Register Number:……..

KUMARAGURU
college of technology
character is life

B.E DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Fourth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U15MET405 : Thermodynamics and Fluid Mechanics

COURSE OUTCOMES

CO1: Explain the concepts of thermodynamics and mechanisms of heat transfer.

CO2: Discuss the working of engines, turbines and boilers.

CO3: Describe the working of compressors and air conditioning.

CO4: Apply the concept of Euler and Bernoulli's equation for solving fluid flow problems.

CO5: Analyze the performance of various fluid machines.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code CO2 [K_1]

List I	List II
A. Carnot cycle	i. Constant pressure heat addition cycle
B. Otto cycle	ii. Semi-diesel cycle
C. Diesel cycle	iii. Petrol cycle
D. Dual cycle	iv. Reversible cycle

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iv	iii	i	ii

2. Which of the following is not a device for measuring discharge from a pipe? CO4 [K_1]

a) Venturi-meter b) Rotameter

c) Nozzle meter d) Energy meter

3. Work transfer during an adiabatic process is — CO1 [K_1]

1. a point function

2. a path function

3. an exact differential

4. an inexact differential

a) 1,3 b) 1,4

c) 1,2 d) 2,3

4. Pascal's law is only applicable where — CO4 [K_1]

a) Density is negligible b) Viscosity is negligible

c) Surface tension is negligible d) Buoyancy is negligible

5. The following question consists of two statements, Assertion and Reason. While answering these questions choose any of the following four responses. — CO2 [K_2]

Assertion (A): The internal combustion engine does not operate on a thermodynamic cycle as it involves an open system.

Reason (R): The working fluid enters the system at one set of conditions and leaves at another.

a) Both A and R are Individually true and R is the correct explanation of A

b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

6. Efficiency of centrifugal pump is maximum when its blades are — CO5 [K_1]

a) Straight b) Bent forward

c) Bent backward d) Bent forward first and then backward

7. Arrange the following based on refrigerant flow in VCR cycle — CO3 [K_1]

1. Condeser
2. Compressor
3. Expansion valve
4. Evaporator

a) 2-1-3-4 b) 1-3-2-4

c) 3-2-4-1 d) 4-1-3-2

8. For a given heat flow and for the same thickness, the temperature drop across the material will be maximum for — CO1 [K1]

a) Copper b) Steel

c) Glass-wool d) Refractory brick

9. The following question consists of two statements, Assertion and Reason. While answering these questions choose any of the following four responses. CO5 [K_1]

Assertion (A): In reaction turbine, draft tube is used

Reason (R): It is used to convert kinetic energy into flow energy

a) Both A and R are Individually true and R is the correct explanation of A

b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

10. The critical pressure of the water is CO3 [K_1]

a) 374 bar b) 280 bar

c) 200 bar d) 222 bar

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Define the science thermodynamics. CO1 [K_2]
12. List the limitations of first law of thermodynamics. CO1 [K_2]
13. Compare the efficiency of Otto, Dual and Diesel cycle for same compression ratio and heat rejection. CO2 [K_2]
14. Differentiate impulse turbine from reaction turbine. CO2 [K_2]
15. Define volumetric efficiency of compressor. CO3 [K_2]
16. State boiling and condensation temperature of water at 1 atm pressure. CO3 [K_2]
17. Write a short note on capillary raise. CO4 [K_2]
18. List the assumptions made in Bernoulli's equation. CO4 [K_2]
19. Classify hydraulic turbines based on its working. CO5 [K_2]
20. Define priming in hydraulic pump. CO5 [K_2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. A stationary fluid system goes through a cycle comprising three thermodynamics process: an isochoric heat addition of 235 kJ/kg followed by an adiabatic expansion process to its original pressure with a loss of 70 kJ/kg in internal energy and ends with isobaric compression to its original volume with heat rejection of 200 kJ/kg. Prepare a balance sheet of energy quantities. CO1 [K_3]

22.	A turbine operates under study flow conditions, receiving steam at the following state: pressure 1.2 MPa, temperature 188^{o}C, enthalpy 2785 kJ/kg, velocity 33.3 m/s and elevation 3 m. The steam leaves the turbine at the following state: Pressure 20 kPa, enthalpy 2512 kJ/kg, velocity 100 m/s, and the elevation 0 m. Heat is lost to the surrounding at the rate of 0.29kJ/s. If the rate of steam flow through the turbine is 0.42 kg/s, what is the power output of the turbine in kW?	CO1	[K_3]
23.	Classify IC engines and explain the working principle of two stroke petrol engine with neat schematic sketch.	CO2	[K_3]
24.	Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m in diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.	CO3	[K_3]
25.	Explain the working principle of vapour compression refrigeration system with the help of P-V diagram.	CO4	[K_3]
26.	List the types of air-conditioning system and enumerate the working principle of summer air-conditioning system with neat sketch.	CO4	[K_3]
27.	Explain the working principle of centrifugal pump with neat sketch.	CO5	[K_3]

****