O.P.Code: 20ME0305	R20	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December-2023

THERMAL ENGINEERING

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	**a**	What are the various classifications of air compressors?	**CO1**	**L2**	**6M**
	b	Explain the working of any two Rotary compressors with neat sketch.	**CO1**	**L2**	**6M**
		OR			
2		A single –stage double –acting air compressor is required to deliver 14 m3 of air per Minute measured at 1.013 bar and 1500C. The delivery pressure is 7 bar and the speed 300 r.p.m. Take the clearance volume as 5% of the swept volume with the compression and expansion index of 1.3 Calculate: (i) Swept volume of the cylinder; The delivery temperature; (iii). Indicated power.	**CO1**	**L4**	**12M**

UNIT-II

3		Explain the working of Open Cycle Brayton cycle with neat sketch.	**CO2**	**L2**	**12M**
		OR			
4		Air enters the compressor of a gas turbine plant operating on Brayton cycle at 1 bar, 27°C. The pressure ratio in the cycle is 6. Calculate the maximum temperature in the cycle and the cycle efficiency. Assume the turbine work as 2.5 times the compressor work. Take γ=1.4	**CO2**	**L4**	**12M**

UNIT-III

5	**a**	Define Steam nozzle and also explain about expansion of steam in nozzle with neat sketch.	**CO3**	**L2**	**6M**
	b	Explain various types of nozzles with neat sketches.	**CO3**	**L2**	**6M**
		OR			
6		Determine the throat area, exit area and exit velocity for a steam nozzle to pass 0.2kg/s when the inlet conditions are 12 bar and 2500C and final pressure is 2bar.Assume that the expansion is isentropic and inlet velocity is negligible. Take n=1.3 for superheated steam	**CO3**	**L3**	**12M**

UNIT-IV

7		Draw the combined velocity triangle of Impulse turbine and explain the salient features.	**CO4**	**L1**	**12M**
		OR			
8		Distinguish between impulse and reaction turbines.	**CO4**	**L4**	**12M**

UNIT-V

9		The following readings were taken during the test of a single cylinder four stroke oil engine: Cylinder diameter=250mm,Stroke Length=400mm, M.E.P=7bar, Engine Speed=250rpm, Net Load on the brake=1080N,Effective diameter of the brake=1.5 metres, Fuel used per hour=10Kg, calorific value fo fuel=44300Kj/Kg. Calculate (i)Indicated Power (ii) Brake Power (iii) Mechanical Efficiency (iv) Indicated thermal efficiency	**CO5**	**L3**	**12M**
		OR			
10		Compare 2-stroke engine with 4-stroke engine.	**CO5**	**L2**	**12M**

***** END *****