

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- Vth SEMESTER-EXAMINATION – MAY/JUNE - 2012****Subject code: 150801****Date: 02/06/2012****Subject Name: Electrical Power Engineering****Time: 02:30 pm – 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Draw and explain the schematic arrangement of thermal power plant. **07**
(b) List the advantages of high transmission voltage. Give the name of conductor used for 400 kV lines and reason for it. **07**

- Q.2** (a) Draw and explain the typical line diagram of A.C power supply scheme. **07**
(b) A single phase AC distributor 500 m long has a total impedance of $(0.02 + j0.04) \Omega$ and is fed from one end at 250 V. It is loaded as under:
(i) 50 A at unity power factor 200 m feeding point.
(ii) 100 A at 0.8 power factor lagging 300 m from feeding point.
(iii) 50 A at 0.6 power factor lagging at the far end.
Calculate the voltage drop and voltage at the far end. Assume all power factor referred to far end voltage.

OR

- (b) An industrial consumer having a maximum demand of 100 kW, maintains a load factor of 60%. The tariff rates are Rs 900 per kVA of maximum demand plus Rs 1.80 per kWh of energy consumed. If the average power factor is 0.8 lagging, calculate the total energy consumed per annum and the annual electricity bill. **07**

- Q.3** (a) Classify the type of HVDC links. Explain bipolar HVDC link in detail with suitable line diagram. **07**
(b) A single phase transmission line delivers 1 MVA at a power factor of 0.71 lagging, 22 kV, 50 Hz. The loop resistance is 15Ω , the loop inductance is 0.2 H and the capacitance is $0.5 \mu\text{F}$. Find (a) the voltage (b) the current and (c) the power factor at the sending end by using nominal π method. Consider receiving end voltage as reference phasor. **07**

OR

- Q.3** (a) Give the classification of cable. **04**
(b) State the different methods use for voltage control in a power system. **03**
(c) State the factor affecting on site selection of hydro power station. Also write the advantages and disadvantages of hydro power plant. **07**

- Q.4** (a) Explain with line diagram various bus bar arrangements used in substation. **07**
(b) In a string of three identical suspension insulator units supporting a transmission line conductor, if the self capacitance of each unit is denoted as C farads, the capacitance of each connector pin to ground can be taken as 0.1 C farads. Determine the voltage distribution across the string if the maximum permissible voltage per unit is given as 20 kV. Also determine the string efficiency. **07**

OR

- Q.4** (a) Define short, medium and long transmission line on the basis of its length **07**

and voltage also explain Nominal T method in respect to medium transmission line.

- (b) Explain limitation and design aspects of EHV-AC power transmission system. **07**

- Q.5** (a) Define sag of overhead transmission line and derive the equation of sag for equivalent line supports. **07**

- (b) What is load curve? State the information available from the load curve. **03**

- (c) List the advantages of power factor improvement. **04**

OR

- Q.5** (a) An overhead line having a span of 250 m has ACSR conductors of 19.5 mm diameter; 2.25 cm^2 area and weighing 0.85 kg/m. This line is to be erected at a temperature of 35°C in still air conditions. It is desired that a factor of safety 2 should be maintained under worst weather conditions (i.e. when the temperature is 5°C and the wind load is 38.5 kg/m^2 of projected area). Determine the sag under erection conditions if breaking load is 8,000 kg, coefficient of linear expansion 18.44×10^{-6} per degree $^\circ \text{C}$ and Young's modulus $9,320 \text{ kg/mm}^2$. **07**

- (b) Explain the term preventive maintenance in case of transmission lines and explain function of grading ring, arcing horn, vibration damper and cross arm in case of overhead transmission lines. **07**
