B.E DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2011

MECHANICAL ENGINEERING – 8th SEMESTER

REGULATION : 2004

ME514 ENERGY CONSERVATION & MANAGEMENT

Time : 3 h Max Marks : 100

Assume relevant data, if information provided is insufficient

Answer ALL Questions

Part A 10x2=20

1. Present the sector wise consumption of oil in India
2. List atleast 4 energy intensive Industries, specified as designated consumers, in the Energy Conservation Act of GoI
3. Mention the need for energy and material balance
4. How specific energy audit is different from detailed energy audit?
5. Distinguish short and long TR
6. Present the advantage of walking beam furnaces over recirculating bogie type furnaces
7. Compare economic thickness of insulation vis-à-vis critical thickness of insulation
8. Does addition of capacitors reduces energy consumption?
9. What is the drawback of SPB period?
10. A Project cost Rs. 1,00,000 and yields an annual cash inflow of Rs. 20,000 for 8 years. Calculate the ARR.

Part B 5x16=80

11. (a) (i) Compare the merits and demerits of renewable and non-renewable sources of energy (6)

(ii) Describe the Greenhouse effect and what does the term CO_2 equivalent mean? (6)

(iii) List the greenhouse gases and which among them produces the maximum green house effect? (4)

12. (a) (i) List the barriers for energy auditing (8)

(ii) Detail on the methodology being adopted for carrying out detailed energy auditing (8)

(or)

(b) (i) Present the role of energy managers (8)

(ii) Prove : "Energy cost for any electrical gadget contributes to more than 90% of

13(a) (i) Why indirect Method is preferred for computing boiler efficiency (4)

(ii) During the test of an oil fired water tube boiler, the following observations were noted : (12)

Steam Pressure = 16 bar (abs); water evaporated per minute = 282.85 kg; feed water temperature = 76°C; steam quality = 99% dry; fuel oil consumption rate = 22.45 kg per minute; heating value of fuel oil = 44,966 kJ/kg.

Calculate : Actual evaporation per kg of fuel oil, Factor of evaporation and Boiler Efficiency

(or)

(b) (i) In a brewery chilling system, ethylene glycol is used a secondary refrigerant The designed capacity is 40 TR. The observations made on the performance study is presented below (12)

Temperature of ethylene glycol entering evaporator = (-) 1°C

Temperature of ethylene glycol leaving evaporator = (-) 4°C

Flow rate of ethylene glycol = 13200 lph

Power input to compressor = 39.5 kW

Specific heat capacity of ethylene glycol = 9.8 kJ/kg°C

Determine (i) Actual refrigeration effect (ii) COP (iii) EER

(ii) What is static, dynamic & total pressure and how these are used for performance evaluation of fans & blowers (4)

14(a) (i) With a neat sketch compare the working principle, advantages and drawbacks of Float coupled thermostatic and Thermodynamic steam traps (8)

(ii) List atleast 8 guidelines for proper drainage and layout of steam supply network (8)

(or)

(b) (i) Following were the observations during compressor trial in a textile plant: (12)

Receiver capacity : 10 m^3

Initial pressure : 0.2 bar and Final pressure : 6.0 bar

Additional hold-up volume : 1.2 m^3

Compressor pump-up time : 4.26 minutes

Motor power consumption (avg.) : 98.6 kW

Calculate the operational capacity of compressor & specific power consumption (neglect temperature correction)

(ii) Explain how the efficacy of Intercooler affect the power consumption in a

15. (a) Three mutually exclusive projects A,B and C have been proposed. Each projects require investment worth Rs. 2,00,000 and have an estimated life of 5 years, 4 years & 3 years respectively. After its life cycle, the salvage value of the projects is observed to be zilch. The company's required rate of return is 10 %. The anticipated cash flows after taxes (CFAT) for the three projects are as follows

Year	CFAT for Projects (Rs.)		
	A	B	C
1	50,000	80,000	1,00,000
2	50,000	80,000	1,00,000
3	50,000	80,000	10,000
4	50,000	30,000	-
5	1,90,000	-	-

Rank each project applying the methods of SPB, ARR, NPV & IRR

(or)

(b) Compare the project acceptance criteria, merits and demerits of the following financial appraisal techniques:

Simple payback period, Net Present Value,

Average Rate of Return & Internal Rate of Return