

5E1760	Roll No. _____	[Total No. of Pages : 3]
	5E1760	
	B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025	
	Electrical Engineering	
	5EE4-02 Power System-I	
	EE, EX	
Time : 3 Hours		Maximum Marks : 70

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. Discriminate between Self and Mutual GMD.
2. What is skin effect? Why it is absent in DC system?
3. What do you understand by the insulation coordination?
4. Illustrate the importance of neutral grounding in power system.
5. Explain balanced and unbalanced faults.
6. What do you mean by Power grid and Micro grid?
7. Describe service mains, feeder and distributor.
8. Enlist the key steps involved in evaluating Per Unit (P.U) value.
9. What is local corona?
10. Write the expression for capacitance of single phase line.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions.

(5×4=20)

1. Describe the various methods for reducing Corona effect in an overhead transmission line.
2. Consider the system shown in Fig.1 below. The percentage reactance of each alternator is expressed on its own capacity determine the short circuit current that will flow into a dead 3- ϕ short circuit at F.

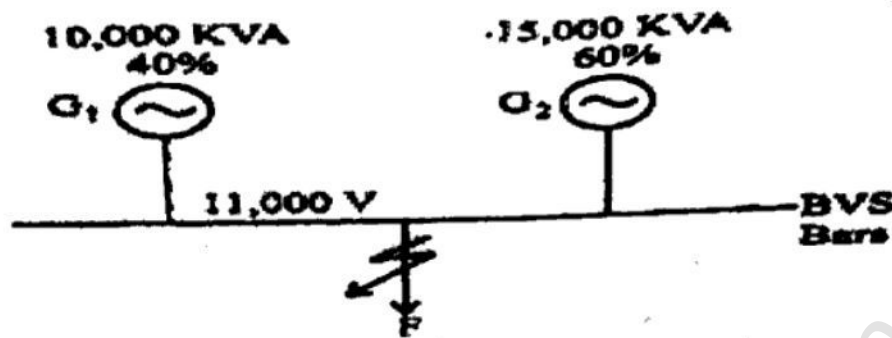


Fig.1

3. Derive an expression for the fault current for the LG and LL fault.
4. What is a nominal π circuit? Find the ABCD constants for nominal π circuit.
5. Derive the Travelling Wave Equation.
6. Why line commutated converter (LCC) are used in HVDC transmission system? Compare AC transmission system with DC transmission system.
7. Explain short circuit of synchronous machine. Also describe steady state, transient and subtransient operation of synchronous machine.

PART - C

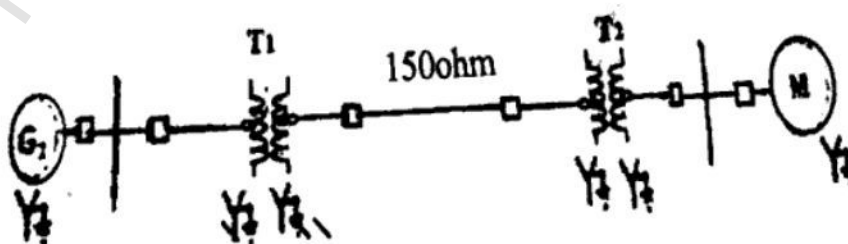
(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any Three questions.

(3×10=30)

1. Derive an expression for the inductance per phase for a three overhead transmission line when
 - a) The conductors are symmetrically placed.
 - b) The conductors are unsymmetrically placed.
2. a) What is meant by insulation coordination? How are the protective devices chosen for optimal insulation level in power system?
 - b) What are the key measures taken to safeguard equipment from lightning strikes?
3. a) Draw the reactance diagram for the power system shown in Fig.2 Neglect resistance and use a base of 100MVA, 220KV in 500K Ω line. The ratings of the generator motor and transformers are given below.

Generator: 40MVA, 25KV, $X = 20\%$.
 Motor: 50MVA, 11KV, $X = 30\%$.
 Transformer T1: 40MVA, 33/220 KV, $X = 15\%$.
 Transformer T2: 30MVA, 11/220 KV, $X = 15\%$.



- b) Discuss the principle of symmetrical components. Derive the necessary equations to convert: Phase quantities into symmetrical components.
4. a) Designate solar PV panels for the generation of electricity and draw their characteristics.
- b) A 1 km long single core cable has a core diameter of 2.5cm, insulation thickness of 1.25cm and resistivity of the insulation is 4.5×10^4 ohms-cm. Calculate the insulation resistance/km.
5. Write down short note on the following protection schemes with their application.
- a) Over-Current.
- b) Directional Protection.
- c) Distance Protection.
- d) Differential Protection.
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