END TERM EXAMINATION

FOURTH SEMESTER [B.TECH.] MAY-JUNE 2017

Paper Code: ETEE-206	Subject: Power System-I

(Batch 2013 Onwards)

Time: 3 Hours	Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory.

Q1 Attempt all of the following:
 (a) Prove that the per unit value of the 3 phase KVA on the 3 phase KVA base is identical to the per unit value of the KVA per phase on the KVA per phase base. **(5)**
 (b) What are the requirements of the cables? **(3)**
 (c) Why we neglect the load during the fault? Explain. **(3)**
 (d) What are the factors that minimize the corona effect? **(3)**
 (e) How does the skin effect vary with conductor materials? **(3)**
 (f) What are the merits and demerits of per-unit system? **(3)**
 (g) Discuss the various types of buses used in load flow studies? **(5)**

Q2 (a) In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self capacitance of each insulator, find (i) the distribution of voltages over 3 insulators and (ii) string efficiency. **(6.5)**
 (b) What are methods of improving string efficiency? Explain. **(6)**

Q3 Transmission line has a span of 275 m between level supports. The conductor has an effective diameter of 1.96 cm and weighs 0.865 kg/m. Its ultimate strength is 8060 kg. If the conductor has ice coating of radial thickness 1.27 cm and is subjected to wind pressure of 3.9 gm/cm^2 projected area, calculate sag for a safety factor of 2. Weight of 1 c.c. ice is 0.91 gm. **(12.5)**

Q4 (a) What is CORONA? How it affects transmission lines? What are the factors affecting CORONA? What are the practical methods to reduce CORONA? **(6.5)**
 (b) Derive an expression for the fault current for a single line to ground fault. **(6)**

Q5 (a) A 3 phase line has conductors 2 cm in diameter spaced equilaterally 1 m apart. If the dielectric strength of air is 30 KV (max)/cm, find the disruptive critical voltage for the line. Take the air density factor $\delta = 0.952$ and irregularity factor $m_0 = 0.9$. **(6.5)**
 (b) What is the effect of load power factor on regulation and efficiency in a transmission line? **(6)**

Q6 A salient pole generator without damper is rated at 20 MVA, 13.8 KV and has a direct axis sub transient reactance of 0.25 pu. The negative and zero sequence reactance are respectively 0.35 pu and 0.10 pu. The neutral of the generator is solidly grounded. Determine the sub transient current in the generator and line-to-line voltages for sub transient conditions when single line to ground fault occur at the generator terminals with generator operating unloaded at rated voltage. Neglect resistance. **(12.5)**

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Q7 (a) Fig. 1 show the one-line diagram of a power system. Table 1 gives the line impedances identified by the buses on which these terminate. The shunt admittance at all the buses is assumed to be negligible. Find the matrix. **(6.5)**

Table 1:

Line, Bus to Bus	R, pu	X, pu
1-2	0.05	0.15
1-3	0.10	0.30
2-3	0.15	0.45
2-4	0.10	0.30
3-4	0.05	0.15

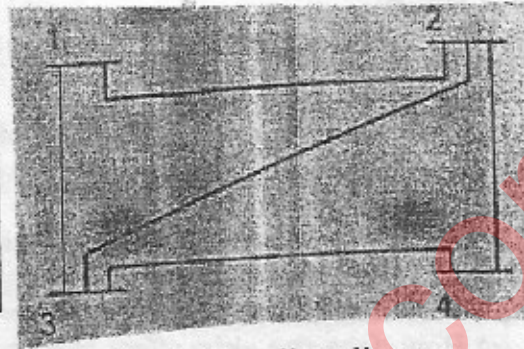
Fig. 1: One-line diagram

(b) Table 2 gives the input data for question 7(a). Calculate the bus voltages after the first iteration using gauss-siedel method. **(6)**

Table 2: Input data

Bus	pu	pu	pu	Bus type
1	-	-		Slack bus
2	0.5	-0.2	-	PQ bus
3	-0.1	0.5	-	PQ bus
4	0.3	-0.1	-	PQ bus

Q8 Write short notes on:
(a) Dielectric Loss **(6)**
(b) Ferranti effect **(6.5)**

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