BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

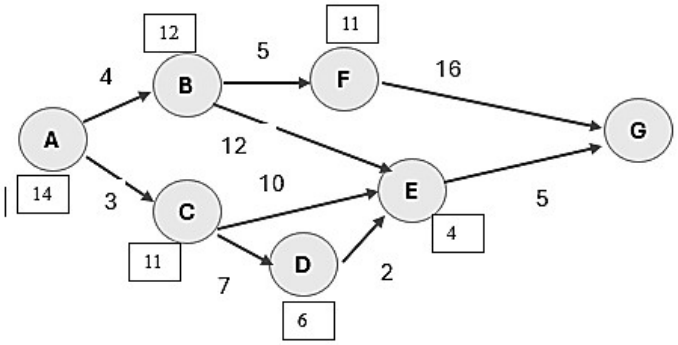
CLASS: BTECH **SEMESTER : VI**
BRANCH: ECE **SESSION : SP/2025**

SUBJECT: EC377 INTELLIGENT COMPUTING AND OPTIMIZATION

TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	What are the key steps in optimal design formulation? Mention different types of optimizations and list some algorithms used for unconstrained multivariable optimization problems.	[5]	1	1,2
Q.1(b)	Minimize the function $f(x)=x^2+(54/x)$ using Fibonacci search method.	[5]	1	4
Q.2(a)	Give some examples of evolutionary algorithms used for optimization. Also, briefly explain the selection techniques used in Genetic Algorithms.	[5]	2	2,3
Q.2(b)	State the difference between single objective optimization and multi-objective optimization. Explain the NSGA-II algorithm.	[5]	2	
Q.3(a)	What are the different parameters to evaluate the performance of an algorithm? Discuss any one uninformed search technique with a suitable example.	[5]	3	2,3
Q.3(b)	Find the optimal path from the source node "A" to the goal node "G" using A* search techniques. The heuristic values are given in the boxes associated with the nodes and the path costs are the values given above the paths.	[5]	3	4



Q.4(a)	Briefly explain the different types of machine learning techniques. Then, derive the formula for the predicted output in simple linear regression.	[5]	4	3
Q.4(b)	Explain the working of k-mean clustering algorithm. Given 2D data points: (1,1), (2,1), (4,3), (5,4). Perform 1 iteration of K-means with K=2, using (1,1) and (5,4) as initial centroids. After first iteration what are the new centroids.	[5]	4	4
Q.5(a)	i. What is the difference between Machine learning and Deep learning? [1] ii. Explain the concept of Parameter Sharing and Sparse Interactions in CNN. [2] iii. In a CNN architecture, you have a convolutional layer with 16 filters, each of size 5×5, and it is applied to an input of dimensions $32\times32\times3$ using a stride of 1 and no padding. Calculate the output's dimension. [2]	[5]	5	1,2,4
Q.5(b)	What is the difference between traditional feed forward neural network and recurrent neural network? Explain the working of RNN architecture with a suitable example.	[5]	5	2,3

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