Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**B. E. - SEMESTER – III • EXAMINATION – WINTER 2012**

**Subject code: 132401** **Date: 05-01-2013**

**Subject Name: Basic Power Systems engineering**

**Time: 10.30 am – 01.00 pm** **Total Marks: 70**

## Instructions:

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

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|---|---|---|---|
| **Q.1** | **(a)** | Brief the following components used in power systems. (1) Breaker (2) Isolator (3) Fuses | **07** |
| | **(b)** | Define Power Factor. Explain the Power Triangle and deduce necessary formula from it. State the causes of low power factor. | **07** |
| **Q.2** | **(a)** | Derive expressions of inductance for three phase overhead transmission line with unsymmetrical conductor spacing. | **07** |
| | **(b)** | Explain the transposition of transmission line. | **07** |
| | | **OR** | |
| | **(b)** | What is flux linkage? Find an expression for the flux linkages due to a single current carrying conductor. | **07** |
| **Q.3** | **(a)** | Draw and explain the schematic diagram of Hydro power station. | **07** |
| | **(b)** | Explain the principle of HVDC transmission. Explain the operation and control of HVDC transmission system with Block diagram. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Draw and explain the schematic diagram of Thermal power station. | **07** |
| | **(b)** | Explain the Skin effect, Proximity effect and Ferranti effect in brief. | **07** |
| **Q.4** | **(a)** | What is Grounding? What are its advantages? | **07** |
| | **(b)** | State and define symmetrical components with neat diagram. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | What is reactance grounding? What are advantages and disadvantages? | **07** |
| | **(b)** | Explain Peterson coil grounding and grounding of transformer. | **07** |
| **Q.5** | **(a)** | State various methods for power factor improvement. Explain power factor correction by static capacitors. | **07** |
| | **(b)** | A single phase Hz motor takes 20 A at 0.75 power factor lagging from a 230 V sinusoidal supply. Calculate the KVAr and capacitance of a capacitor to be connected in parallel to raise the power factor to 0.99 lagging. What the new supply current? | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Define PU system. List the advantages of it. Derive the equation of base impedance for single-phase and three-phase system. | **07** |
| | **(b)** | A 3-phase 3-wire system has its conductors arranged at the corners of an equilateral triangle of 2 m side, the diameter of each conductor is 2.5 cm. Calculate the inductance and capacitance of each conductor. | **07** |

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