Course Name:	**Elements of Electrical and Electronics Engineering**	**Semester:**	**I**
Date of Submission:	**01/ 02/ 2022**	**Batch No:**	G3
Faculty Name:	Seema Talmale	**Roll No:**	16010421063
Faculty Sign & Date:		**Grade/Marks:**	**/ 20**

Internal Assessment: 2

Case study on Electricity consumption and billing of a home

1. What is electrical power and energy? What are their units?

1) Electric power is the rate, per unit time, at which electrical energy is transferred by an electric circuit Or Electric power is the rate at which work is done or energy is transformed into an electrical circuit.
2) The SI unit of power is the watt, one joule per second. Electrical energy is energy derived from electric potential energy or kinetic energy. When used loosely, electrical energy refers to energy that has been converted from electric potential energy.
3) This energy is supplied by the combination of electric current and electric potential that is delivered by an electrical circuit . Once converted from potential energy, electrical energy can always be called another type of energy.
4) Electrical energy is usually sold by the kilowatt-hour. Units of Electric Power are Watt (SI Unit), VA, kW, Joule per second, Horsepower(1HP=746 W)etc.
5) A body is said to have the power of 1 watt if it does work at the rate of 1 joule in 1 s. Electrical energy is the energy derived from electric potential energy or kinetic energy of the charged particles. In general, it is referred to as the energy that has been converted from electric potential energy. We can define electrical energy as the energy generated by the movement of electrons from one point to another. The movement of charged particles along/through a medium (say wire) constitutes current or electricity.
6) The basic unit of electrical energy is the joule or watt-second. An electrical energy is said to be one joule when one ampere of current flows through the circuit for a second when the potential difference of one volt is applied across it. The commercial unit of electrical energy is the kilowatt-hour (kWh) which is also known as the Board of trade unit (B.O.T).

1 kwh = 1000 × 60 × 60 watt – second 1
kwh = 36 × 10^5 Ws or Joules

Generally, one kwh is called one unit.

2. What is 1-unit electrical energy?

1 unit of electrical energy is equal to 1 kWh. For example, if an electrical appliance of power 1000 watt is operated on mains for 1 hour, it will consume 1 unit of electricity. It is commercially known as 'unit'. It is also called B.O.T. (Board of Trade Unit).

1kWh = 1000Wh.

1kWh = 1000 x 60 x 60 W second.

1kWh = 3600000 W second.

1kWh = 3.6×10^6J.
1kWh = 3.6 MJ.

3. Estimate the electricity consumption of your home for two months (units/month) **December 2021 & January 2022. (Following table is applicable as per actuals)**

December 2021-

Sr. No.	Appliances	Power Rating (watts/appliance) (a)	No of appliances (b)	Utilization in Hours per day (c)	Energy in Wh/1000 (units)/day (d=axbxc)/1000	Energy units/month dx30
1	Lights	38	2	6	0.456	13.68
2	Lights	15	4	6	0.36	10.8
3	Fans	75	4	8	2.4	72
4	Air conditioners	940	2	1	1.88	56.4
5	Washing Machine	300	1	1	0.3	9
6	Electric water heaters (Geysers)	2000	1	0.3	0.6	18
7	Mixer	700	1	0.3	0.21	6.3
8	Electric Iron				0	0
9	Microwave Oven	1350	1	0.3	0.405	12.15
10	Television	80	1	3	0.24	7.2
11	Freeze	250	1	24	6	180

