

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER- V EXAMINATION – SUMMER 2026

Subject Code:3150210

Date:30-05-2026

Subject Name: Automobile Engines

Time: 02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Define following terms: (1) Compression ratio (2) Scavenging (3) Cut-off ratio	03
	(b) Differentiate valve timing diagram of 4-stroke S.I and C.I engines with neat sketch.	04
	(c) State the firing order of 4-cylinder 4-stroke petrol engine. Draw the theoretical and actual P-V diagram of 2-stroke diesel engine and explain port-timing diagram of 2-stroke diesel engine.	07
Q.2	(a) Enlist the effects of knocking. Explain preignition in details.	03
	(b) Define: Delay period. Differentiate knocking in SI and CI engines.	04
	(c) Explain the stages of combustion in S.I engines using p- Θ (pressure vs crank angle) diagram with neat sketch.	07
	OR	
	(c) Explain the stages of combustion in C.I engines using p- Θ (pressure vs crank angle) diagram with neat sketch.	07
Q.3	(a) Define Carburetion. Enlist the limitation of simple carburetor.	03
	(b) Explain the starting or pilot jet with neat sketch	04
	(c) Enlist the types of nozzles. Explain the construction and working of common rail diesel injection system with neat sketch.	07
	OR	
Q.3	(a) Enlist the properties of CI engine fuels.	03
	(b) Explain the construction and working of fuel injector with neat sketch.	04
	(c) Enlist the function of venturi, choke valve and float and float chamber. Explain mechanical petrol pump with neat sketch.	07
Q.4	(a) Enlist the functions of lubrication system. Designate the lubricating oil grade: SAE 10W/30.	03
	(b) Explain Thermo-siphon cooling system with neat sketch.	04
	(c) Differentiate supercharging and turbocharging in details.	07
	OR	
Q.4	(a) Enlist scavenging methods and explain any one method with neat sketch.	03
	(b) Differentiate air cooling and water-cooling system in details.	04
	(c) Explain the splash lubrication system with neat sketch.	07

- Q.5 (a)** Define following terms (1) Mechanical efficiency (2) Indicated thermal efficiency (3) brake specific fuel consumption (bsfc). **03**
- (b)** Explain the working principle of pneumatic governor with neat sketch. **04**
- (c)** A 4-cylinder, 4-stroke petrol engine develops 21 kW. A morse test was conducted at constant speed of 3000 rpm and B.P is measured, when each cylinder was cut-off are 14.8, 14.5, 14.6 and 14.75 kW respectively. Find I.P. of the engine when all cylinders are developing power. Also find the mechanical efficiency and brake mean effective pressure. Take bore = 7.5 cm and stroke = 9 cm. **07**

OR

- Q.5 (a)** Explain the Morse test in details. **03**
- (b)** Explain the significance of performance maps in IC engines. **04**
- (c)** The following observations are made during a trial on an oil engine. (1) Motor power to start the engine = 10 kW (2) R.P.M = 1750 (3) Brake torque = 327.5 Nm (4) Fuel used = 15 kg/hr. (5) Calorific value of fuel used = 42000 kJ/kg (6) Air supplied = 4.75 kg/min (7) Quantity of cooling water = 16 kg/min (8) Outlet temperature of cooling water = 65.8 °C (9) Room temperature = 20.8 °C (10) Exhaust gas temperature = 400 °C. Take $C_{pw} = 4.2$ kJ/kg K and $C_{pg} = 1.25$ kJ/kg K. **07**
- Determine (a) BP (2) Mechanical efficiency (3) bsfc (4) draw heat balance sheet on kW basis and percentage basis.
