CBCS SCHEME

USN OF 76		BAU304
USIX		

Third Semester B.E./B.Tech. Degree Examination, June/July 2025 Engineering Thermodynamics

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M: Marks, L: Bloom's level, C: Course outcomes.

3. Missing data, if any, may be suitably assumed.

		Module – 1	M	L	C
Q.1	a.	What is thermodynamic state and process? What is Quasi-Static process? Explain.	10	L1	CO3
	b.	Explain thermodynamic equilibrium.	10	L1	CO1
	1 20	OR			001
Q.2	a.	The temperature 't' on a certain Celsius thermodynamic scale is given by	10	L3	CO1
		means of property through a relation $t = a \ln P + b$ where 'a' and 'b' are			
		constants and P is the property of the fluid. If at the ice point and steam			
		points the values of P are to found to be 4 and 20 respectively, what will be			
		the temperature reading corresponding to a reading of $P = 16$?			
	b.	What are point and path functions? Explain.	10	L2	CO1
		Module – 2			
Q.3	a.	Derive steady flow energy equation,	10	L4	CO1
	b.	A steam turbine operating under steady flow conditions receiver 4500 kg of	10	L4	CO1
	1	steam per hour. The steam enters the turbine at a velocity of 42 m/s at the			
		elevation of 4m and a specific enthalpy of 2800 kJ/kg. It leaves the turbine			-
		at a velocity of 9.4 m/s at an elevation of 1 m and specific enthalpy of			
		2262 kJ/kg. The heat losses from the turbine to the surroundings amounts to			
		16780 kJ/hr. Determine the power output of the machine.			
		OR			
Q.4	a.	Prove Carnot theorem.	10	L3	CO1
	b.	A reservoirs heat engine operates between two reservoirs at temperatures of	10	L2	CO1
		600°C and 40°C the engine drives a reversible refrigerator, which operates			
		between 40°C and – 20°C. The heat transfer to the engine is 2000 kJ and			
		network output from combined engine and refrigerator system is 360 kJ.			
		Calculate heat transfer to the refrigerator and net heat transfer to the			· 8
		refrigerator and net heat transfer to the reservoir at 40°C.			
	_	Module – 3	10	T 0	001
Q.5	a.	State and prove clausius theorem and clausius inequality.	10	L3	CO1
	b.	A 30 kg steel ball at 427°C dropped in 150 kg oil at 27°C, the specific heat	10	L3	CO ₁
		of steel and oil are 0.5 kJ/kg K and 2.5 kJ/kg K respectively. Estimate the			
		entropy change of steel, oil and that of system containing oil and steel.			
0.6	1	OR	10	Т 2	001
Q.6	a.	Sketch and explain P-V-T surface for a pure substance that expands on	10	L2	CO3
	1.	freezing.	10	1 2	CO1
	b.	One kg of super heated steam at 0.2 MPa and 200°C is contained in a	10	L3	CO
		piston cylinder arrangement at 300 K. Steam is condensed to saturated			
		liquid at constant pressure. Calculate the change in entropy of the universe associated with this process.			
		associated with this process.			
		1 01 2			

