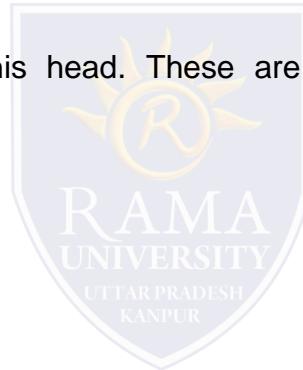


e) The supervision cost: -

it includes the salary of the supervising staff and executives. a good supervision reduces the breakdowns and extends the plant life. the supervising staff includes chief engineer, superintendent, engineers, stores in charges, purchase officers, other supporting staffs and executives, etc.

f) Taxes: -

the various taxes are included in this head. These are income tax, sales tax, provisional tax, commercial tax, etc.





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FACULTY OF ENGINEERING &
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Introduction

A power station is required to deliver power to a large number of consumers to meet their requirements. While designing and building a power station, efforts should be made to achieve overall economy so that the per unit cost of production is as low as possible.

This will enable the electric supply company to sell electrical energy at a profit and ensure reliable service. The problem of determining the cost of production of electrical energy is highly complex and poses a challenge to power engineers.

There are several factors which influence the production cost such as cost of land and equipment, depreciation of equipment, interest on capital investment etc.

Therefore, a careful study has to be made to calculate the cost of production. In this chapter, we shall focus our attention on the various aspects of economics of power generation.

Economics of Power Generation

The art of determining the per unit (i.e., one kWh) cost of production of electrical energy is known as economics of power generation. The economics of power generation has assumed a great importance in this fast developing

power plant engineering. A consumer will use electric power only if it is supplied at reasonable rate. Therefore, power engineers have to find convenient methods to produce electric power as cheap as possible so that consumers are tempted to use electrical methods. Before passing on to the subject further, it is desirable that the readers get themselves acquainted with the following terms much used in the economics of power generation : (i) Interest. The cost of use of money is known as interest. A power station is constructed by investing a huge capital. This money is generally borrowed from banks or other financial institutions and the supply company has to pay the annual interest on this amount. Even if company has spent out of its reserve funds, the interest must be still allowed for, since this amount could have earned interest if deposited in a bank. Therefore, while calculating the cost of production of electrical energy, the interest payable on the capital investment must be included. The rate of interest depends upon market position and other factors, and may vary from 4% to 8% per annum. (ii) Depreciation. The decrease in the value of the power plant equipment and building due to constant use is known as depreciation. If the power station equipment were to last for ever, then interest on the capital investment would have been the only charge to be made.

However, in actual practice, every power station has a useful life ranging from fifty to sixty years. From the time the power station is installed, its equipment steadily deteriorates due to wear and tear so that there is a gradual reduction in the value of the plant. This reduction in the value of plant every year is known as annual depreciation. Due to depreciation, the plant has to be replaced by the new one after its useful life. Therefore, suitable amount must be set aside every year so that by the time the plant retires, the collected amount by way of depreciation equals the cost of replacement. It becomes obvious that while determining the cost of production, annual depreciation charges must be included. There are several methods of finding the annual depreciation charges

Cost of Electrical Ener Cost of Electrical Energy

The total cost of electrical energy generated can be divided into three parts, namely ;

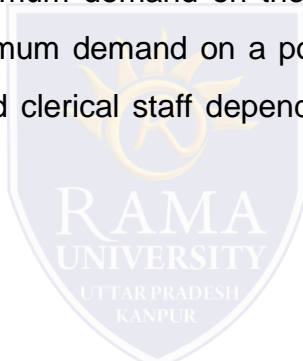
- (i) Fixed cost ;
- (ii) Semi-fixed cost ;
- (iii) Running or operating cost.

(i) Fixed cost.

It is the cost which is independent of maximum demand and units generated. The fixed cost is due to the annual cost of central organisation, interest on capital cost of land and salaries of high officials. The annual expenditure on the central organisation and salaries of high officials is fixed since it has to be met whether the plant has high or low maximum demand or it generates less or more units. Further, the capital investment on the land is fixed and hence the amount of interest is also fixed.

(ii) Semi-fixed cost.

It is the cost which depends upon maximum demand but is independent of units generated. The semi-fixed cost is directly proportional to the maximum demand on power station and is on account of annual interest and depreciation on capital investment of building and equipment, taxes, salaries of management and clerical staff. The maximum demand on the power station determines its size and cost of installation. The greater the maximum demand on a power station, the greater is its size and cost of installation. Further, the taxes and clerical staff depend upon the size of the plant and hence upon maximum demand.



(iii) Running cost.

It is the cost which depends only upon the number of units generated. The running cost is on account of annual cost of fuel, lubricating oil, maintenance, repairs and salaries of operating staff. Since these charges depend upon the energy output, the running cost is directly proportional to the number of units generated by the station. In other words, if the power station generates more units, it will have higher running cost and vice-versa.