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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: VII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 19EE7OE2EC **Max Marks: 100**
Course: Electrical Power and Energy Conservation **Date: 22.02.2023**

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) Management of electrical energy supply and demand in India has been a great challenge from recent past. What are the main reasons/challenges related to incapability to meet energy supply and demand in India? What initiatives have been take up recently to solve these issues? **08**

b) Every country specifies the index of standard of living of people. What is it called and mention its significance. As per recent data of 2022-23, what is it for India and France? Enumerate with examples what measures are taken by the government and people of India to adopt effective use of energy. **07**

c) Define the following **05**
i)Maximum Demand ii) Demand factor iii) Load Factor

UNIT - II

2 a) A residential consumer uses the electricity during a day as follows: **07**
12 midnight to 5am : One bulb, Two fan and Two light point,
5am to 7am: 2 fans and one light point,
7am to 9am : Three bulbs and one fan,
9am to 6pm: one fan and 2 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 mention objectives of Tariff and its importance for various sector of consumers. **06**

c) Compute the monthly bill and unit energy cost for a total consumption of 1600 kWh and a maximum demand of 16 kW using Hopkinson demand rate quoted as follows: **07**
Maximum Demand Rates:

First kilo-watts of maximum demand Rs.72 per kW per month.
Next 6 kW of maximum demand at Rs.11 per kW per month.
Last 9 kW of maximum demand at Rs. 9.5 per kW per month.
Energy Rates:
First 50 kWh at 18 paise per kWh.
Next 50 kWh at 15 paise per kWh.
Next 300 kWh at 9 paise per kWh.
Next 500 kWh at 6.5 paise per kWh.
Excess over 900 kWh at 5.5 paise per kWh.
a) Find the electricity bill.

OR

3 a) What are the various typical energy consumers sectors? Draw the typical load curve of various energy sectors and explain briefly. Mention the typical Demand factor for each type of consumer. **08**

b) An industrial consumer has an annual energy consumption of 200510kWh at a load factor of 0.55. **08**
The tariff is Rs.4800+ Rs 1135 per kW of M.D. + Rs.2.10 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 30% but L.F is same as initial value of 0.55
d) Find average energy cost in each case.

c) A power station has to supply three regions of load whose peak loads are 20MW, 25MW and 15MW. The annual load factor is 55%. **04**
Determine the station Maximum Demand if the diversity factor of the load at the station is 1.5. Also find Average Load.

UNIT - III

4 a) Analyze the power consumption and savings for the following: **07**
i) Total number of Ceiling fans with 75w rating is 4 no. and 5 hours daily usage.
ii)Total number of T12Tube lights with 60w is: 9 no. and 8.5 hours daily usage.
iii) Entertainment: Television=180w, 5.5 hours daily usage.
iv) Water pump 1 HP (746 w) 1.5 hours daily
v) Desktop computer=250w, 11 hours daily usage

By using Energy Efficient Equipment

i)Total number of Energy Efficient Ceiling fans with 50 w rating is 4 no.and 5 hours daily usage
ii) Total number of T5Tube lights with 20w is: 9 no.and 8.5 hours daily usage.
iii) Energy efficient Plasma TV, 126w,5.5 hours daily usage.
iv) Desktop computer by laptop =65w, 11 hours daily usage.
Find the total energy savings in number of units

b) As an energy manager, what methods and techniques would you suggest and implement for Energy Conservation Planning? **08**

c) As an energy manager, what methods would you suggest for successful implementation of Energy Conservation in Cement factories? What is the probable percentage savings after adopting the measures suggested by you? **05**

UNIT - IV

5 a) HVAC system may consume huge amount of energy especially in areas having adverse climate conditions. What methods of energy audit would you suggest for such systems? Also what techniques would you suggest for possibility of recovering energy from HVAC systems? **10**

b) Analyze the power consumption in home: **05**

i) Total number of T12Tube lights with 55w is:4no, 4hours daily consumption

ii) Total number of Ceiling fans with 80w rating is 4 with 12 hours daily usage

iii) Washing Machine=1500w, 2hrs daily

iv) Other Appliances: Mixer=200, 2hrs perday.

Replaced by energy efficient equipments

i) if we replace regular lighting with T5 or Fluorescent lamps then, 21w, 4no, 4hrs daily

ii) In Ceiling Fans if we replace with Energy Efficient Fans then, 65w, 4no, 12hrs daily

iii) Energy efficient Washing machine=800 w for 2 hrs per day

Find the energy savings.

c) What are the methods adopted for energy audit for an Illumination system? **05**

OR

6 a) With the help of a block diagram explain the energy audit of a compressed air system. Also explain the evaluation methods adopted for the same. **08**

b) As an energy manager, what are your duties towards execution of energy audit of a plant for successfully completing a plant audit? **07**

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

UNIT - V

7 a) Justify that all the techniques used for application of load control helps in energy conservation. Explain the techniques briefly. **07**

b) 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**

c) What are the factors that influence the customer's willingness participation for successful implementation of DSM? **06**

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