the optimal sequence, the total minimum elapsed time and idle time for either machine.

Job	No. of Units of each Job	Processing Times	
		Machine A	Machine B
1.	3	5	8
2.	4	16	7
3.	2	6	11
4.	5	3	5
5.	2	9	7.5
6.	3	6	1

6. A project consists of a series of tasks labelled A, B, ..., I with the following relationships.

$$A < D, E; B, D < F; C < G; B < H; F, G < I.$$

Draw the network diagram. Also find the minimum time of completion of the project, when the time in days of completion of each task is as follows :

Task	A	B	C	D	E	F	G	H	I
Time (Days)	23	8	29	16	24	18	19	4	10

7. a) Explain Kuhn-Tucker conditions with the help of a suitable example.  
 b) Describe elementary graph theory.
8. a) State dual theorem and its implications. What is the essential difference between regular simplex method and dual simplex method?  
 b) Explain non-linear programming problem with an example.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**