The Open University of Sri Lanka
Faculty of Engineering Technology

00024

Study Programme	:	MASTER OF TECHNOLOGY IN INDUSTRIAL ENGINEERING
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX 7125 – ENERGY MANAGEMENT IN INDUSTRIES**
Academic Year	:	2012/13
Date	:	22nd August 2013
Time	:	0930 hours -1230 hours
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of 6 questions.
3. Answer only five (05) questions. Question No 6 is compulsory

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Q1.

In the combustion of fuel for energy there are three key parameters considered as important determinants of efficient combustion. They are;

i) Temperature
ii) Turbulence
iii) Time

They are normally referred to as 3Ts in the subject of fuel combustion. Answer the following questions.

a) Explain the above three parameters and discuss how they influence the combustion efficiency of a fuel.

(9 marks)

b) Discuss options you would suggest to improve "turbulence" in the case of combustion of fire wood as a fuel for energy.

(9 marks)

Q2.

Write short notes on four (04) of the following.

1. Specific energy consumption
2. Variable speed drive (VSD)
3. Equilibrium moisture content
4. Housekeeping measures in energy efficiency
5. Energy audit

(4.5 marks each)

Q3.

a) 'Energy Labelling' is one of the Demand Side Management initiatives undertaken by the government. Discuss in detail how consumers and the government could be benefited by this initiative.

(9 marks)

b) Explain the term "Best Practices" as applied to energy efficiency.
Discuss best practices that you can consider applying to improve energy efficiency in air conditioning in a building.

(9 marks)

Q4.

"Life styles and attitudinal behaviour of people are two key determinants of overall energy efficiency of a country". Discuss this statement critically. With respect to Sri Lanka, give a few practical examples of life styles and attitudinal behaviours of people that can have positive impact on energy efficiency.

(18 marks)

Q5.

a) Explain the role of an Energy Manager in an organisation.

(5 marks)

b) One of his main tasks would be to TAKE CONTROL OF ENERGY USAGE in the organisation. Discuss in detail the actions and strategic moves the energy manager should take in achieving this objective.

(13 marks)

Q6. (Compulsory question)

Table 1 below gives the details of electricity consumption of an industrial organisation taken from CEB electricity bills. Table 2 below shows the firewood consumption for a boiler in the same industry and taken from daily log sheet.

Electricity supply is charged according to industrial tariff I-2, as follows.

Peak consumption	- at Rs.21.00 per kWh
Day consumption	- at Rs. 11.30 per kWh
Off Peak consumption	- at Rs. 7.00 per kWh
Maximum demand charge	- at Rs. 1,100 per kVA
Fix charge	- at Rs. 3,000 per month
Fuel adjustment charge	- at 15% of energy charge

And
Cost of firewood is Rs. 1,250 per Yard.

Answer the following questions.

a) Calculate the total yearly energy cost of the organisation, giving separately the contribution from each source.

(10 marks)

b) Calculate the share of each energy source of the total energy consumption.

(18 marks)

Tip: Convert energy consumed by both sources into common energy units. 00024

Use following data where necessary for your computations.

1 kWh of electricity = 3.6 MJ

Calorific value of firewood = 13 MJ/kg

1 Yard of firewood = 275 kg

Table 1: Electricity Consumption from National Grid

Year	Month	kVA	kWh		
			Peak	Day	Off Peak
2012	January	139	9,772	30,140	18,565
	February	136	9,726	29,938	17,880
	March	148	11,233	34,557	22,098
	April	177	9,140	29,028	19,242
	May	176	9,885	29,794	18,908
	June	129	8,513	24,888	14,556
	July	140	9,025	26,860	16,770
	August	137	12,045	37,494	21,197
	September	168	9,883	31,201	20,012
	October	145	9,871	29,046	18,967
	November	160	11,279	37,779	24,237
	December	158	11,210	35,278	21,344

Table 2: Firewood consumption

Year	Month	Consumption
		Yards
2012	January	421.50
	February	357.75
	March	417.25
	April	410.50
	May	475.75
	June	414.25
	July	469.75
	August	395.75
	Sepember	495.50
	October	555.50
	November	711.25
	December	712.00

END