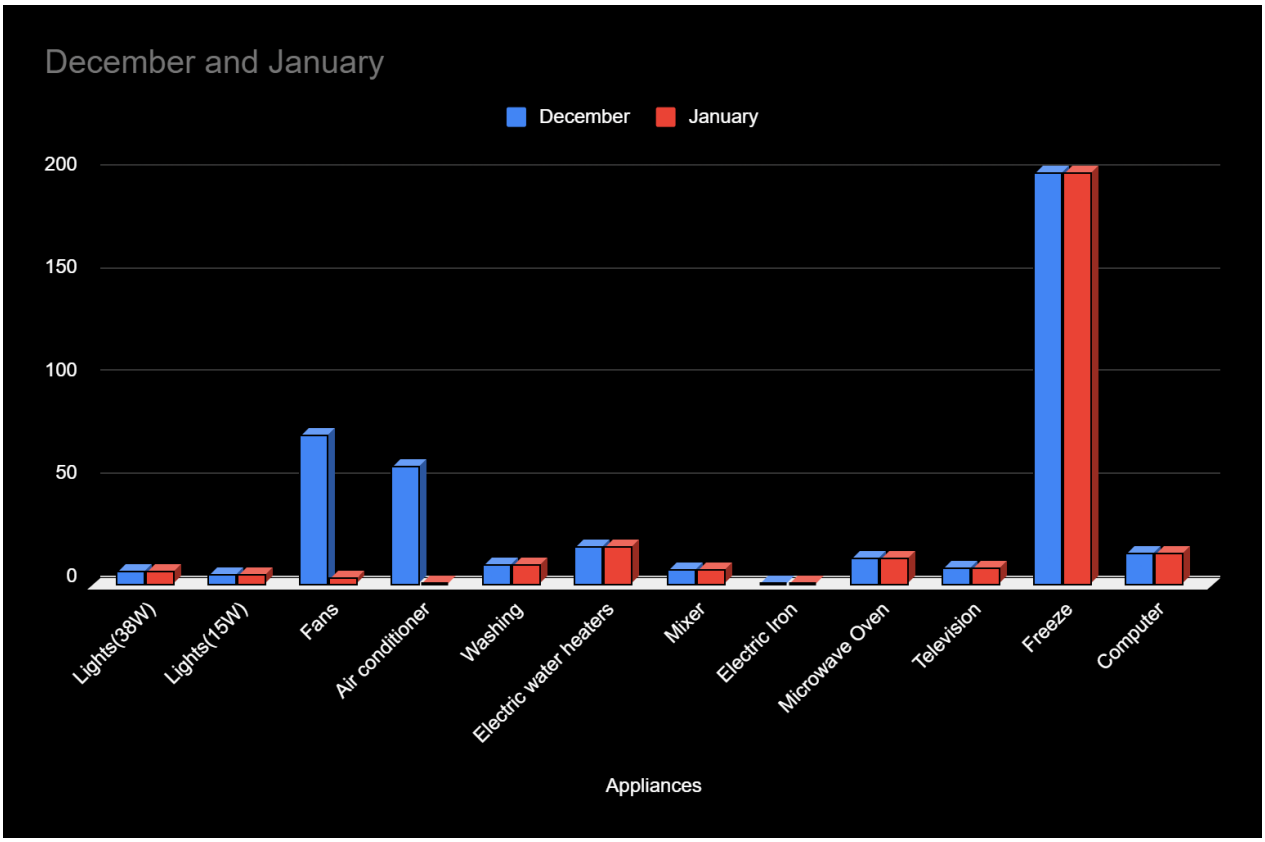
12	Computer	30	2	8	0.48	14.4
					Total energy (Units/month)	399.93

January 2022-

Sr. No.	Appliances	Power Rating (watts/appliance) (a)	No of appliances (b)	Utilization in Hours per day (c)	Energy in Wh/1000 (units)/day (d=axbxc)/1000	Energy units/month dx30
1	Lights	38	2	6	0.456	13.68
2	Lights	15	4	6	0.36	10.8
3	Fans	75	4	0.3	0.09	2.7
4	Air conditioners	940	0	1	0	0
5	Washing Machine	300	1	1	0.3	9
6	Electric water heaters (Geysers)	2000	1	0.3	0.6	18
7	Mixer	700	1	0.3	0.21	6.3
8	Electric Iron				0	0
9	Microwave Oven	1350	1	0.3	0.405	12.15
10	Television	80	1	3	0.24	7.2
11	Freeze	250	1	24	6	180
12	Computer	30	2	8	0.48	14.4
					Total energy (Units/month)	274.23

Plot a bar Graph showing appliances on x-axis and energy (units/month/appliance) on Y –axis. Draw the graph for both the months (Use can Microsoft Excel to plot graphs)

e.g.



