A Guide to

E.H.T. SUB-STATIONS

Kekalathur Krishnaiah

ABOUT THE AUTHOR

A doyen among power engineer specialising in survey and construction of UHT transmission lines, Kekalathur Krishnaiah was born as the youngest and the eighth child into an agrarian family of Sankampalle in Pakala Mandal of Chittor district on May 2, 1938.

Life anything but rosy for Krishnaiah even as a boy. Driveb by economic compulsions of the family, he began the arduous joruney of life soom after matriculation. In his quest for placement, he found that government job was not his cup of tea and opted for private sector.

He joined a Hyderabad - based firm engaged in engineering construction. Soom, he acquired commendable skills while working in civil electrical and mechanical sections. He rose to become an engineer through hard work and relentless pursuit excellence. He successfully handled several projects in India and aborad during his illustrious professional career spanning over half a century. He had travelled extensively in Europe, Singaopore, Malaysia, Dubai, Srilanka and Nepal as a professional and also as a tourist. He is much in demand as a leading consultant.

He decided to document his long experience and knoweledeg in a book to serve as a valuable guide to aspiring engineers. He had authored 12 books in Telugu and 5 in English on subjects as diverse as sports, spirituality, religion, ecology and travelogue, books for the benifit of

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Other works:

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A GUIDE TO
EHT SUB - STATIONS

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First : July 2015

Price : Rs. 300/-

Pages : 388

D.T.P. : V. Chandu
Cell : 9392935074

Cover Page : D. Partha Saradhi
Cell : 98485 16896

Printed at : Printline Printers
Himayathnagar, Hyd - 29.
Cell : 9346113112

Books Available : With the Author, Vishalandra Publishing House,
Navachethana Vignana samiti, T.S. and
Other major book shops.

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CHAPTER - 1

POWER GENERATION STATION

Generation of Electrical Energy :

The most common method of generating energy is by means of electric machines generally called " Generators" when the Power Generation is D.C. and "Alternative" when the power generator is A.C. These machines are essentially convertors which convert mechanical energy in to electrical energy i.e these machines must be mechanically coupled to prime – movers.

The alternate method of generating electricity without the use of Prime Mover consists of magnets-hydro -dynamics, thermionic and thermo-electric generation.

The prime movers in turn look to the following for sources of energy.

(a)Fuels : 1. Solid fuels 2 Liquid fuels and 3. Gaseous fuels 4.Solar hear 5. Terrestrial heat 6. Wind Power 7. Tidal Power

Out of the above mentioned seven sources of available energy only first three are most dependable and are commonly used for generation of electrical power. The continuity of electrical power from other sources is not continuity of electrical power from other sources is not certain and depends on nature.

(b)Liquid Power : The largest amount of electric power is the world produced by the thermal electrical plants. These are two type of energies which the water can possess. The flowing water in stream may have only kinetic energy. The flowing stream of water may have both kinetic as well as potential energies or simply potent at energy at some elevation with respect to a lower datum level. A generator completed with hydraulic turbine tuned with the water-wheel generator. Hence, the

power plants is know a as a hydro electric station. Water – power plants are constructed on mountain and low land rivers, dams and water -storage facilities are built to control the water flow through the turbines and thus, the plant capacity.

(c) Sold Fuels : The generating stations which use solid fuels called as ' Thermal Power Station'. The natural solid fuels are different varieties of coal while the prepared ones are charcoal, coke and pulverized fuel. The steam is produced by burning the coal in the billons to rotate the steam turbine for power generation. The cleanest, simplest and easiest way for producing power is from water. There is no danger and hazards.

(d) Nuclear Power : The nuclear power abstained by unclear fission is fast entering into arena of energy sources. The heat produced by nuclear fission of atomic material is utilized in special heat exchangers to run steam turbines. The atomic materials utilized for nuclear fission are thorium and uranium. It is estimated that 1 kg of unclear fuel is equivalent to about 2,750 tonnes (metric tons) of coal. The first atomic power station was commissioned in U.K. in the year 1946 at "Calder Hall'.

(e) Gaseous Fuel : Natural gas is obtained from the soil by means of deep wells. The gases arise from the well under pressure of pumping may be required many gas wells yield only gas and which comes out with oil from an oil well is called casing head gas.

Casing head gas or the gas which comes out from wells which produce oil as well, is rich in methane in the beginning but slowly goes on becoming richer and richer in higher hydrocarbons and power in methane.

