P P SAVANI UNIVERSITY

Third Semester of Diploma Examination

December 2022

IDME2020 Thermodynamics

23.11.2022, Wednesday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1	**Define (Any Five)**	**[05]**	**CO**	**BTL**
(i)	Enthalpy		**1**	**1**
(ii)	Entropy		**1**	**1**
(iii)	Heat		**1**	**1**
(iv)	Work		**1**	**1**
(v)	Exergy		**2**	**2**
(vi)	PMM1		**2**	**2**
(vii)	PMM2		**2**	**2**
Q - 2 (a)	What are the limitation of 1st law of thermodynamics?	**[05]**	**2**	**2**
Q - 2 (b)	Define and explain 1st law of thermodynamics.	**[05]**	**2**	**2**
	OR			
Q - 2 (a)	State 1st law of thermodynamics for no flow process.	**[05]**	**2**	**2**
Q - 2 (b)	State 1st law of thermodynamics for flow process.	**[05]**	**2**	**2**
Q - 3 (a)	What is Clausius inequality?	**[05]**	**2**	**2**
Q - 3 (b)	State and explain PMM3.	**[05]**	**2**	**2**
	OR			
Q - 3 (a)	What are the properties of entropy?	**[05]**	**4**	**2**
Q - 3 (b)	State and explain 3rd law of thermodynamics.	**[05]**	**4**	**2**
Q - 4	**Attempt anyone.**	**[05]**		
(i)	What is Rankine cycle? Derive the expression of thermal efficiency of Rankine cycle.		**3**	**2**
(II)	Draw PV and TS diagram of Dual cycle and derive an expression for thermal efficiency of dual cycle.		**3**	**2**

SECTION – II

Q - 1	**MCQ/Short Question/Fill in the Blanks (Any Five)**	**[05]**		
(i)	Explain Avogadro's law.		**1**	**1**
(ii)	Define energy.		**1**	**1**
(iii)	Write the similarities and differences of heat energy and work energy.		**1**	**1**
(iv)	Mention Steady Flow Energy Equation.		**2**	**2**
(v)	Explain cut-off ratio		**3**	**2**
(vi)	Define process and cycle.		**3**	**2**
(vii)	Define air standard efficiency.		**3**	**2**
Q - 2 (a)	State limitations of first law of thermodynamics.	**[05]**	**2**	**2**
Q - 2 (b)	Write down fundamental laws for ideal gas.	**[05]**	**2**	**2**

	OR			
Q - 2 (a)	Give the difference between the Path function and the point function.	**[05]**	**2**	**2**
Q - 2 (b)	Write a Short Note on the Steady Flow Energy Equation.	**[05]**	**2**	**2**
Q - 3 (a)	One Carnot engine receives 1200 KJ/min heat energy from the reservoir at 350°C temperature and rejects heat energy to the sink at 25°C temperature. Find thermal efficiency and work done.	**[05]**	**3**	**2**
Q - 3 (b)	Explain. 1] Specific heat at constant pressure (C_p) 2] specific heat at constant volume (C_v).	**[05]**	**3**	**2**
	OR			
Q - 3 (a)	Explain the C.O.P of the Refrigerator and heat pump and show their relationship	**[05]**	**3**	**2**
Q - 3 (b)	In the diesel cycle, the compression ratio is 16, the pressure and temperature at beginning of the compression stroke are 1 bar & 20°C respectively and the maximum temperature of the cycle is 1430°C. Find the thermal efficiency of the cycle	**[05]**	**3**	**2**
Q - 4	**Attempt any one/two.**	**[05]**		
(i)	Explain the reversible process.		**4**	**2**
(ii)	Differentiate between the Otto cycle and the Diesel cycle		**3**	**2**

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CO : Course Outcome Number BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create