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RCS-001

**Ph. D. IN COMPUTER SCIENCE
(PHDCS)**

Term-End Examination

December, 2025

RCS-001 : RESEARCH METHODOLOGY

Time : 3 Hours

Maximum Marks : 100

Weightage : 50%

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any **three** questions from the rest.*

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1. (a) Differentiate between Qualitative Research and Quantitative Research. Give advantages and disadvantages of both. 8
- (b) Describe the fractional Knapsack problem. Discuss the solution to the fractional Knapsack problem using

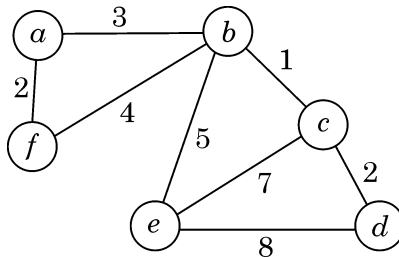
Greedy approach. Given 7 objects, and a sack of capacity 15 the distribution of objects, profit and their weights is as follows :

(i) Objects	(p_i) Profits	(w_i) Weights
1	10	2
2	5	3
3	15	5
4	7	7
5	6	1
6	18	4
7	3	1

Solve the Knapsack problem using greedy method and determine which objects are most profitable. 8

- (c) Draw a flowchart to represent the steps involved in the development of any research proposal. Also, explain each stage involved in the flowchart developed by you. 8

- (d) What is Simulation ? Write and explain the steps involved in development of any simulation model. 8
- (e) What is h -index ? Explain the method of finding h -index for any author. Also, discuss the term impact-factor. What is the role played by h -index and impact factor in active research ? 8
2. (a) Write Dijkstra's algorithm to find the shortest path from Mode 'a' to all other vertices in graph 'G.' Apply the same to the graph 'G' given below : 10



- (b) Discuss the organisation of the Thesis and the tentative content that need to be written under various sections and headings. 10

3. (a) Describe P and NP-class of problems ? What is an NP-complete problem ? How does NP-complete problem differ from NP-Hard problem ? Give *one* example of NP-complete problem. 10
- (b) What is literature survey ? How is it performed ? Discuss the tools and techniques used for literature survey. What are monographs ? Discuss the role of monographs in literature review. 10
4. (a) Compare Qualitative reasoning with Causal reasoning and Teleological reasoning. List the techniques used for Qualitative reasoning and explain any *one* of them with suitable example. 10
- (b) Consider the random sample data for IQ score of 5 students of a school 101, 95, 135, 88, 145.
Assume the average IQ of all the students of the city as 105. How can you answer the question : “Average IQ of the student of the school is higher than other students of the city.”

Based on above details, perform the following : 10

- (i) Write proper H_0 and H_1 hypothesis for the claim as above.
- (ii) Which test will you apply ? Describe various parameters and assumptions related to the test.

5. Write short notes on the following : $5 \times 4 = 20$

- (i) Dynamic Programming.
- (ii) Ethical Issues that arise from computer technologies.
- (iii) Turing machines and computability.
- (iv) Greedy analysis of algorithms.

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