Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Vth Semester–Examination – Nov-Dec- 2011

Subject code: 150801

Subject Name: Electrical Power Engineering

Date:24/11/2011 **Time: 02:30 pm – 05:30 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 schematic diagram of Thermal Power Plant. Also explain functions of following **07**

(1) Economiser (2) Air pre-heater (3) ID-fan & FD-fan

(b) Define the following terms: **07**

(1) Load factor (2) demand factor (3) Diversity factor (4) Base load (5) Operating reserves (6) Spinning reserves (7) Cold reserves

Q.2 **(a)** Each line of a 3-phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 KV, calculate the line to neutral voltage. Assume that the shunt capacitance between each insulator and earth is 1/8th of the capacitance of the insulator itself. Also find the string efficiency. **07**

(b) What is meant by Corona? What are the various factors which affect corona? How can the corona effect be minimized? **07**

OR

(b) Classify the Underground cables. Also describe the general construction of an underground cable with neat sketch. **07**

Q.3 **(a)** Derive the equation for volume of conductor material required for dc 2-wire system with one conductor earthed and 3-phase 3-wire ac system **07**

(b) A 350m, 2-wire d.c. distributor fed from one end is loaded uniformly at the rate of 1.5 A/metre. The resistance of each conductor is 0.0002 Ω per metre. Find the voltage necessary at feed point to maintain 250V (i) at the far end (ii) at the mid-point of the distributor. **07**

OR

Q.3 **(a)** A single phase a.c distributor AB 300 metres long is fed from end A and is loaded as under: **07**

(i) 150 A at 0.707 p.f lagging 150 m from point A.

(ii) 200 A at 0.8 p.f lagging 300m from point A.

The load resistance and reactance of the distributor is 0.2Ω and 1Ω per km. calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end.

(b) Discuss the merits and demerits of Underground and Overhead systems. **07**

Q.4 **(a)** Derive an expression for the inductance of three phase line with conductor having equilateral spacing. **07**

(b) Derive A,B,C,D constants of a medium length transmission line. Also draw the phasor diagram assuming of Nominal π configuration. **07**

OR

Q.4	**(a)**	Derive an expression for the capacitance of single phase line without effect of ground.	**07**
	(b)	Explain FACTS devices.	**07**
Q.5	**(a)**	Discuss the causes and consequences of low power factor.	**07**
	(b)	State the different methods for power factor improvement. Explain any one in detail.	**07**

OR

Q.5	**(a)**	Explain working of Tap changing transformer.	**07**
	(b)	A single phase motor connected to 400 V , 50 Hz supply takes 30.5A at a power factor of 0.7 lagging. Calculate the capacitance required in parallel with the motor to raised the power factor to 0.95 lagging.	**07**

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