b. A reversed cycle has refrigerating COP of 4. Determine: i) The ratio of T ₂ /T ₁ or T _{max} /T _{min} ii) The ratio of T ₂ /T ₁ or T _{max} /T _{min} ii) The ratio of T ₂ /T ₁ or T _{max} /T _{min} ii) The ratio of T ₂ /T ₁ or T _{max} /T _{min} ii) If this cycle is used as heat pump, determine the maximum refrigeration effect in ton iii) If this cycle is used as heat pump, determine the COP and heat delivered. OR Q.8 a. Define and explain following terms: i) Specific humidity iii) Dew point temperature iv) Degree of saturation v) Wet bulb temperature, b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 kg/kg of determine: i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module – 5 Q.9 a. Discuss: i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1760 K and 300 K respectively, at the beginning of the compassion proce3s, the pressure is 1 atm. Assume y = 1.4, C _p = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: ii) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency iii) Barke thermal efficiency iii) BsFC					BA	U304
b. A reversed cycle has refrigerating COP of 4. Determine: i) The ratio of T ₂ /T ₁ or T _{max} /T _{min} ii) If the work done on the cycle is 20 KW, determine the maximum refrigeration effect in ton iii) If this cycle is used as heat pump, determine the COP and heat delivered. OR Q.8 a. Define and explain following terms: i) Specific humidity iii) Dew point temperature iv) Degree of saturation y) Wet bulb temperature. b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 kg/kg of determine: i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module – 5 Q.9 a. Discuss: i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively, at the beginning of the compassion proce3s, the pressure is 1 atm. Assume $\gamma = 1.4$, $C_p = 1.005$ kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: ii) Willan's line iii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency iii) Brake thermal efficiency iii) Brake thermal efficiency iii) Brake thermal efficiency iiii) Brake thermal efficiency iiii) Brake thermal efficiency iiii BsPC	7		Module – 4			
ii) The ratio of T ₂ /T ₁ or T _{max} /T _{min} iii) If the work doone on the cycle is 20 KW, determine the maximum refrigeration effect in ton iii) If this cycle is used as heat pump, determine the COP and heat delivered. OR Q.8 a. Define and explain following terms: i) Specific humidity ii) Relative humidity iii) Dew point temperature iv) Degree of saturation v) Wet bulb temperature. b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 kg/kg of determine: i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module – 5 Q.9 a. Discuss: i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively, at the beginning of the compassion procease, the pressure is 1 atm. Assume \(\gamma = 1.4, \text{C}_p = 1.005 \) kJ/Kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: ii) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency iii) Brake thermal efficiency iii) Brake thermal efficiency iii) Brake thermal efficiency iiii) BSFC	Q.7	a.	Sketch and explain vapour compression refrigeration system.	10	L2	CO ₂
ii) If the work done on the cycle is 20 KW, determine the maximum refrigeration effect in ton iii) If this cycle is used as heat pump, determine the COP and heat delivered. OR Q.8 a. Define and explain following terms:		b.	A reversed cycle has refrigerating COP of 4. Determine:	10	L3	CO ₂
refrigeration effect in ton iii) If this cycle is used as heat pump, determine the COP and heat delivered. OR 3. Define and explain following terms: i) Specific humidity ii) Dew point temperature iv) Degree of saturation y) Wet bulb temperature. b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 kg/kg of determine; i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module – 5 Q.9 a. Discuss: i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1760 K and 300 K respectively. at the beginning of the compassion process, the pressure is 1 atm. Assume \(\gamma = 1.4, C_p = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine; \) Pressure and temperature at each point in the cycle ii) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: ii) Heat balance speet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BsFC			i) The ratio of T_2/T_1 or T_{max}/T_{min}			
iii) If this cycle is used as heat pump, determine the COP and heat delivered. OR						
delivered. OR						
OR a. Define and explain following terms: i) Specific humidity ii) Relative humidity iii) Dew point temperature iv) Degree of saturation v) Wet bulb temperature. b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 kg/kg of determine: i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module – 5 Q.9 a. Discuss: i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively, at the beginning of the compassion proce3ss, the pressure is 1 atm. Assume γ = 1.4, C _p = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: ii) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency iii) Brake thermal efficiency iii) Brake thermal efficiency iiii) BSFC						
Q.8 a. Define and explain following terms: i) Specific humidity ii) Relative humidity iii) Dew point temperature iv) Degree of saturation v) Wet bulb temperature.	-					
i) Specific humidity ii) Relative humidity iii) Dew point temperature iv) Degree of saturation v) Wet bulb temperature. b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 kg/kg of determine : i) Partial pressure of vapour iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module - 5 Q.9 a. Discuss : i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively, at the beginning of the compassion proce3ss, the pressure is 1 atm. Assume γ = 1.4, C _p = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine : Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. Q.10 a. What is meant by : i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes : Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate : i) Mechanical efficiency iii) Brake thermal efficiency iii) Brake thermal efficiency iiii) BSFC						
