7E1847

7E1847

B. Tech. VII - Sem. (Main / Back) Exam., Nov-Dec 2025
Mechanical Engineering
7ME5-11 I. C. Engines

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____ 2. NIL _____

PART – A [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Define an air-standard cycle. How is it different from a fuel-air cycle?

Q.2 What is volumetric efficiency in an I.C. engine?

Q.3 What is meant by turbulence and swirl in context of I.C. engine?

Q.4 What is transesterification in biodiesel production?

Q.5 What is the role of a venturi in a carburettor?

Q.6 What is spark advance and why is it needed?

Q.7 Why is proper firing order important in an engine?

Q.8 What is the function of the radiator in an engine?

Q.9 What is supercharging in I.C. engines?

Q.10 What is scavenging in I.C. engines?

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Differentiate between Spark Ignition (SI) and Compression Ignition (CI) engines.

Q.2 Explain the working of a simple carburettor with a neat sketch.

Q.3 An SI engine consumes 12 kg of air per minute and 0.8 kg of petrol per minute. Calculate the air-fuel ratio and state whether the mixture is rich or lean, if the stoichiometric A/F ratio for petrol is 14.7:1.

Q.4 Explain the working and advantages of Common Rail Direct Injection (CRDI) system.

Q.5 Explain the functions and desirable properties of good lubricating oil.

Q.6 Explain the effect of supercharging on the thermodynamic cycle and performance of SI engines.

Q.7 Write short notes on –

(i) Supercharging

(ii) Methanol vs Gasoline as a fuel

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Explain the stages of combustion in Spark Ignition (SI) and Compression Ignition (CI) engines with neat sketches. Compare their characteristics.

Q.2 Explain the complete working of a fuel injection system in C.I. engines with suitable diagrams. Mention types of injectors.

Q.3 Compare the engine performance and emissions characteristics of pure methanol, ethanol and their blends with gasoline. Include advantages and limitations.

Q.4 A single-cylinder 4-stroke engine has:

Bore = 100 mm, Stroke = 120 mm,

Speed = 1500 rpm,

Brake power = 4.5 kW,

Fuel consumption = 1.8 kg/h,

Calorific value = 42000 kJ/kg

Calculate -

(a) Indicated power using mechanical efficiency = 80%

(b) Brake thermal efficiency

(c) Mean effective pressure

Q.5 Compare air cooling and water cooling systems. Discuss their construction, working, applications and limitations.

Roll No. _____

Total No. of Pages: 2

7E1811

7E1811

B. Tech. VII - Sem. (Main / Back) Exam., Nov-Dec 2025
Open Elective - I
7AG6-60.2 Environmental Engineering and
Disaster Management

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____

2. NIL _____

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 State the per capita domestic water requirement for urban and rural areas in India.

Q.2 List two main sources of surface water supply.

Q.3 What is the function of intake structure?

Q.4 State the desirable values/range of pH, TDS, NO_3 and turbidity as per BIS standards for drinking water.

Q.5 Define BOD of wastewater.

Q.6 Name any two types of sewers.

Q.7 Give one example of primary treatment of wastewater.

Q.8 Define air pollution.

Q.9 List two gaseous air pollutants.

Q.10 What is the full form of NDMA? What is its main function?

PART – B

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Compare domestic water requirements of urban and rural areas in India with suitable examples.

Q.2 Describe the role and working mechanism of sedimentation tanks in water treatment.

Q.3 Write a note on BIS drinking water quality standards (IS 10500 : 2012).

Q.4 Explain the significance of hydraulic design of sewers.

Q.5 Discuss the major physical, chemical and biological characteristics of wastewater.

Q.6 Describe composting as a method of solid waste management.

Q.7 Explain the concept of disaster preparedness and its importance.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Explain different sources of water supply and factors influencing the choice of a source for urban water supply schemes.

Q.2 Explain the various stages in conventional water treatment including their functions and significance.

Q.3 Describe in detail the methods of solid waste disposal and their suitability under Indian conditions.

Q.4 Discuss various types of air pollutants, their sources and health/environmental impacts.

Q.5 Explain the importance of disaster management in India and discuss different phases (prevention, preparedness, response, recovery).