OR

6 a. What are the functions of the ignition system? **(04 Marks)**

b. What are the types of ignition system? Explain with a neat sketch electronic ignition system. **(10 Marks)**

c. Differentiate between battery ignition system and magneto ignition system. **(06 Marks)**

Module-4

7 a. Define super charger? List the types of super charger? Explain with a neat sketch centrifugal type super charger. **(08 Marks)**

b. Write a note on turbo charger lag. **(06 Marks)**

c. Distinguish between super charging and turbo charging. **(06 Marks)**

OR

8 a. List the various alternate fuels used for S.I engine. Explain any two fuels. **(08 Marks)**

b. Explain Cetane number and octane number. **(04 Marks)**

c. Explain with a neat sketch common rail direct injection system. **(08 Marks)**

Module-5

9 a. List the various pollutants. List the measures taken to reduce pollutants. **(04 Marks)**

b. Explain with a neat sketch crank case ventilation system. **(08 Marks)**

c. Discuss how evaporative emission can be controlled. **(08 Marks)**

OR

10 a. Discuss about how air injection system can control the pollution. **(06 Marks)**

b. What are catalytic converters? How they are helpful in reducing HC, CO and NO_2. **(08 Marks)**

c. Write a note on Motor Vehicle Act. **(06 Marks)**

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CBCS SCHEME

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18ME735

Seventh Semester B.E. Degree Examination, June/July 2025
Operations Research

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. List and explain different phases of operations research. **(06 Marks)**

b. The plant has to supply the products to market where the maximum demand for Product B is 450 units/month. Formulate the problem as LP model and find graphically the number of products A and B to maximize the total profit/month.

Type of product	Profit (Rs.)	Processing time in the departments		Market demand
		1	2	
A	20 / unit	2 hrs / unit	3 hrs / unit	-
B	24 / unit	3 hrs / unit	2 hrs / unit	≤ 450
Man availability of departments		1500 hrs/month	1500 hrs/month	

(14 Marks)

OR

2 a. Discuss the scope of operations research. **(06 Marks)**

b. Solve the following LPP using graphical method. Also comment on what type of solution.

Minimize, $z = 4x_1 + 6x_2$

Subjected to,

$$x_1 + x_2 \geq 8$$
$$6x_1 + x_2 \geq 12$$
$$\text{and } x_1 \geq 0,\ x_2 \geq 0$$

(14 Marks)

Module-2

3 a. What is the significance of introducing slack, surplus and artificial variables in LP? **(06 Marks)**

b. Solve the LPP by simplex method :

Maximize, $z = 7x_1 + 5x_2$

Subjected to, $-x_1 - 2x_2 \geq -6$

$$4x_1 + 3x_2 \leq 12$$
$$\text{and } x_1 \geq 0,\ x_2 \geq 0$$

(14 Marks)

OR

4 a. Write the dual for the following primal :

Minimize, $z = 3x_1 + x_2 - 7x_3$

Subjected to, $x_1 - 2x_2 + 3x_3 \leq 10$

$$3x_1 + 5x_2 - x_3 \geq 9$$
$$-x_1 - 4x_2 + x_3 = 6$$
$$\text{and } x_1 \text{ is unrestricted, } x_2 \geq 0,\ x_3 \geq 0$$

(06 Marks)