



Shirpur Education Society's  
**R. C. PATEL INSTITUTE OF TECHNOLOGY, SHIRPUR**

An Autonomous Institute  
[ Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere ]



आर. सी. पटेल इन्स्टिट्यूट ऑफ टेक्नॉलॉजी, शिरपुर  
(स्वायत्त महाविद्यालय)

**Academic Year (2022-23)**

**Year: 3 Semester: V**

**Program: B. Tech. (ELECTRICAL ENGG.)**

**Max. Marks: 75**

**Subject: Power System Analysis (PCEE5020T)**

**Time: 10:30 am to 1:30 pm**

**Date: 07/01/2023**

**Duration: 3 Hours**

**END SEM EXAMINATION – ODD SEM-V (Regular)**

**Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.**

- (1) This question paper contains 02 pages.
- (2) **All Questions are Compulsory.**
- (3) All questions carry equal marks.
- (4) **Answer to each new question is to be started on a fresh page.**
- (5) **Figures in the brackets on the right indicate full marks.**
- (6) **Assume suitable data wherever required, but justify it.**
- (7) Draw the neat labelled diagrams, wherever necessary.

Question No.		Max. Marks
Q1 (a)	Discuss that the per unit equivalent impedance is exactly same for the transformer calculated from primary or secondary.	[10]
Q1 (b)	What is per unit system? How this system is beneficial for analysis <b>OR</b> Brief about construction of impedance diagram of transmission line & Generators.	[05] [05]
Q2 (a)	Derive expression for fault current for single line to ground fault as an unloaded generator <b>OR</b> Given $V_a = 5\angle 53^\circ \text{V}$ , $V_b = 7\angle -164^\circ \text{V}$ , $V_c = 7\angle 105^\circ \text{V}$ , find the symmetrical components of voltages of a phase.	[05] [05]
Q2 (b)	Using appropriate interconnection of sequence networks, derive the equation for a line to line fault in a power system with fault impedance of $Z_f$ . <b>OR</b> An 11KV, 25MVA synchronous generator has positive, negative and zero sequence reactance's of 0.12, 0.12 and 0.08 per unit respectively. The generator neutral is grounded through a reactance of 0.03 per unit. A single line to ground fault occurs at the terminals of generator. Determine the fault current & line to line voltages (Assume that the generator was unloaded before fault)	[10] [10]
Q3 (a)	i. What is meant by a fault? State the assumptions that are made in analysis of faults. ii. Differentiate symmetrical and unsymmetrical faults. List various unsymmetrical faults. <b>OR</b> Show that symmetrical component transformation is power invariant.	[06] [04] [10]



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Q3 (b)	Derive expression for fault current for single line to line fault of an unloaded generator.	[05]
Q4 (a)	Explain NR method for non linear algebraic equation & state its advantages. <b>OR</b> i. What is Bus? Explain its classification in details & Draw 4 bus system with shunt admittance. ii. Define load flow analysis? State application of power flow studies & its significance in power system operation and control.	[08] [04] [04]
Q4 (b)	Compare Newton Raphson method and Gauss Seidal method for load flow analysis.	[07]
Q5 (a)	<b>Solve any two.</b> i. State the benefits of a competitive Electricity market. ii. Write a note on Ancillary Service management. iii. Derive an expression of swing equation. iv. Compare between transient and steady state stability	[05] [05] [05] [05]
Q5 (b)	Discuss the various methods of improving steady state stability.	[05]