JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech- VII Semester (ECE)

COURSE CODE (CREDITS): 19B1WEC733 (3)   MAX. MARKS: 35

COURSE NAME: Optimization Techniques

COURSE INSTRUCTORS: Dr. Alok Kumar   MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	Differentiate between Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT). Define the three-time estimates used in PERT: Optimistic Time (O), Most Likely Time (M), and Pessimistic Time (P).	CO-3	4
Q.2	State the steps involved in solving optimization problems using Lagrange multipliers. Discuss the geometric interpretation of Lagrange multipliers.	CO-4	4
Q.3	A department of a company has five employees with five jobs to be performed. The time (in hours) that each man takes to perform each job is given in the effectiveness matrix. How should the jobs be allocated, one per employee, so as to minimize the total man-hours?	CO-2	5
Q.4	A. Find the sequence that minimizes the total elapsed time required to complete the following task on machines. B. Find the Idle time for Machine I and Machine II.	CO-3	5
Q.5	A. Discuss the importance of inventory management in supply chain operations. What is the significance of the ABC analysis in inventory control? B. What is a deterministic inventory model? How does it differ from a stochastic inventory model?	CO-3	4

Q.3 effectiveness matrix:

Employees

Jobs		I	II	III	IV	V
	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

Q.4 table:

Task	A	B	C	D	E	F	G	H	I
Machine 1	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

Q.6	Define a convex function. State the necessary and sufficient conditions for a function to be convex. Provide examples of convex and non-convex functions. Prove that the sum of two convex functions is convex.	CO-4	5
Q.7	A. Explain the role of the Hessian matrix in determining maxima, minima, or saddle points. B. Find the critical points of $f(x, y) = x^3 - 3x + y^2$ and determine their nature (maximum, minimum, or saddle point)	CO-4	4
Q.8	Define the Golden Ratio and its significance in the Golden Section method. Use the Golden Section method to minimize a given function. $f(x) = x^2 + 4x + 6$ over the interval $[0,4]$ using the Golden Section method up to 4 iterations.	CO-4	4