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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech III Year II Semester Supplementary Examinations July-2021**

**POWER SYSTEM ANALYSIS**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a Derive the necessary expressions for building up of  $Z_{bus}$  when New element is added to Reference. **6M**
- b Derive the necessary expressions for building up of  $Z_{bus}$  when New element is added between two existing buses. **6M**

**OR**

- 2 Define the following with suitable examples **12M**
- i) Branch and Links
- ii) Loops and cut sets
- iii) Tree and Co-tree

**UNIT-II**

- 3 a Define per unit system and advantages of per unit system? **5M**
- b How are reactors classified? Explain the merits and demerits of different types of system protection using reactors. **7M**

**OR**

- 4 25MVA, 13.2KV alternator with solidly ground neutral as sub-transient reactances of 0.25 p.u the Negative & zero sequence reactances are 0.35 and 0.1 /p.u. respectively a single line to ground alternator. Determine the fault current line to line voltage neglect the resistances Assume line to ground  $V=1.0$  **12M**

**UNIT-III**

- 5 a Derive and explain about static load flow equations. **7M**
- b Explain the data for Load flow studies. **5M**

OR

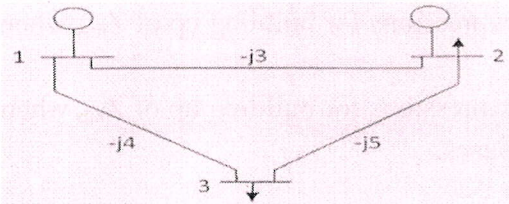
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A three bus power system is shown.

12M

Bus No.	Type	Generation		Load		Bus Voltage	
		P <sub>G</sub>	Q <sub>G</sub>	P <sub>L</sub>	Q <sub>L</sub>	V	δ
1	Slack	-	-	-	-	1.02	0
2	PQ	0.25	0.15	0.5	0.25	-	-
3	PQ	0	0	0.6	0.3	-	-

Determine the voltages at buses 2 and 3 after 1<sup>st</sup> iteration using Gauss-Seidal method. Take the acceleration factor  $\alpha=1.6$ .



## UNIT-IV

- 7 Derive power flow equation and draw power angle diagram for a 2-machine system with negligible losses. 12M

OR

- 8 a Derive and explain how to determine of transient stability by equal area criterion. 7M  
b What are the essential factors for stability problems? 5M

## UNIT-V

- 9 A 50Hz, 4 pole turbo generator rated 20MVA, 11kV has inertia constant of  $H=9$  kw-sec/KVA. Find the kinetic energy stored in the rotator at synchronous speed. Find the acceleration, if the input less the rotational losses is 26800HP and the electrical power developed is 16MW. 12M

OR

- 10 a Define and explain about Steady state stability limit, Transient state stability limit and Dynamic state stability limit. 7M  
b Define and explain about Steady state stability, Transient state stability and Dynamic state stability. 5M

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