



R18 Regulation

Subject code: 2E8EE

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech VIII Semester Regular Examinations, June 2022

Operations Research

(Computer Science and Engineering)

Maximum Marks: 70

Date:18.08.2022 Duration: 3 hours

- Note:
- 1.This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Define an unbounded solution in LP.
- 2 What is a redundant constraint in LPP?
- 3 What is degeneracy in transportation problem?
- 4 Is assignment model a special case of the transportation model? Why?
- 5 What is 'No passing rule' in sequencing algorithm?
- 6 Give the benefits of sequencing in a job shop.
- 7 What are the assumptions and limitations of a game theory?
- 8 How is the concept of dominance used in simplifying the solution of a rectangular game?
- 9 Write a note on various assumptions made in single channel queuing theory.
- 10 Give the elements of a queuing system.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Use simplex method to solve the following problem:

10M

Maximize subject to $Z= 5x_1+4x_2$, Subjected to

$4x_1+ 5x_2\leq 10$,

$3x_1+2x_2\leq 9$,

$8x_1+3x_2\leq 12$,

$x_1, x_2\geq 0$

OR

- 12 Use graphical method to solve the problem:

10M

Minimize subject to $Z=20x_1+10x_2$,

$x_1+2x_2\leq 40$,

$3x_1+x_2\geq 30$

$4x_1+3x_2\geq 60$,

$x_1, x_2\geq 0$

- 13 Find the initial basic feasible solution of the following transportation problem using Vogel's approximation method. 10M

Vogel's approximation method.

	W ₁	W ₂	W ₃	W ₄	Capacity
Factory F ₁	19	30	50	10	7
F ₂	70	30	40	60	9
F ₃	40	8	70	20	18
Requirement	5	8	7	14	34 (total)

OR

- 14 (a) What are the conditions for the application of optimality test in case of transportation problem? Briefly explain as to why these conditions should be satisfied? 5M
 (b) Why does 'VAM' provide a good initial basic feasible solution? Could 'NWC' method ever provide an initial solution as low as cost? 3M
 (c) How is degeneracy in transportation problem resolved? 2M
- 15 Solve the following sequencing problem giving an optimal solution when passing out is not allowed. 10M

Machines	Job-1	Job-2	Job-3	Job-4	Job-5
M ₁	11	13	9	16	17
M ₂	4	3	5	2	6
M ₃	6	7	5	8	4

OR

- 16 There are 7 jobs, each of which has to go through the Machines A and B in the order A,B. The Processing time in hours are given below. 10M

Machines/ Job	1	2	3	4	5	6	7
A	3	12	15	6	10	11	9
B	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimize the total elapsed time. Also find the idle time of machines.

- 17 Obtain the optimum strategies for both the persons and the value of game for two persons zero-sum game whose payoff matrix is given below: 10M

Player A	Player B	
	B ₁	B ₂
A ₁	1	-3
A ₂	3	5
A ₃	-1	6
A ₄	4	1
A ₅	2	2
A ₆	-5	0

OR

- 18 Reduce the following game by dominance and find the game value. 10M

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

- 19 A repair shop attended by a single mechanic has an average of 4 customers per hour who bring small appliances for repair. The mechanic inspects them for defect and quite often can fix them right away or otherwise renders a diagnosis. This takes him 6 minutes on the average. Arrivals are Poisson and service time has the exponential distribution. 10M
- a) Find the proportion of time during which the shop is empty.
 - b) Find the probability of finding at least one customer in the shop.
 - c) The average number of customers in the system.
 - d) The average time, including service, spent by a customer.

OR

- 20 (a) Define the queue and explain the various queue disciplines. 3M
- (b) Discuss the arrival and service process of waiting line model. Write the standard method of expressing the queuing problem. 7M