JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -3 EXAMINATION-2022
B.Tech-VII Semester (ECE)
COURSE CODE (CREDITS): 19B1WEC733(3)
COURSE NAME: Optimization Techniques
COURSE INSTRUCTORS: Dr.Neel Kanth

MAX. MARKS: 35

MAX. TIME: 2 Hours

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1.A furniture maker has 6 units of wood and 28 hours free time, in which he will make decorative screens. Two models have sold well in past, so he will resist himself to those two. He estimates that model I requires 2 units of wood and 7 hours of time, while model II requires 1 unit of wood and 8 hours of time. The prices of models are Rs.120 and Rs.80 respectively. How many screens of each model should the furniture maker assemble if he wishes to maximize his sales revenue. Find the solution of LPP with the help of graphical method.   [CO-1][5]

Q2. Explain basic solution and basic feasible solution of the linear programming problem.

[CO-1][2]

Q3.A City Corporation has decided to carry out road repairs on main four arteries of the city. The government has agreed to make a special grant of Rs.50 lakhs towards the cost with a condition that repairs must be done at the lowest cost and quickest time. If conditions warrant, then the supplementary token grant will also be considered favaourably.The Corporation has floated tenders and 5 contractors have sent in their bids. In order to expedite work, one road will be awarded to only one contactor. The cost of repair of roads is given in the table below.

Contractor/Road	R1	R2	R3	R4
C1	9	14	19	15
C2	7	17	20	19
C3	9	18	21	18
C4	10	12	18	19
C5	10	15	21	16

(i)   Find the best way of assigning the repair work to the contractors.

(ii)   If it is necessary to seek supplementary grants, then what should be amount sought.

(iii)   Which of the five contractors will be unsuccessful in the bid.   [CO-2][5+1+1]

Q4. (a) Write the mathematical form of transportation problem.   [CO-2][2]

(b) Hindustan construction company needs 3,3,4 and 5 million cubic feet of fill at four earthen dam sites in Punjab.It can transfer the fill from three mounds A,B and C where 2, 6 and 7 million cubic feet of fill is available respectively.Costs of transporting one million cubic feet of fill from mounds to the four sites in lakhs are given in the table.

From/To	I	II	III	IV	Available
A	15	10	17	18	2
B	16	13	12	13	6
C	12	17	20	11	7
Requirement	3	3	4	5	

Solve the problem using transportation algorithm for minimum cost.   [CO-2][7]

Q5.Solve the job sequencing problem in order to find the optimal job sequence,total elapsed time and Idle time for three machines M1,M2 and M3.The machine order is M1M2M3   [CO-3][5]

Machine/Job	A	B	C	D	E	F	G
M1	3	8	7	4	9	8	7
M2	4	3	2	5	1	4	3
M3	6	7	5	11	5	6	12

Q6. (a) Explain non linear programming problem.   [CO-4] [2]

(b) Solve the NLPP

$$Max\ Z = 10x_1 - x_1^2 + 10x_2 - x_2^2$$
$$s/t\ x_1 + x_2 \le 14\ ,\quad -x_1 + x_2 \le 6$$
$$x_1, x_2 \ge 0$$

[CO-4][5]