UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

Course: Energy Management (PSEG 442) **Semester: VI**
Program: B.Tech Mechanical
Time: 03 hrs. **Max. Marks: 100**

Instructions:

SECTION A

S. No.		Marks	CO
Q 1	The annual fuel cost of boiler operation in a plant is Rs.8 Lakhs. The boiler with 65% efficiency is now replaced by a new one with 78% efficiency. What is the annual cost savings?	**5**	**CO2**
Q2	Explain the relationship between Absolute and Gauge pressures. Give 4 different units used in pressure measurement.	**5**	**CO1**
Q3	Describe the following terms. a) Normalizing of data b) Benchmarking	**5**	**CO1**
Q4	Explain how Sankey diagram is useful for energy analysis.	**5**	**CO1**
	SECTION B		
Q1	A tank containing 500 kg of kerosene is to be heated from 10°C to 40°C in 20 minutes, using 4 bar (g) steam. The kerosene has a specific heat capacity of 2.0 kJ/kg °C over that temperature range. Latent heat of steam (hfg) at 4.0 bar g is 2 108.1 kJ/kg. The tank is well insulated and heat losses are negligible. Determine the steam flow rate in kg/hr.	**12**	**CO3**
Q2	A plant is using 6 tonnes/day of coal to generate steam . The calorific of coal is 3300 kcal/kg. The cost of coal is Rs 4200/tonne . The plant substitutes coal with agro-residue , as a boiler fuel, which has a calorific value of 3100 kcal /kg and cost Rs.1800/tonne. Calculate the annual cost savings at 350 days of operation ,assuming the boiler efficiency remains same at 72% for coal and agro residue as fuel.	**12**	**CO3**
Q3	In a textile manufacturing unit, wet cloth is dried in a stenter. The cloth entering the stenter has a moisture of 52% while that leaving the stenter is 96% dry. If the production rate (output) from the stenter is 200 Kg/hr, what is the quantity of steam required per hour, if the steam enters the stenter with an enthalpy of 660 kcal/kg. The condensate leaving the stenter is at 150oC. Consider drying to take place at atmospheric pressure where the latent heat of water is 540 Kcal/Kg.	**12**	**CO2**
Q4	Biscuits are to be baked in a continuous oven. The inlet moisture content is 25%. The outlet is 1%. The production is 2 tonned=s/hour on a dry basis. Make a material balance and find	**12**	**CO4**

	out how much quantity of moisture is removed per hour.		
Q5	The average monthly electricity consumption in an Aluminium producing unit is 12.35 lakh kWh. The other energy sources used in the manufacturing process are Furnace oil (GCV9660 Kcal/Ltr) and HSD (GCV-9410 Kcal/Ltr). If the annual fuel oil consumption is 5760 KL of Furnace oil (sp. gr. 0.92) and 500 KL of HSD (sp. gr. 0.88), determine total energy consumption?	**12**	**CO3**
SECTION-C **There is internal choice. Either do Q.No. of 20 Marks or do (a) & (b) of 10 marks each.**			
Q1	An integrated paper plant has produced 134241 MT of paper during the year 2012-13. The management has implemented various energy conservation measures as part of PAT scheme and reduced the specific energy consumption from 53 GJ/ tonne of product to 49 GJ/tonne of product. The actual production during the assessment year (2014-15) is 124141 MT. Calculate the plant energy performance and state your inference.	**20**	**CO4**
	OR		
Q1	(a) Explain the difference between preliminary and detailed energy audits?	**10**	
	(b) Explain the implications of part load operation of energy equipment with examples.	**10**	