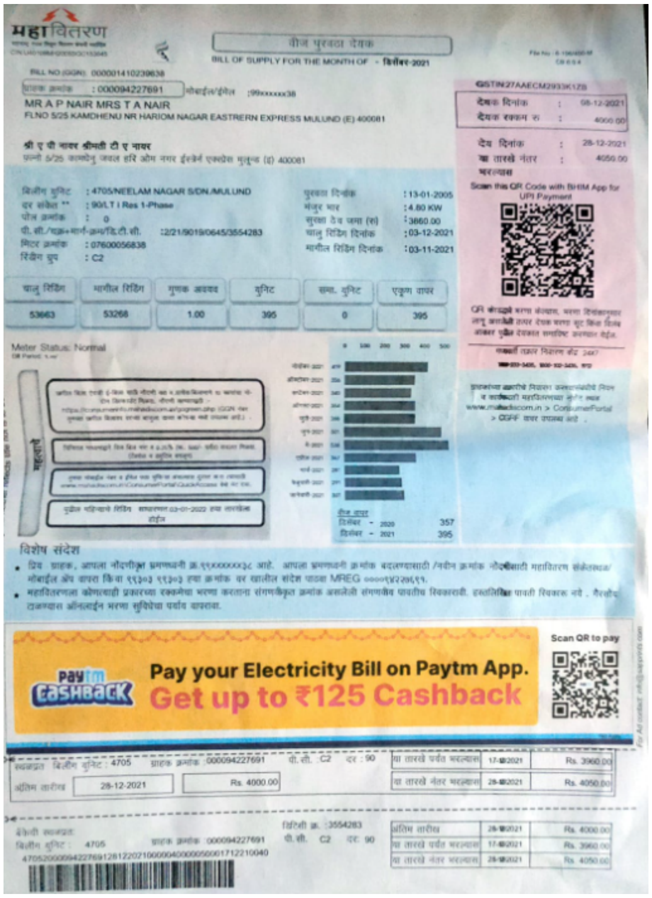
4. Compare actual electricity units and bills (Rupees) with your estimation (Use electricity bill of the recent month of your home. Attach copy of the same with assignment)

December 2021-

Energy consumption	Energy units/month	Billing Rate Rs./Unit	Total (Rs)
Estimated	399.93	10.25316456	4100.54810248
Actual	395	10.25316456	4050

January 2022-

Energy consumption	Energy units/month	Billing Rate Rs./Unit	Total (Rs)
Estimated	274.23	10.25316456	2811.72531729
Actual	270	10.25316456	2768.35443



महावितरण

वीज पुरवठा देयक

BILL OF SUPPLY FOR THE MONTH OF - डिसेंबर-2021

BILL NO.(GGN): 000001410239638

ग्राहक क्रमांक : 000094227691 मोबाईल/ईमेल :99xxxxxx38

MR A P NAIR MRS T A NAIR
FLNO 5/25 KAMDHENU NR HARIOM NAGAR EASTRERN EXPRESS MULUND (E) 400081

श्री ए पी नायर श्रीमती टी ए नायर

GSTIN:27AAECM2933K1ZB

देयक दिनांक : 08-12-2021
देयक रक्कम रु : 4000.00
देय दिनांक : 28-12-2021
या तारखे नंतर भरल्यास : 4050.00

