

# ELEMENTS OF ELECTRICAL ENGINEERING

Course Code : UE25EE141A/B

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## ENERGY CONSUMPTION & TARIFF CALCULATION

**Jyothi T.N**

Department of Electrical & Electronics Engineering

# ELEMENTS OF ELECTRICAL ENGINEERING

## Energy consumption & Tariff calculation

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- Electrical Energy consumed is recorded by the energy meter.
- Energy consumed = (Power consumed)\*(No. of hours in operation)
- The unit of energy consumed is Kilowatt-hour (KWHr) which is often referred to as 'UNIT'
- 1 UNIT = 1KWHr = 1000WHr



For example,

- **An appliance 'A' rated at 1KW if used for 1 hour,**  
Energy consumed =  $1\text{KW} \times 1\text{ Hr} = 1\text{KWHr} = 1\text{ Unit}$
- **An appliance 'B' rated at 100W if used for 10 hours,**  
Energy consumed =  $100\text{W} \times 10\text{Hr} = 1000\text{WHr} = 1\text{KWHr} = 1\text{ Unit}$
- **An appliance 'C' rated at 2000W if used for half-an hour,**  
Energy consumed =  $2000\text{W} \times (1/2)\text{Hr} = 1000\text{WHr} = 1\text{KWHr} = 1\text{ Unit}$

# ELEMENTS OF ELECTRICAL ENGINEERING

## Energy consumption & Tariff calculation



<b>ಬೆಂಗಳೂರು ವಿದ್ಯುತ್ ಸರಬರಾಜು ಕಂಪನಿ ನಿಯಮಿತ</b> Sub Divn. (140029)	
<b>ವಿದ್ಯುತ್ ಬಿಲ್ / ELECTRICITY BILL</b>	
ಆರ್.ಆರ್.ಸಂಖ್ಯೆ / RR Number :	14543E
ಖಾತೆ ಸಂಖ್ಯೆ / Account ID :	1100157649
ಮಾ.ಓ. ಸಂಕೇತ / Mtr. Rdr. Code :	14002901
<b>ಹೆಸರು ಮತ್ತು ವಿಳಾಸ / Name and Address</b>	
BANGALORE	
ಜಕಾತಿ / Tariff :	LT2A1 - N
ಮಂ. ಪ್ರಮಾಣ / Sanct. Load :	0.00HP+ 3.00KW
ಬಿಲ್ಲಿಂಗ್ ಅವಧಿ / Billing Period :	01/08/16 - 01/09/16
ರೀಡಿಂಗ್ ದಿನಾಂಕ / Reading Date :	09/10/16
ಬಿಲ್ ಸಂಖ್ಯೆ / Bill Number :	1100157649 - 01/09/2016
ಮಾಪಕ ಕ್ರ.ಸಂ. / Meter Sl. No. :	1100157649
ಇಂದಿನ ಮಾಪನ / Pres. Rdg. :	2765
ಹಿಂದಿನ ಮಾಪನ / Prev. Rdg. :	2400
ಮಾಪನ ಸ್ಥಿರಾಂಕ / Constant :	1.00
ಬಳಕೆ / Consumption :	325
ಸರಾಸರಿ / Average :	0000
ದಾಖಲಿತ ಬೇಡಿಕೆ / Recorded MD :	0000
ಪವರ್ ಫ್ಯಾಕ್ಟರ್ / Power Factor :	0000

Revenue Register Number

Tariff Category

Sanctioned Load of your building


Two Cumulative readings from which your consumption is calculated

Consumption in Units (KWh)

