



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

III B.Tech I Sem Regular End Examination, January 2022

Power Systems – II**(EEE)****Time: 3 Hours.****Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part – A, answer all questions which carries 20 marks.

3. In Part – B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

PART- A**(10*2 Marks = 20 Marks)**

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|-------|--|----|-----|-----|
| 1. a) | Briefly explain about transmission line classification. | 2M | CO1 | BL4 |
| b) | What is Surge Impedance Loading (SIL) of the overhead lines? | 2M | CO1 | BL1 |
| c) | Write short notes on on-load tap changing Transformer. | 2M | CO2 | BL1 |
| d) | Distinguish between line and load compensation. | 2M | CO2 | BL2 |
| e) | What do you mean by attenuation of a travelling voltage wave? | 2M | CO3 | BL1 |
| f) | A Generator is rated at 100MVA, 11kV, with sub-transient reactance of $X''=0.2\text{p.u.}$ on its own base. Determine its sub-transient reactance on new 500 MVA base. | 2M | CO3 | BL3 |
| g) | Explain the importance of Ground resistance. | 2M | CO4 | BL4 |
| h) | What are Rod-Gaps? Explain briefly. | 2M | CO4 | BL4 |
| i) | What are Symmetrical components? Explain their role in Fault Analysis. | 2M | CO5 | BL4 |
| j) | Explain the necessity of line reactors. | 2M | CO5 | BL4 |

PART- B**(10*5 Marks = 50 Marks)**

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|------|--|----|-----|-----|
| 2 a) | Find the ABCD parameters of a 3-phase, 80km, 50Hz transmission line with series impedance of $(0.15 + j 0.28)$ ohms per km and a shunt admittance of $j 5 \times 10^{-4}$ ohm per km for the both Π network. | 5M | CO1 | BL3 |
| b) | Derive the expression for voltage and current through rigorous solution, of a long transmission line and give the interpretation of these line equations. | 5M | CO1 | BL5 |

OR

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|------|---|-----|-----|-----|
| 3 | Write short notes on classification of Transmission lines. Also determine A, B, C, D parameters of the line 400 km long having $(0.15+j0.28)$ ohms per km and a shunt admittance of $j5 \times 10^{-4}$ mhos per km using the exact representation of the line. | 10M | CO1 | BL3 |
| 4 a) | Distinguish between Uncompensated vs Compensated Transmission lines. | 5M | CO2 | BL2 |
| b) | Briefly explain the concepts of Load Compensation methods. | 5M | CO2 | BL4 |

OR

- 5 Explain transmission line voltage control methods and their advantages and disadvantages. 10M C02 BL4
- 6 a) Briefly discuss about the advantages of per unit system representation of power system. 5M C03 BL2
 b) Derive the expression for travelling wave in a power system. 5M C03 BL5

OR

- 7 A 500kV, 2 μs rectangular wave travels on a line having a surge impedance of 400Ω and approaches a termination with a capacitance C equal to 300 pF. Determine the magnitudes of the reflected and transmitted waves. 10M C03 BL3
- 8 a) Discuss various causes for over-voltages in the Power system. 5M C04 BL2
 b) What is Insulation Coordination? Explain. 5M C04 BL4

OR

- 9 With the help of a neat diagram explain the construction and working principle of Valve-Type Lightning Arrester. 10M C04 BL4
- 10 a) Determine the all the sequence components for the un-balanced phasors given by

$$I_a = 10 \angle 0^\circ \text{ A} \quad I_b = 10 \angle 180^\circ \text{ A} \quad I_c = 0 \text{ A}$$

 b) Briefly explain the Short Circuit Capacity of a Bus. Mention its physical significance in the real world power system. 5M C05 BL4

OR

- 11 Two synchronous machines are connected through three-phase transformers to the transmission line as shown in figure below. The ratings and reactances of the machines and transformers are Machine 1 and 2: 100MVA, 20kV; $X_d'' = X_1 = X_2 = 20\%$, $X_0 = 4\%$, $X_n = 5\%$ Transformers T_1 and T_2 : 100MVA, 20 Delta/345 Star kV; $X = 8\%$ On a chosen base of 100MVA, 345kV in the transmission-line circuit the line reactances are $X_1 = X_2 = 15\%$ and $X_0 = 50\%$. For an LG fault on bus 2, find the sub-transient fault current in phase quantity. 10M C05 BL3



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