Scan this QR Code with BHIM App for UPI Payment

बिलींग युनिट : 4705/NEELAM NAGAR S/DN./MULUND
दर संकेत ** : 90/LT I Res 1-Phase
पोल क्रमांक : 0
डी.सी./फ्रक+मार्ग-क्रम/डि.टी.सी. :2/21/9019/0645/3554283
मिटर क्रमांक : 07600056838
रिडींग ग्रुप : C2

पुरवठा दिनांक : 13-01-2005
मंजूर भार : 4.80 KW
सुरक्षा ठेव जमा (रु) : 3860.00
चालु रिडिंग दिनांक : 03-12-2021
मागील रिडिंग दिनांक : 03-11-2021

चालु रिडिंग	मागील रिडिंग	गुणक अवयव	युनिट	समा. युनिट	एकुण वापर
53663	53268	1.00	395	0	395

Meter Status: Normal

विशेष संदेश

Pay your Electricity Bill on Paytm App.
Get up to ₹125 Cashback

अंतिम तारीख 28-12-2021 Rs. 4000.00

महावितरण

वीज पुरवठा देयक

BILL OF SUPPLY FOR THE MONTH OF - जानेवारी-2022

BILL NO.(GGN): 000001442190144

ग्राहक क्रमांक : 000094227691 मोबाईल/ईमेल :99xxxxxx38

MR A P NAIR MRS T A NAIR
FLNO 5/25 KAMDHENU NR HARIOM NAGAR EASTRERN EXPRESS MULUND (E) 400081

श्री ए पी नायर श्रीमती टी ए नायर

बिलींग युनिट : 4705/NEELAM NAGAR S/DN./MULUND
दर संकेत ** : 90/LT I Res 1-Phase
पोल क्रमांक : 0
डी.सी./फ्रक+मार्ग-क्रम/डि.टी.सी. :2/21/9019/0645/3554283
मिटर क्रमांक : 07600056838
रिडींग ग्रुप : C2

पुरवठा दिनांक : 13-01-2005
मंजूर भार : 4.80 KW
सुरक्षा ठेव जमा (रु) : 3860.00
चालु रिडिंग दिनांक : 03-01-2022
मागील रिडिंग दिनांक : 03-12-2021

चालु रिडिंग	मागील रिडिंग	गुणक अवयव	युनिट	समा. युनिट	एकुण वापर
53933	53663	1.00	270	0	270

Meter Status: Normal

विशेष संदेश

Pay your Electricity Bill on Paytm App.
Get up to ₹125 Cashback

अंतिम तारीख 28-01-2022 Rs. 2390.00

5. How can you reduce the electrical energy consumption of your home? Alternatives methods

e.g. use of energy efficient lights….. Use of Gas water heater instead of electric water heater… etc.

Ans-

1. Unplug your appliances when they're not in use
2. Make a switch to energy-efficient lighting
3. Make use of energy monitors
4. Swap old, inefficient appliances for their eco-friendly versions
5. Use smart power strips
6. Use natural light
7. Use battery-operated devices like laptops instead of desktops
8. Instead of using dryers try drying stuff naturally.
9. Movement activated lights
10. Try to go for 5 or 4 star appliances.

