



Avinashilingam Institute for Home Science and Higher Education for Women

Deemed to be University Estd.u/s 3of UGC Act 1956, Category A by MHRD [now MoE]

Re-accredited with an A++ Grade by NAAC CGPA 3.65/4, Category I by UGC

Coimbatore-641043, Tamil Nadu, India

Continuous Internal Assessment II –April-2025 Semester II

Class : I PG

Major : Computer Applications

Time : 2 Hours

Max. Marks :60

23MCAC08 OptimizationTechniques

Course Outcomes:

1. Formulate a real-world problem as a mathematical programming model with application software.
2. Solve the Linear Problems and analyze the simplex and dual simplex principles.
3. Apply optimality and allocation methods for resources.
4. Demonstrate network scheduling concepts and apply critical path analysis and time estimate for real time project completion.
5. Apply sequencing algorithm for job scheduling.

Part A

6x1=6

Choose the Correct Answer

1. PERT stands for CO4K1
 - a. Program Evaluation Review Technique
 - b. Project Evaluation Review Technique
 - c. Program Evaluation Revised Technique
 - d. Project Evaluation Revised Technique
2. Critical path analysis is a/an_____for scheduling a set of project activities CO4K2
 - a. Path
 - b. Algorithm
 - c. Hardware
 - d. Software
3. Replacement Policy is a_____ CO5K1
 - a. Program
 - b. rules of replacement
 - c. Hardware
 - d. Software
4. Which Is the selection of an appropriate order in which a number of jobs (Operations) can be assigned to a finite number of service facilities (Machines or equipments) CO5K1
 - a. Optimization
 - b. Sequencing
 - c. Functional
 - d. Replacement Policy
5. An item that is replaced immediately after its failure is called CO5K1
 - a. individual replacement.
 - b. group replacement
 - c. both a and b
 - d. none of the above
6. I. In sequencing no machine can process one job at a time CO5K1
II. Processing times are independent of processing the jobs.
 - a. TT
 - b. TF
 - c. FT
 - d. FF

Part B

3x6 = 18

Answer ALL questions

Each answer should not exceed 400 words or two pages

7 . a. Write down the dual problem for the following L.P.P

CO2K3

$$\text{Maximize } Z = 4x_1 + 2x_2$$

Subject to the constraints:

$$x_1 + x_2 \geq 3$$

$$x_1 - x_2 \geq 2$$

$$x_1, x_2 \geq 0$$

(or)

7. b. Write down the dual problem for the following L.P.P

CO2K3

$$\text{Minimize } Z = 2x_1 + 2x_2$$

Subject to the constraints:

$$2x_1 + 4x_2 \geq 1$$

$$x_1 + 2x_2 \geq 1$$

$$2x_1 + x_2 \geq 1$$

$$x_1, x_2 \geq 0$$

8. a. Write the applications of PERT/CPM.

CO4K5

(or)

8. b. Construct PERT diagram for the following constraints and label the nodes.

CO4K3

$$A < D, E; B, D < F; C < G; B < H; F, G < I$$

9. a.. A truck owner finds from the past records that the maintenance cost per year, of a truck whose purchase price is Rs.8000 are given below:

CO5K4

| Year: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--------|------|------|------|------|------|------|------|------|
| f(t) : | 1000 | 1300 | 1700 | 2000 | 2900 | 3800 | 4800 | 6000 |
| s(t) : | 4000 | 2000 | 1200 | 600 | 500 | 400 | 400 | 400 |

Determine the best time which is profitable to replace the truck.

