

End Semester Examinations - 2015-16 Even Semester - May 2016

14EE2018 Energy Systems

Set B

Time : 3 hrs
Total Marks: 100

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1. A) A domestic lighting installation having sixteen, 60 Watt lamps is operated as follows: (10)
- 7 lamps from 6 p.m till 8 p.m
- 12 lamps from 8 p.m till 10 p.m
- 8 lamps from 10 p.m to 12 p.m
- Determine the connected load, the maximum demand, the demand factor and the daily load factor.
- B) Draw and explain the construction and working of Horizontal Axis Wind Turbine (HAWT). (10)
- OR**
2. A) Give a neat diagram for a central tower receiver power plant and explain its operation. (10)
- B) With help of neat diagram, explain the working of standalone solar PV system. (10)
3. A) With help of neat diagram, explain the general working of dry-steam hydrothermal system in geothermal energy. (10)
- B) Explain the ten step methodology for Detailed Energy Audit with Plan of Action and Purpose/Results. (10)
- OR**
4. A) A 5Hp Induction Motor, Voltage is 415V, Current is 7.8A and Frequency is 50Hz. During energy auditing, it is observed that the I_{THD} is 24%. Calculate the excess current drawn by motor and also discuss the effects due that excess current in motor and give your suggestions to reduce the I_{THD} . (10)
- B) List down the important factors to be considered while selecting a site for thermal power plant. (5)
- C) Bring down the effects of distributed generation on power system operation. (5)
5. A) Discuss the fixed cost components like capital cost, Interest on capital, Salaries and Depreciation. (10)
- B) The utility bill shows an average power factor of 0.72 with an average kW of 688. How much kVAr is required to improve the power factor of 0.95? Calculate the savings after added the kVAr, if the Electricity board charging the penalty of Rs. 210/- for every reducing 0.1 power factor from 0.95. (10)
- OR**
6. A) State Inverse Square Law with neat diagram and equation. (5)
- B) Draw the voltage and current sinusoidal waveform for Inductive and Capacitive load and also represent the V_m , I_m and Phase difference. (5)
- C) Discuss the functions of Maximum Demand Controller and Energy Efficient Lighting Control. (10)
7. A) A 20kW single phase, 220V resistance oven employs circular nichrome wire for its heating element. If the wire temperature is not exceeding 1137°C and the temperature of charge is to be 425°C , calculate the size and length of the wire required. Assume $e=0.9$, $k=0.6$ and $\rho=1.09 \times 10^{-6}$ ohm/m. What would be the temperature of wire when the charge is cold? (15)
- B) List down the requirements of Ideal Traction system. (5)
- OR**
8. A) An illumination on the working plane of 35 lux is required in a room 5m x 5m. Assume utilization factor 0.6, lamp efficacy of 15 lumens per watt, rating of lamp is 115W. Calculate: (10)

1. Lumens required
2. Number of lamps required
3. Average Illumination (Assume $M=0.8$)
4. Draw the arrangements of lamps for given area.

B) With neat diagram, explain the Ajax-Wyatt Core type Induction furnace. (10)

9. A) Discuss the mechanism of Train Movement in Electric Traction. (5)

B) Derive the tractive effort during acceleration, gradient, resistance and also calculate net tractive effort for propulsion of trains. (15)

Wishing you All the Best
