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B.E / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2012

MECHANICAL ENGINEERING BRANCH

EIGHTH SEMESTER

33

ME 9021 – ENERGY CONSERVATION AND MANAGEMENT

(REGULATIONS 2008)

Time : 3 hr

Max Mark : 100

Answer ALL Questions

PART - A (10 x 2 = 20 Marks)

- 1) Name Primary Energy Sources and Secondary Energy Sources.
- 2) Write the tons of oil equivalent (toe) of 1 million kWh of electricity.
- 3) Name 4 problems that can arise due to harmonic current experienced in utilities.
- 4) Define Power Factor with a vector sketch.
- 5) Explain the terminology : F & A 100°C while specifying the boiler rating.
- 6) What is Pinch Point ?
- 7) How Fans and Blowers are differentiated ?
- 8) Define Specific Humidity and Relative Humidity.
- 9) How Discount Rate is fixed in IRR analysis?
- 10) Name 2 major disadvantages of a Payback Period Analysis.

PART - B (5 x 16 = 80 Marks)

- 11) Write on the following
 - (i) Scope and objective of Preliminary and Detailed Energy Auditing (6)
 - (ii) Administered Praising Mechanism (APM) with reference to Conventional fuels (4)
 - (iii) Energy Accounting with reference to Energy Share and Cost Share in a production unit (6)
- 12) a) (i) A transformer (315 kVA) has a No Load Loss of 1.2 kW and a Full Load Loss of 6.2 kW. Estimate the maximum efficiency achievable in the transformer and the corresponding load. (6)
- (ii) The nameplate details of a 3 ϕ squirrel cage induction motor are as follows: (10)
 - 415 V, 15 amps, 7.5 kW, 4 pole, 50HZ, 0.80 PFThe data measured when the motor was in operation is as below :
 - 410 V, 9.3 amps, 49.8 HZ, 1470 rpm, 0.78 PFNo Load Test data : 410 V, 5 amp, 0.2 PF, Ω stator of 30°C = 0.24 Ω
Stator temperature : 100°C, Stray Loss = 4 % of motor rated output
Estimate the Slip and Full Load Efficiency of the motor

(or)

- b) Write Notes on : (16)
- (i) Peak Clipping & Valley Filling w.r.t Demand Side Management
 - (ii) Variable Frequency Drives – Its operating principle & usefulness
 - (iii) Working Principle of an LED Lamp
 - (iv) Capacitors
- 13) a) (i) Name 6 major losses that occur in a boiler operation and indicate the methods to control them. (12)
- (ii) Write on the need : "Blow Down" and "Superheated Steam" in a boiler (4)
- (or)
- b) (i) Name 4 functions of a steam trap and describe (6)
- (ii) Enumerate Heat Exchanger Networking (6)
- (iii) Write on "Flash Steam Generation" in a boiler (4)
- 14) a) (i) A centrifugal fan has a circular inlet duct (450 mm dia) and rectangular outlet duct [450 x 375 mm]. Static pressure at fan inlet is - 12.5 mm WC and that at fan outlet is 25 mm WC. Airflow is 115 m³/ min. Estimate the total pressure developed by the fan and the overall efficiency. (8)
- (ii) List ENCON opportunities (atleast 5) available in a Pumping System (8)
- (or)
- b) (i) Write Notes on : (9)
Heat Wheel, Recuperator and Regenerator
- (ii) Write down the equation for estimating "Air Leakage" in an Air Compressor System and explain (5)
- (iii) A DG Set consumes 316 ml of HSD to produce 1 kWh. Estimate the operating efficiency (CV of HSD = 40 MJ / lit) (2)
- 15) a) (i) What are the advantages of Discounted Cash Flow method ? (8)
- (ii) What is the role of a ESCO ? (4)
- (ii) Write on Performance Contracting (4)
- (or)
- b) (i) Define : Energy Resource Management (5)
- (ii) What are the prerequisites for a successful Energy Management Programme ? (6)
- (iii) Enumerate : Performance and Energy Benchmarking (5)