

HALL TICKET NUMBER

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PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)

II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, JAN - 2023
THERMAL AND HYDRAULIC PRIME MOVERS
(EEE Branch)

Time: 3 hours

Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer all the questions in Part-A (5X2=10M)

Q.No.	Questions	Marks	CO	KL
1	a) Why Compounding is necessary for steam turbines.	[2M]	1	
	b) Differentiate the open cycle and closed cycle gas turbine.	[2M]	2	
	c) Draw the P-V and T-S diagrams for diesel cycle.	[2M]	3	
	d) Define load curve and load factor.	[2M]	4	
	e) List out the main components of a centrifugal pump.	[2M]	5	

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.	Questions	Marks	CO	KL
UNIT-I				
2.	Derive an expression for thermal efficiency for Otto cycle in terms of compression ratio with the help of P-V and T-S diagrams.	[10M]	1	
OR				
3.	a) Explain the working of 2-stroke petrol engine with neat sketch.	[5M]	1	
	b) Discuss about the necessity of lubrication to the IC engines and explain any one method.	[5M]	1	
UNIT-II				
4.	Explain the working principle of reheat Rankine cycle and mention its advantages and disadvantages.	[10M]	2	
OR				
5.	a) Differentiate between the impulse and reaction turbines.	[5M]	2	
	b) Explain any method of compounding of a single stage impulse turbine.	[5M]	2	
UNIT-III				
6.	Derive blade efficiency of a single stage impulse turbine with the help of velocity diagram.	[10M]	3	
OR				
7.	a) Explain the working principle of open cycle Gas turbine plant with	[5M]	3	
	b) A gas turbine unit receives air at 1 bar and 300 K and compresses it adiabatically to 6.2 bar. The compressor efficiency is 88%. The fuel has a heating value of 44,186 kJ/kg and the fuel air ratio is 0.017 kJ/kg of air. The turbine efficiency is 90%. Calculate the work of turbine and compressor per kg of air compressed and thermal efficiency. Take $C_p = 1.147$ kJ/kg K and $\gamma = 1.4$ for all processes.	[5M]	3	
UNIT-IV				
8.	a) Classify the Hydraulic pumps.	[5M]	4	

	b)	Explain the working of a Centrifugal pump with neat sketch and express its efficiencies.	[5M]	4	
OR					
9.	a)	Explain the working principle of a Francis turbine with neat sketch.	[5M]	4	
	b)	Write a short note on the various heads and efficiencies of a hydraulic turbine.	[5M]	4	
UNIT-V					
10.		Draw the schematic diagram of a hydroelectric power plant and briefly explain the main components of it.	[10M]	5	
OR					
11.	a)	Write a short note on estimation of waterpower potential.	[5M]	5	
	b)	Mention the advantages and disadvantages of hydroelectric power plants.	[5M]	5	