# ELEMENTS OF ELECTRICAL ENGINEERING

## Energy consumption & Tariff calculation



ನಿಗದಿತ ಶುಲ್ಕ / Fixed Charges (Unit, Rate, Amount)			
1.00	30.00	30.00	Fixed Charges for Sanctioned Load
2.00	40.00	80.00	
ವಿದ್ಯುತ್ ಶುಲ್ಕ / Energy Charges (Unit, Rate, Amount)			
30.000	3.00	90.00	Tariff Slabs for Residential
70.000	4.40	308.00	
100.00	5.90	590.00	
125.00	6.90	862.50	
ಇಂಧನ ಹೊಂದಾಣಿಕೆ ಶುಲ್ಕ /F.A.C. :		0.00	
ರಿಯಾಯಿತಿ/ Rebates, TOD charges :			
ಪವರ್ ಪಾಶ್ಚರ್ ದಂಡ / PF Penalty :		0.00	
ಹ.ಲೋ. ದಂಡ /Ex.Load/MD Penalty:		0.00	
ಬಡ್ಡಿ / Interest :			
ಇತರೇ / Others :			
ತೆರಿಗೆ / Tax :		78.42	
ಒಟ್ಟುಬಿಲ್ ಮೊತ್ತ /Current Bill Amt.:		2038.92	
ಬಾಕಿ / Arrears :			
ಜಮೆ / Credits & Adj. :			
ಸರ್ಕಾರದ ಸಹಾಯಧನ /GOK Subsidy :			
ಪಾವತಿಸಬೇಕಾದ ಮೊತ್ತ/Net Amt. Due:			
ಪಾವತಿ ಕಡೇ ದಿನಾಂಕ/Due Date :		15/09/2016	
Amount to be paid ASD		Amount to be paid:500 Rs	
Amount to be paid ASD		Amount to be paid:500 Rs	
Amount to be paid ASD		Amount to be paid:500 Rs	
			
110015764929269 09/10/2013 15:42			



# ELEMENTS OF ELECTRICAL ENGINEERING

## Energy consumption & Tariff calculation



### What you will pay now

#### DOMESTIC CONSUMERS

##### URBAN AREAS

Monthly consumption	Old rates /unit	New rates /unit
Up to 30 units	₹3	₹3.25
Between 31 and 100 units	₹4.40	₹4.70
101 to 200 units	₹5.90	₹6.25
Above 200 units	₹6.90	₹7.30

##### RURAL AREAS

Monthly consumption	Old rates /unit	New rates /unit
Up to 30 units	₹2.90	₹3.15
Between 31 and 100 units	₹4.10	₹4.40
101 to 200 units	₹5.60	₹5.95
Above 200 units	₹6.40	₹6.80

Fixed charges up in the range of ₹5/KW to ₹10/KW

#### INDUSTRIAL

**LT industrial consumers**  
Overall increase of 10 to 20 paise a unit

**HT industrial users**  
Increase in tariff in the range of 20 paise to 40 paise a unit

#### COMMERCIAL CONSUMERS

**LT category**  
Increase of 35 paise a unit

**HT category**  
Increase of 20 to 40 paise a unit

1.The list of loads and average consumption hours per day of a typical household is given below:

S.No.	Name of the Appliance	Wattage	Average consumption hours per day
1.	4 Incandescent Bulbs	60W/Bulb	10 hours each
2.	4 Ceiling fans	75W/fan	12 hours each
3.	Geysers	1 KW	1 hour
4.	Refrigerator	100W	16 hours
5.	Television	50W	10 hours
6.	Mixer Grinder	750W	1 hour



Considering a 30 day month, Determine

- i) Total number of units consumed in a month
- ii) Monthly bill for the above consumption units considering a domestic connection of 3KW sanctioned load with the tariff details given below:

S.No	Type of Charges	Tariff Details
1.	Fixed Charges for the sanctioned load	Rs. 50 /- for first KW Rs. 60/- for every additional KW
2.	Energy consumption Charges	0 to 30 units @ Rs. 3.5 per unit 31 to 100 units @ Rs. 4.95 per unit 101 to 200 units @ Rs. 6.50per unit 201 to 300 units @ Rs. 7.55 per unit 301 to 400 units @ Rs. 7.60 per unit Above 400 units @ Rs. 7.65per unit

Consider a tax 7.3% on Energy charges. Neglect any other charges.

### Text Book:

1. “Basic Electrical Engineering” S.K Bhattacharya, 1<sup>st</sup>Edition Pearson India Education Services Pvt. Ltd., 2017
2. “Basic Electrical Engineering”, D. C. Kulshreshta, 2<sup>nd</sup>Edition, McGraw-Hill. 2019
3. “Special Electrical Machines” E G Janardanan, PHI Learning Pvt. Ltd., 2014

### Reference Books:

1. “Engineering Circuit Analysis” William Hayt, Jack Kemmerly, Jamie Phillips and Steven Durbin, 10<sup>th</sup> Edition McGraw Hill, 2023
2. “Electrical and Electronic Technology” E. Hughes (Revised by J. Hiley, K. Brown & I.M Smith), 12<sup>th</sup> Edition, Pearson Education, 2016.



**THANK YOU**

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