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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Electrical & Electronics Engineering **Duration: 3 hrs.**
Course Code: 19EE5PE1EA **Max Marks: 100**
Course: Electrical Energy Conservation and Auditing **Date: 03.03.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Define i) Demand factor **08**
ii) Plant use factor
iii) Load Curve
iv) Load Factor

b) Annual consumption of consumer energy is 60,000 kWh, the charge is Rs. 110/kW of maximum demand plus 6 paise per kWh. **05**
(i) Determine the annual bill and the overall costs per kWh if the load factor is 50%.
(ii) What is the overall cost per kWh if consumption was reduced by 30% with the same load factor?

c) Describe the Power tariff types with its advantages and Disadvantages **07**

OR

2 a) A generating station has a maximum demand of 10MW and the daily load on the station is as follows: **08**

Time	KW
11 PM-6AM	2000
6 AM-8AM	3500
8 AM-12 Noon	8000
12 Noon-1 PM	3000
1 PM-5 PM	7500
5 PM-7 PM	8500
7 PM-9 PM	10000
9 PM- 11 PM	4500

Choose the size and number of generator units. What reserve plant would be necessary. Find the load factor, plant factor and plant use factor of the station. Also draw up the operating schedule.

b) Explain the Classification of Energy sources. **06**

c) Explain the current status of energy supply and demand in India and list the major power crisis issues. **06**

UNIT - II

3 a) Define Energy Management. What is the importance and role of energy management? **10**

b) Describe the various principles of energy conservation. **05**

c) Explain the environmental consideration strategy for energy conservation and importance of global need to save energy. **05**

UNIT - III

4 a) Conservation of energy has become a necessity in recent years. Justify this Statement and list out the objectives of energy conservation. **06**

b) Analyse the power consumption and savings for the following data: **06**

i) Total number of T12Tube lights with 80W is: 8 no.and 3 hours daily usage.

ii) Total number of Ceiling fans with 90W rating is 6 no. and 12 hours daily usage.

iii) Refrigerator (Single door), 230 litres capacity=800W and 24 hours daily usage

iv) Other Appliances: Mixer=500W and 2hrs daily usage.

By using Energy Efficient Equipment

i) Total number of T5Tube lights with 20W is: 8 no. and 3 hours daily usage.

ii) Total number of Energy Efficient Ceiling fans with 45W rating is 6 no. and 12 hours daily usage.

iii) Refrigerator reduce the number of openings of fridge door and using Energy Efficient (5 star rating) = 600W and 24 hours daily usage.

iv) Other Appliances: Mixer=250w and 2hrs daily usage.

Find the total energy savings in number of units.

c) Small-scale industry and the transport sector consume energy in various capacities. To optimize the use of electrical energy, energy conservation plays an important role. Justify that the technologies employed in these sectors contribute to substantial energy conservation. Mention what percentage of energy can be saved by implementing these technologies? **08**

UNIT - IV

5 a) Explain the various methods adopted for energy audit in HVAC system. . List the types of heat recovery system and Explain any one type. **10**

b) Why energy audit is necessary and what are their types. Explain any one in detail. **10**

OR

6 a) Explain Instruments used in Energy Audit. **10**

(i) Electric Power meter

(ii) Speed Measurement device

b) Analyse the power consumption and savings for the following Domestic sector: **06**

i) Heating: Electric Iron 1300W, 3 hours daily usage.
ii) Entertainment: Television=300 W, 13 hours daily usage.
iii) Water Pump 1 HP=1000W and 2 hours daily usage
iv) Air conditioner 1.5 Ton=2500W and 7hrs per day.

By using Energy Efficient Equipment

i) Heating: Electric Iron 900W, 3 hours daily usage.
ii) Energy efficient Plasma TV, 120W, 13 hours daily usage.
iii) With controllers and sensors in water pump = 600W , 2 hours daily
iv) 5 star AC=1500 W and 7hrs per day.

c) List the duties and roles of the Energy management team. **04**

UNIT - V

7 a) Illustrate Demand side management through Time of day and power factor tariff options. **08**

b) The total demand of an area keeps changing depending on the time of day. With the help of load management concept, explain the various load Control techniques adopted for the same. **07**

c) What are the factors that influence customer acceptance of Demand side management? **05**

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