Advantages as follows :

1. Gaseons fuel can used in internal combustion engine.
2. Their rate of burning can be controlled easily.
3. They have no ash or clinkering trouble. Burning is quite clean.
4. The nature of flame can be easily made oxidizing or reducing.
5. They can be easily moved by means of pipes etc.
6. Higher thermal efficiency can be obtained. Enough much heat is lost in transforming solid fuel in to gaseous fuel yet all this loss is made up due to the economic way in which gas is burnt as compared to solid or liquid fuel.
7. Smoke nuisance which is a great evil in modern times, is avoided the case of gaseous fuels.

RENEWABLE ENERGY IN INDIA

Renewable Energy in India comes under the purvies of new and renewable energy. India was the first counrty is the world to set up a ministry of non-conventional energy resources, in early 1980s. India's cimulative grid interactive or grid tied renewable energy capacity(excluding large hydro) has reached 29.9 GW of which 68.9% comes from wind, which solar P.V. contributed nearly 4.59% of the renewable energy installed capacity in India.

SOLAR POWER :

Solar is a renewable energy source that uses sunlight to create electricity.

A Solar System has three main parts :

1. Solar PV Panels capture energy from the sun and create direct current (DC) electricity.
2. An inverter in the power box converts the D.C. POwer into Alternating current (AC) that is suitable for use by homes and businesses.
3. A two - way electricity meter records the amount of electricity generated and, if required, measures any power the some of business feads into the grid.

How the sun is used to make electricity?

a) Uses a cell of semiconductor material which creates an electrical voltage when exposed to the sun's radiant energy.

b) Small - scale household roof top solar PV Pannels.

c) Large -scale which include large amounts of solar panels and some times mirrors are used to concentrate the sun's radiant energy into the panels.

2. Solar Thermal

a) Converts sunlight in thermal energy (i.e heat)

b) Small Scale : House hold roof top hot water system.

c) Mirror's are used to concentrate the sun's heat on to fluids or salts, heating them to create steam which can then drive turbines to generate electricity.

India is densely populated and has high solar insolation, an ideal combination for using solar power in India. In the solar energy sector, some large projects have been proposed, and a 35,000 km^2 (14,000 sq mi) area of theThar Desert has been set aside for solar power projects, sufficient to generate 700 to 2,100 GW.

In July 2009, India unveiled a US$19 billion plan to produce 20 GW of solar power by 2020. Under the plan, the use of solar-powered equipment and applications would be made compulsory in all government buildings, as well as hospitals and hotels. In January 2015, the Indian government significantly expanded its solar plans, targetingUS$100 billion of investment and 100 GW of solar capacity by 2022.

India, "as a growing economy with a surging middle class, is now facing a severe electricity deficit that often runs between 10% and 13% of daily need". India is planning to install the World's largest Solar Power Plant with 4,000 MW Capacity near Sambhar Lake in Rajasthan.

On 16 May 2011, India's first 5 MW of installed capacity solar power project was registered under the Clean Development Mechanism. The project is in Sivagangai Village, Sivaganga district, Tamil Nadu.

WIND POWER

The development of wind power in India began in the 1990's and has significantly increased in the last few years. Although a releative new comer to the wind industry compared with Denmark or the US, domestic policy support for wind power has led India to become the country with the fifth largest installed wind power capacity in the world.

Wind energy is a form or renewable energy that used airflow to generate electricity. Its usage is likely to increase in the comming years.

How does wind create electricity?

1. The wind turns the blades of a turbine that is connected to a generator, whihc then converts the wind's kintic energy to electricity. Wind turbines are typically aboout 120 meters high to capture stronger winds and their blades span about 45 meters.
2. A single small turbine can generate electricity for a single home, while many larger turbines lined up together (in a wind farm) can generate electricity for the grid.

Wind turbine design is the process of defining the form and specifications of a wind turbine to extract energy from the wind . A wind turbine installation consists of the necessary systems needed to capture the wind's energy, point the turbine into the wind, convert mechanical rotation into electrical power, and other systems to start, stop, and control the turbine.

In 1919 the physicist Albert Betz showed that for a hypothetical ideal wind-energy extraction machine, the fundamental laws of conservation of mass and energy allowed no more than 16/27 (59.3%) of the kinetic

End of Preview.

Rest of the book can be read @

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