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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: V**
Branch: Electrical & Electronics Engineering **Duration: 3 hrs.**
Course Code: 19EE5PE1EA **Max Marks: 100**
Course: Electrical & Energy Conservation & Auditing **Date: 12.09.2023**

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) What are the types of Conventional and Alternate energy sources? As per recent data of 2022, What is the Per capita energy consumption of India and US. **06**

b) Compute the monthly bill and unit energy cost for a total consumption of 1250 kWh and a maximum demand of 12 Kw using Hopkinson demand rate quoted as follows: **08**

Maximum Demand Rates:
First kilo-watts of maximum demand Rs.17 per kW per month.
Next 5 kW of maximum demand at Rs.13 per kW per month.
Last 6 kW of maximum demand at Rs. 10.5 per kW per month.

Energy Rates:
First 50 kWh at 22 paise per kWh.
Next 50kWh at 17 paise per kWh.
Next 350 kWh at 11 paise per kWh.
Next 300 kWh at 9.5 paise per kWh.
Excess over 750 kWh at 5.5 paise per kWh.
Find the electricity bill.

c) The annual peak load on a 50MW power station is 45MW. The power supplies loads having maximum demands of 18MW, 5MW, 13.5MW, 10.5MW. The annual load factor is 45%. **06**
Find:
i)Average load ii) Energy supplied per year
iii) Diversity factor iv) Demand factor

OR

2 a) A residential consumer uses the electricity during a day as follows: **07**
12 midnight to 5am : Two fan and Two light point,
5am to 7am: One bulb, 2 fans and one light point,
7am to 9am : Three bulbs and Two fan,
9am to 6pm: one fan and Six bulbs,
6pm to midnight: 2 fans and 4 bulbs.
He has the following connected load: 8 bulbs of 100W each, 2 fans of 60W

each, 2 light plug point of 100W each.
Find i) Connected load ii) Maximum Demand iii) Demand factor
iv) Energy connected during 24hrs v) Energy consumed in 24 hrs if all the devices are used all the day.

b) Define Tariff. Briefly explain the types of Tariff. **06**

c) An industrial consumer has an annual energy consumption of 200500kWh at a load factor of 0.45. **07**
The tariff is Rs.4600+ Rs 1225 per kW of M.D. + Rs.1.75 per kWh.
a) Find the annual bill
b) What is the bill if total energy consumption is same but L.F is improved to 0.65
c) What is the bill if total energy consumption is reduced by 25% but L.F is same as initial value of 0.45
d) Find average energy cost in each case.

UNIT - II

3 a) As an energy manager, what methods will you suggest for principles of Energy conservation, Energy outages in India – Issues and Remedy? **10**

b) What are the Environmental considerations strategy, techniques, importance, global need to save energy. Explain briefly. **10**

UNIT - III

4 a) As an energy manager, what methods would you suggest for successful implementation of Energy Conservation in Small Scale Industries? What is the probable percentage saving after adopting the measures suggested by you? **08**

b) Analyze the power consumption and savings for the following: **07**
i) Total number of Ceiling fans with 60w rating is 4 no. and 5 hours daily usage.
ii) Total number of T12Tube lights with 100w is: 9 no. and 8.5 hours daily usage.
iii) Entertainment: Television=180w, 4 hours daily usage.
iv) Water pump 1 HP (750 w) 1.5 hours daily
v) Desktop computer=250w, 8 hours daily usage

By using Energy Efficient Equipment
i)Total number of Energy Efficient Ceiling fans with 40 w rating is 4 no.and 5 hours daily usage
ii) Total number of T5Tube lights with 40w is: 9 no.and 8.5 hours daily usage.
iii) Energy efficient Plasma TV, 126w, 4 hours daily usage.
iv) Desktop computer by laptop =65w, 8 hours daily usage.

Find the total energy savings in number of units

c) As an energy manager, what methods and techniques would you suggest to implement Energy Conservation in domestic sector? **05**

UNIT - IV

5 a) As an energy manager, what are your duties towards execution of energy audit of a plant for successfully completing a plant audit? **10**

b) Analyze the power consumption in home: **05**
i) Total number of T12Tube lights with 55w is:5no, 6hours daily consumption

ii) Total number of Ceiling fans with 80w rating is 4 with 9 hours daily usage
iii) Washing Machine=1500w, 1.5hrs daily
iv) Other Appliances: Mixer=200, 1hrs perday.

Replaced by energy efficient equipments

i) if we replace regular lighting with T5 or Fluorescent lamps then, 21w, 5no, 6hrs daily
ii) In Ceiling Fans if we replace with Energy Efficient Fans then, 65w, 4no, 9hrs daily
iii) Energy efficient Washing machine=800 w for 1.5 hrs per day

Find the energy savings.

c) What are the various instruments used in energy audit of **05**
i) Humidity ii) Illumination and iii) Chemical measurements?

OR

6 a) What are the factors involved in Considerations in Implementing Energy conservation programs? How is Periodic progress review helpful for optimization of energy use? **10**

b) Explain the energy audit of heating, Ventilation, Air-condition systems. Also explain the methods adopted heat recovery for the same. **10**

UNIT - V

7 a) Load management as a DSM strategy is very much useful for any consumer. As an energy manager what clarity would you give to your clients on load management? **07**

b) What is Green energy concept? How can it help in establishing the versatility of energy conservation for Developing the society. **05**

c) Justify that all the techniques used for application of load control helps in energy conservation. Explain the techniques briefly. **08**

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