(or)

9. b. Find the sequence of jobs that minimizes the total elapsed time to complete the jobs. The following table gives the machine times in hours for six jobs and two machines:

CO4K5

| | | | | | | | |
|-----------|---|---|---|---|---|---|---|
| JobNo | : | 1 | 2 | 3 | 4 | 5 | 6 |
| Machinel | : | 5 | 9 | 4 | 7 | 8 | 6 |
| Machinell | : | 7 | 4 | 8 | 3 | 9 | 5 |

Part C

3x12 =36

Answer ALL questions

Each answer should not exceed 800 words or four pages

10. a. Use Dual Simplex method to

$$\begin{aligned} &\text{Maximize } Z = -3x_1 - x_2 \\ &\text{Subject to the constraints} \\ &x_1 + x_2 \geq 1 \\ &2x_1 + 3x_2 \geq 2 \\ &x_1, x_2 \geq 0 \end{aligned}$$

CO1K3

(or)

10. b. Use principle of duality to

$$\begin{aligned} &\text{Minimize } Z = 2x_1 + 2x_2 \\ &\text{Subject to the constraints:} \\ &2x_1 + 4x_2 \geq 1 \\ &x_1 + 2x_2 \geq 1 \\ &2x_1 + x_2 \geq 1 \\ &x_1, x_2 \geq 0 \end{aligned}$$

CO1K3

11. a. The following table gives the activities in a construction project and time duration:

CO4K5

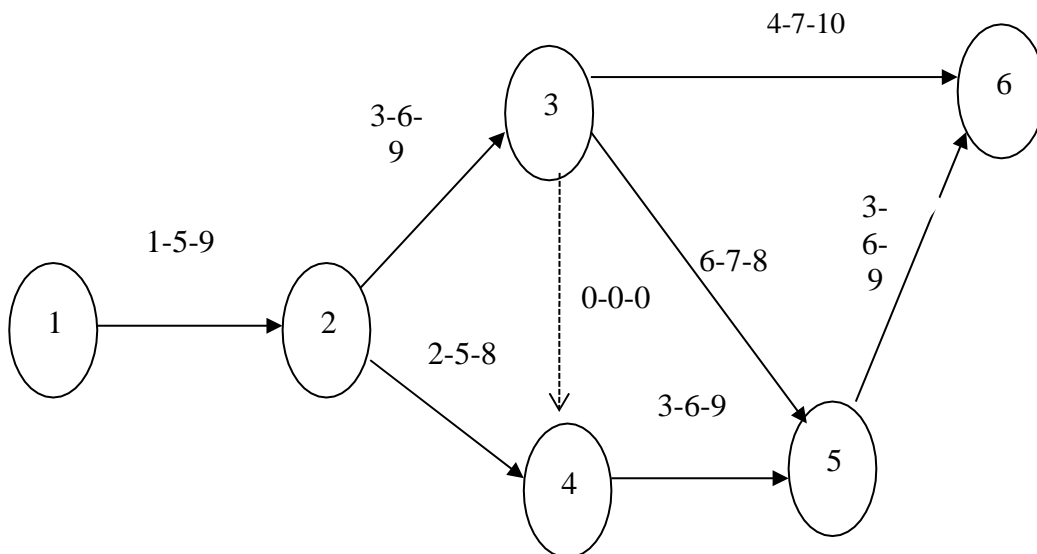
| Activity | Preceding Activity | Normal Time (days) |
|----------|--------------------|--------------------|
| 1-2 | - | 20 |
| 1-3 | - | 25 |
| 2-3 | 1-2 | 10 |
| 2-4 | 1-2 | 12 |
| 3-4 | 1-3, 2-3 | 5 |

- (i) Draw the activity network of the project.
- (ii) Find the critical path and the duration.

(or)

11. b. For the net work given below, find the critical path and also find the probability of completing the project in 21 days.

CO4K5



12. a. Machine A cost Rs.9,000. Annual operating costs are Rs.200 for the first year, and then increase by Rs. 2000 every year. Determine the best age at which to replace the machine. If the optimum replacement policy is followed, what will be the average yearly cost of owning and operating the machine?

CO5K4

(or)

12 .b. Find the sequence that minimizes the total elapsed time required to complete the following jobs:

CO5K4

| | | | | | | |
|----------------------------|-------------|---|---|---|---|---|
| Jobs | : | 1 | 2 | 3 | 4 | 5 |
| Processing Time (in hours) | Machine A : | 5 | 7 | 6 | 9 | 5 |
| | Machine B : | 2 | 1 | 4 | 5 | 3 |
| | Machine C : | 3 | 7 | 5 | 6 | 7 |

Number of Copies : 45

Staff In charge : Dr. V.Radha