ii) Relative humidity iii) Dew point temperature iv) Degree of saturation v) Wet bulb temperature; b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 kg/kg of determine: i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module – 5 Q.9 a. Discuss: i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively, at the beginning of the compassion proce3ss, the pressure is 1 atm. Assume $\gamma = 1.4$, $C_p = 1.005$ kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: j) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) Brake thermal efficiency iii) Brake thermal efficiency iii) Brake thermal efficiency	Q.8	a.		10	L1	CO ₂
iii) Dew point temperature iv) Degree of saturation v) Wet bulb temperature.						
iv) Degree of saturation v) Wet bulb temperature. b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 kg/kg of determine : i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module - 5						
v) Wet bulb temperature. b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 10 L3 kg/kg of determine : i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module - 5 Q.9 a. Discuss : 10 DTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively. at the beginning of the compassion process, the pressure is 1 atm. Assume γ = 1.4, C _p = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine : Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure.						
b. The humidity ratio or specific humidity of atmospheric air at 30°C is 0.016 kg/kg of determine: i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module - 5						
kg/kg of determine: i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. 10		,		10	T 2	000
i) Partial pressure of vapour ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module – 5 Q.9 a. Discuss: i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively, at the beginning of the compassion proce3ss, the pressure is 1 atm. Assume $\gamma = 1.4$, $C_p = 1.005$ kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC		D.		10	L3	CO2
ii) The relative humidity iii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg. Module - 5						
Iiii) Dew point temperature Assume standard barometric pressure of 760 mm if Hg.						
Assume standard barometric pressure of 760 mm if Hg. Module – 5						
Module – 5 10 L1						
 Q.9 a. Discuss: i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and the beginning of the compassion proce3ss, the pressure is 1 atm. Assume γ = 1.4, Cp = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC 			Assume standard outometric pressure of 700 mm if fig.			
 Q.9 a. Discuss: i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively. at the beginning of the compassion proce3ss, the pressure is 1 atm. Assume γ = 1.4, Cp = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC 			Module – 5			
i) OTTO cycle ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively. at the beginning of the compassion proce3ss, the pressure is 1 atm. Assume γ = 1.4, C _p = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC	0.9	a.		10	L1	CO3
ii) Diesel cycle with P-V diagrams. b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively. at the beginning of the compassion proce3ss, the pressure is 1 atm. Assume γ = 1.4, C _p = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC			A CONTRACTOR OF THE PROPERTY O			
 b. An air standard diesel cycle operates with a compression ratio of 18 and maximum and minimum temperature of 1700 K and 300 K respectively, at the beginning of the compassion proce3ss, the pressure is 1 atm. Assume γ = 1.4, C_p = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC 						
maximum and minimum temperature of 1700 K and 300 K respectively, at the beginning of the compassion proce3ss, the pressure is 1 atm. Assume $\gamma = 1.4$, $C_p = 1.005$ kJ/kg K and $R = 0.287$ kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC	12	b.		10	L1	CO4
 γ = 1.4, C_p = 1.005 kJ/kg K and R = 0.287 kJ/kg K. Determine: Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC 						160 1 0000 1.0
Pressure and temperature at each point in the cycle i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC						
i) Specific net work output ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC			$\gamma = 1.4$, $C_p = 1.005 \text{ kJ/kg K}$ and $R = 0.287 \text{ kJ/kg K}$. Determine:			
ii) Thermal efficiency iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC			Pressure and temperature at each point in the cycle			
iii) Work ratio iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC			i) Specific net work output			
iv) Mean effective pressure. OR Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC						
Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC						
 Q.10 a. What is meant by: i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC 						
 i) Willan's line ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC 	0.40					
ii) Heat balance sheet. Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC	Q.10	a.		10	L2	CO3
Explain. b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC						-
b. The following observations were rewarded in a test of one hour duration on a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC						1
a single cylinder oil engine working on four strokes: Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC		h		4.0	T 0	~~
Bore = 300 mm, Stroke = 450 mm, Fuel used = 8.8 kg, C.V of the fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC		D.	a single cylinder oil angine working on four strokes.	10	L3	CO ₄
fuel = 41800 kJ/kg, Average Speed = 200 rpm, MEP = 5.8 bar, brake friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC						
friction load = 1860 N. Diameter of the Brake wheel = 1.22 m. Calculate: i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC			fiel = 41800 kl/kg Average Speed = 200 mm MED = 50 to 1		£	,
i) Mechanical efficiency ii) Brake thermal efficiency iii) BSFC			friction load = 1860 N. Diameter of the Prelic wheel = 1.22 m. Columbia			
ii) Brake thermal efficiency iii) BSFC						
iii) BSFC						
			iv) BMEP.			
TV) DIVILLE.			ATT DIVIDE			