

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-III • EXAMINATION – WINTER 2013

Subject Code: 132401**Date: 30-11-2013****Subject Name: Basic Power Systems 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)** Give Correct answer to the multiple choice questions which is (or near) the result(s). **07**
- (i) To increase the efficiency of the boiler in thermal power plant the coals are burnt in a _____ form.
- (a) Powder (b) Raw
(c) Grit (d) b and c
- (ii) Manometer is used in _____ at the inlet of the water turbine for measurement of the pressure energy of the water.
- (a) thermal power plant (b) hydro-electric plant
(c) nuclear power plant (d) all of the above
- (iii) Gas turbine is used in _____ power plant.
- (a) hydro-electric (b) thermal
(c) nuclear (d) Non of the above
- (iv) In HVDC transmission, _____ system is installed for AC-to- DC Conversion.
- (a) Inverter (b) chopper
(c) converter (d) cyclo-converter
- (v) Most of electrical appliances have _____ power factor.
- (a) leading (b) lagging
(c) zero (d) unity
- (vi) Vector diagram of the power factor for transformer used in sub-station lies in _____ quadrant.
- (a) first (b) second
(c) third (d) fourth
- (vii) To improve the power factor at sub-station in power system _____ is installed.
- (a) synchronous condenser (b) capacitor bank
(c) phase advancer (d) Induction motor
- (b)** Fill in the blanks with appropriate option from given options. **07**
- (i) Make carry and break are the functions associated with _____. (Circuit Breaker, Relay)
- (ii) Transposition is associated with _____. (Feeder line, Distribution line, Transmission line)
- (iii) Fuse is provided for _____ protection. (over current, over voltage, under voltage)
- (iv) Spillways Tunnels and Catchments area are associated with _____. (Hydro electric plant, Thermal power plant)
- (v) Steam turbine is associated with _____. Thermal power plant, Hydro electric plant)
- (vi) In power-triangle, _____ component is a measure of the power factor. (active, reactive, apparent)
- (vii) Static capacitor, Synchronous condenser and Phase

advancer are the _____. (Power factor improvement equipments, various types of Auto- reclosure.)

- Q.2** (a) Explain the causes of low power factor. Also enumerate the advantages of power factor improvement. **07**
(b) Discuss various power factor improvement methods. **07**

OR

- (b) Explain the concept of power circle diagram. **07**

- Q.3** (a) Explain sending end circle diagram. **07**
(b) A load of 4000 KW at 1100 Volts is being received from a single-phase transmission line at a power factor of 0.9 lag. If the resistance and reactance of each conductor is 0.018 ohm and 0.02 ohm respectively, calculate the sending end voltage, current and power factor. Neglect the capacitance of the line. **07**

OR

- Q.3** (a) Explain receiving end circle diagram. **07**
(b) A 3-phase, 50c/s, 11KV transmission line delivers a load of 2400 KW at power factor 0.8 lag over a distance of 20 km. The line conductors are placed at the corners of an equilateral triangle of 2m side. The line losses are 10% calculate the sending end power factor. **07**

- Q.4** (a) Derive equation for inductance of single-phase two wire line. **07**
(b) A single-phase line has two parallel conductors 3-m apart. The radius of each conductors is 1.0 cm. calculate (a) The loop inductance of the line per km and (b)The inductance and capacitance of each conductor/km. **07**

OR

- Q.4** (a) Explain transposition of transmission line. **07**
(b) A three-phase three-wire system has its conductors arranged at the corners of an equilateral triangle of 2m side. The diameter of each conductor is 2.5cm. Calculate the inductance and capacitance of each conductor. **07**

- Q.5** (a) Write the principle of HVDC transmission. Explain its operation and control techniques with the help of block diagram. **07**

- (b) Enlist the basic equipment used in HVDC transmission. Explain the operation of converters in HVDC transmission systems. **07**

OR

- Q.5** (a) What is solid grounding: Enlist its advantages and disadvantages. **07**
(b) A 3-Phase, 5KW, induction motor has a power factor of 0.75 lagging. A bank of capacitors is connected in delta across the supply of terminals and power factor raised to 0.9 lagging. Determine the KVAR-rating of the capacitor connected in each phase. **07**
