

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, November 2016

B. Tech. in Mechanical Engineering, Semester VII

Roll No.....

ME 737: Waste Heat Recovery and Management

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	A major advantage of waste heat recovery in industry is: (a) Reduction in pollution; (b) increase in efficiency; (c) both (a) and (b); (d) None of the above	
ii.	Heat recovery equipment will be most effective when the temperature of flue gas is: (a) 250°C (b) 200°C (c) 400°C (d) 280°C	
iii.	Economizer is provided to utilize the flue gas heat for ----- (a) preheating the boiler feed water (b) preheating the stock (c) preheating the combustion air (d) preheating fuel	
iv.	For every 6°C rise in feed water temperature through an economizer the fuel savings in the boiler is of the order of: (a) 1% (b) 1.5% (c) 3% (d) 2%	
v.	Capillary wick is a part of: (a) heat pump (b) heat wheel (c) heat pipe (d) regenerator	
vi.	Recovery of waste heat from cold fluid to hot fluid is called; (a) thermo compressor (b) waste heat recovery boiler (c) heat pump (d) economizer	
vii.	Exhaust back pressure is the amount of pressure developed in the exhaust system when the engine is; (a) Running (b) Stopped (c) Accelerating (d) Decelerating	
viii.	With increase in percentage of excess air for combustion of a given fuel percentage of oxygen in flue gas (a) increases (b) decreases (c) remains same (d) none of the above	
ix.	Latent heat of steam at critical point is (a) Infinite (b) 540 kcal (c) Zero (d) None of the above	
x.	Higher excess air in an oil fired furnace would result in (a) increases furnace temperature (b) increased heating rate (c) reduced flame temperature (d) None of the above	

Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	List some of the direct and indirect benefits of waste heat recovery systems.	
ii.	What are the advantages of thermoelectric generator?	
iii.	What is the advantage of 'plate heat exchanger' over 'shell and tube heat exchanger'?	

iv.	List at least five applications of 'heat pipe'.	
Q.3A	Explain with a T-S chart the working of a combined cycle (gas turbine-steam turbine) power plant.	05
Q.3B	Explain with a neat sketch the operation of an economizer.	05
Q.4A	Write a note on multi-fluid coupled cycles.	05
Q.4B	Write a short note on 'Spiral plate heat exchanger'.	05
Q.5A	What are the major points to be considered for development of a waste heat recovery system?	05
Q.5B	Explain the concept of low temperature heat recovery from power plants.	05
Q.6A	Explain the operating principle of a waste heat recovery boiler.	05
Q.6B	What are the three most widely accepted technologies for exhaust energy recovery?	05
	OR	
Q.6B	What is incineration?	05
Q.7	Explain the main areas of energy conservation in an apartment building.	10
Q.8	Explain the working principle of MHD generator with a neat sketch.	10
Q.9	Explain the principle of heat pump with the line diagram of heat pump cycle.	10
Q.10	Explain the principle of operation of a heat pipe with a neat sketch.	10

-----ALL THE BEST-----