OR

A power plant has 3 units with the followings input output curves:

$$Q_1 = 0.002P_1^2 + 0.86P_2 + 20 \text{ tons/hour}$$

$$Q_2 = 0.004P_1^2 + 1.08P_2 + 20 \text{ tons/hour}$$

$$Q_3 = 0.0028P_1^2 + 0.64P_2 + 36 \text{ tons/hour}$$

Fuel cost is 500 rupees per ton. Maximum and minimum generation level for each unit is 120MWatt and 36MWatt. Find optimum scheduling for a total load of 200MWatts.

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EE-602

B.E. VI Semester

Examination, December 2016

Electrical Power Generation

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except Numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Explain the basic principle of MHD power generation.

   b) Explain the working principle of a solar plant.

   c) Explain the working of a solar collector with an example.

   d) Explain the working principle of wind energy generation with neat sketch. Enlist the factors to be considered for selection of site for a wind plant.

OR

How can geothermal energy be utilised for electricity generation? Explain dry steam, wet steam and hot water geothermal system.

Unit - II

2. a) Give the classification of steam turbines used in a power plant.

   b) What is the function of condenser in a thermal power plant?

   c) What are the various types of nozzles used in steam turbines?

   d) Draw the neat line diagram of a nuclear power plant showing basic components. Discuss the advantages of nuclear power plant compared with thermal power plant.

OR

Draw a typical layout of the thermal power plant and describe the working of coal and Ash handling plants.

Unit - III

3. a) What do you understand by a flow duration curve? Explain.

   b) What is the function of draft tube in a hydro power plant?

   c) Discuss the various factors which affects the location of site of hydel power plant.

   d) Discuss the function of followings in a hydro power plant:

      i) Penstock

      ii) Surge tank

      iii) Spillway

      iv) Forebay

OR

What is meant by combined gas turbine plant? What are their salient features? Discuss briefly the popular system.

Unit - IV

4. a) Explain the term depreciation of an electric power plant.

   b) Explain load duration curve and what information one can get from them.

   c) What do you understand by power factor? Explain the necessity of improving power factor.

   d) A star connected 500HP, 2400V, 50Hz, 3 phase induction motor works at 0.75pf lagging. A bank of delta connected capacitors is used to raise the power factor to 0.95 lagging. Calculate the capacitance of each unit and the total number of units if each rated at 500 volts, 50Hz. Motor efficiency is 85%.

OR

A 3 phase synchronous motor having a mechanical load (including losses) of 122kW is connected in parallel with a load of 500 kWatt at 0.8pf lagging. The excitation of motor is adjusted so that the kVA input to the motor becomes 140kVA. Determine the new power factor of the whole system.

Unit - V

5. a) What are the objectives of automatic generation control?

   b) What do you understand by the economic operation of a power system?

   c) What do you understand by the incremental fuel cost of a plant?

   d) On a system consisting of two generating plants, the incremental cost is given by:

$$\frac{dF_1}{dP_1} = 0.008P_1 + 8 \quad \frac{dF_2}{dP_2} = 0.012P_2 + 9$$

The system is operating on economic dispatch with

$$P_1 = P_2 = 500\text{MWatts and } \partial P_L / \partial P_2 = 0.2$$