(Please write your Exam Roll No.) Exam Roll No. .

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] JUNE 2025

Paper Code: EEC-212 ***Subject: Power Systems-I***

Time: 3 Hours ***Maximum Marks:60***

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.

Q1 Attempt all questions **(4x5=20)**

a) Draw a single line diagram of power systems with its main components?

b) Discuss the importance of surge impedance loading in transmission lines.

c) Name the different types of overhead line insulators used in transmission and distribution systems.

d) Why the Per-Unit (PU) system is used in power system. What are the merits and demerits of this system?

e) What do you understand by positive, negative and zero sequence impedances?

UNIT-I

Q2 a) Derive the expression for sag calculation when supports are at equal heights. Discuss the effects of wind pressure and ice loadings. **(5)**

b) A transmission line has a span of 275 m between level supports. The conductor has an effective diameter of 1.96 cm and weighs 0.865kg/m. its ultimate strength is 8060 kg. if the conductor has ice coating of radial thickness 1.27 cm and is subjected to a wind pressure of 3.9 gm/cm^2 of projected area. Calculate sag for a safety factor of 2. Weight of 1 c.c. of ice is 0.91 gm. **(5)**

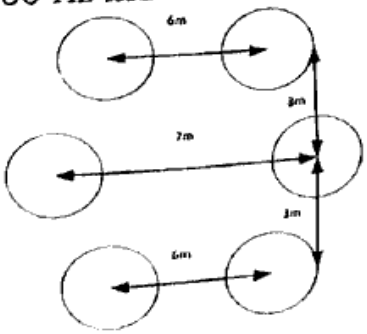
Q3 a) What is string efficiency? What are the methods by which string efficiency can be improved? **(5)**

b) The self-capacitance of each unit in a string of three suspension insulators is 'C'. The shunting capacitance of the connecting metal work of each insulator to earth is 0.2 C. Find the voltage distribution among the insulators and the string efficiency if the maximum permissible voltage per unit is given as 20 kV? **(5)**

UNIT-II

Q4 a) What is corona? How it affects transmission lines? What factors affect Corona? What are the practical methods to reduce corona? **(5)**

b) A three phase double circuit line consists of conductors' 1 cm diameter ACSR, conductor's arrangement as shown in Figure. Find 50 Hz inductive reactance in ohms per km per phase. **(5)**



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Q5 a) A 3-phase 110 KV, 50 Hz, 100 Km line delivers a load of 50 MW at a power factor of 0.8 lag. The resistance and reactance of the line per phase per km are 0.1 ohm and 0.5 ohm respectively. While the capacitive admittance is 3×10^{-6} Siemens/km/phase. Using line as medium line with pi network, calculate

i) Sending end voltage and current
ii) Voltage regulation **(5)**
iii) Efficiency of the line.

b) What do you understand by bundling of power conductors? Explain why there is an increase in capacitance due to *bundling?* **(5)**

UNIT-III

Q6 a) Explain the term capacitance grading in cables. What are its advantages? How practical this method is? **(5)**

b) A synchronous generator is rated at 25 KVA, 11 kV. It is star connected with neutral point solidly grounded. $X_1=X_2 = 0.2$ p.u. and $X_0=0.08$ p.u. Calculate the fault currents for L-G Fault, L-L Fault , L-L-G Fault and 3-Phase Faults. Analyse the faults in terms of severity. **(5)**

Q7 a) Why do we use reactors in a power system? Explain the different types of reactors with neat diagrams. **(5)**

b) What are the causes of unsymmetrical faults in a power system? Derive an expression for the fault current for a single line to ground fault. **(5)**

UNIT-IV

Q8 a) Describe the various types of buses used in load flow studies. **(5)**

b) A sample power system has the following line data. Form bus admittance matrix for this system. **(5)**

Bus Code	Series Impedance	PU line charging Admittance Y/2
1-2	0.02+j0.08	j0.04
1-3	0.06+j0.24	j0.03
2-3	0.04+j0.16	j0.025
2-4	0.04+j0.16	j0.025
3-4	0.01+j0.04	j0.015

Q9 a) What is the importance of load flow studies in power systems? **(5)**

b) Explain the Newton-Raphson method of load flow studies. **(5)**

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