6. Estimation of electrical energy consumption after alternate methods suggested in step-5.

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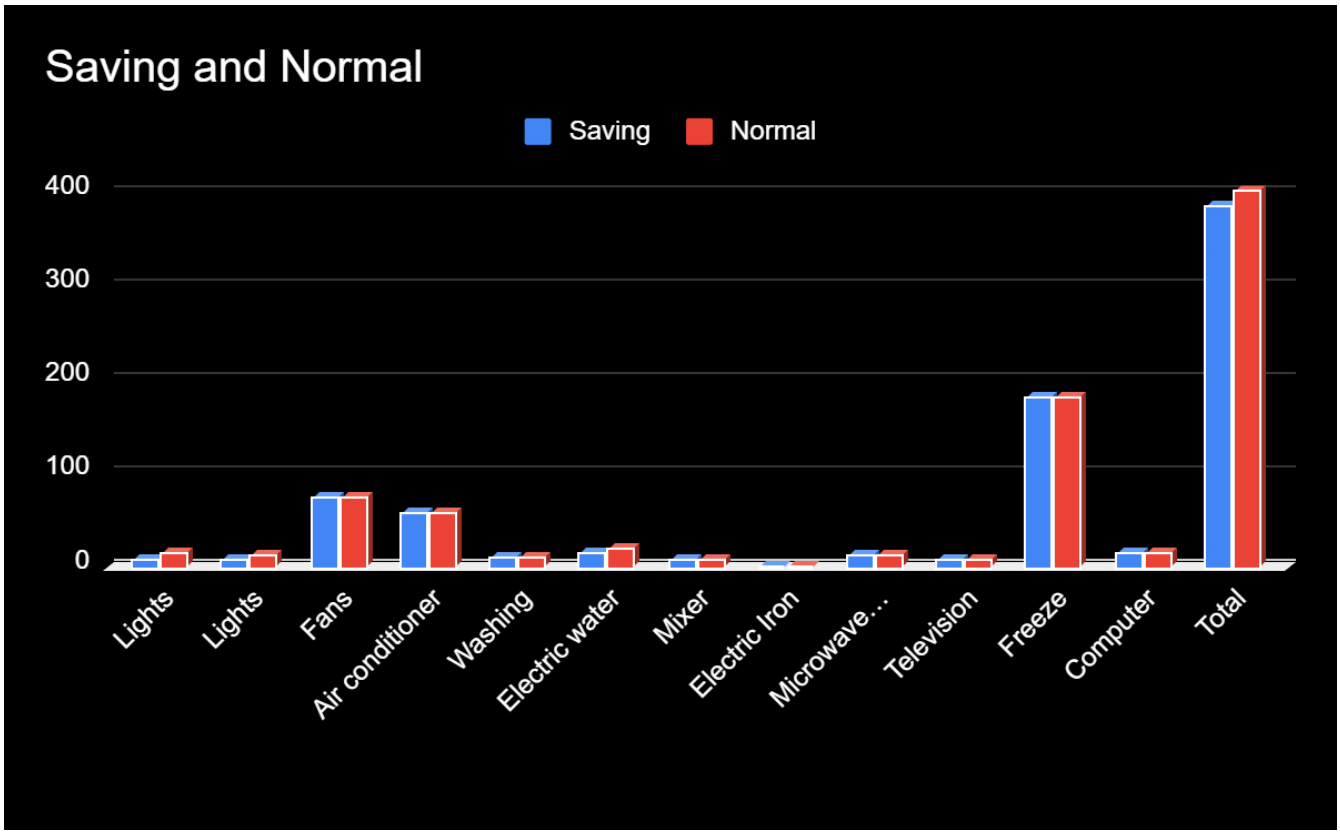
1	Lights	38	2	3	0.228	6.84
2	Lights	15	4	4	0.24	7.2
3	Fans	75	4	8	2.4	72
4	Air conditioners	940	2	1	1.88	56.4
5	Washing Machine	300	1	1	0.3	9
6	Electric water heaters (Geysers)	1500	1	0.3	0.45	13.5
7	Mixer	700	1	0.3	0.21	6.3
8	Electric Iron				0	0
9	Microwave Oven	1200	1	0.3	0.36	10.8
10	Television	80	1	3	0.24	7.2
11	Freeze	250	1	24	6	180
12	Computer	30	2	8	0.48	14.4
					Total energy (Units/month)	383.64



7. Energy saving units/month and expenses in Rs/month (after implementation of alternative method suggested in step

	Units	cost per unit	price
Normal	399.93	10.25316456	4100.548102
With Saving method	383.64	10.25316456	3933.524052

Savings- Rs.167.0240507

Signature of faculty in-charge with Date: