**20EE502**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **December, 2023** | **Electrical and Electronics Engineering** | | |
| **Fifth Semester** | **Power System Analysis** | | |
| **Time:** Three Hours | | **Maximum:** 70 Marks | |
| ***Answer question 1 compulsory.*** | | | **(14X1 = 14Marks)** |
| ***Answer one question from each unit.*** | | | **(4X14=56 Marks)** |
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|  |  |  | CO | BL | M |
| 1 | a) | List the types of cables in underground cables. | CO1 | L1 | 1M |
|  | b) | Inter sheath function of a cable? | CO1 | L3 | 1M |
|  | c) | Identify the methods of grading of cables? | CO1 | L2 | 1M |
|  | d) | Classify the types of buses in power system | CO2 | L3 | 1M |
|  | e) | Why the circuit breaker rating is decided on the basis of symmetrical short circuit current? | CO2 | L4 | 1M |
|  | f) | What is the significance of steady state, transient and sub transient reactance of a synchronous machines | CO2 | L4 | 1M |
|  | g) | Analyze the transients in RL series circuit | CO2 | L1 | 1M |
|  | h) | Develop the expression for voltage in terms of symmetrical components. | CO3 | L2 | 1M |
|  | i) | Outline the advantages of symmetrical components. | CO3 | L3 | 1M |
|  | j) | Classify unsymmetrical faults | CO3 | L3 | 1M |
|  | k) | Classify different types of distribution system. | CO4 | L3 | 1M |
|  | l) | What are the merits of indoor substations | CO4 | L4 | 1M |
|  | m) | Discuss the classification of substations | CO4 | L2 | 1M |
|  | n) | Discuss main bus bar system | CO4 | L2 | 1M |
| **Unit-I** | | | | | |
| 2 | a) | What is a cable and sketch a typical 1–core cable with the important parts and give brief explanation | CO1 | L4 | 7M |
|  | b) | Explain grading of cables. Compare the grading of cables with respect to practical power system. | CO1 | L3 | 7M |
| **(OR)** | | | | | |
| 3 | a) | Develop the PU diagram for the below given circuit with generator parameters as base value. | CO1 | L2 | 14M |
| **Unit-II** | | | | | |
| 4 | a) | Deduce the power angle equation of a synchronous machine and explain graphically | CO2 | L2 | 7M |
|  | b) | A three-phase round-rotor synchronous generator, rated 10 Kv, 50 MVA has armature resistance R of 0.1 p.u and synchronous reactance Xd of 1.65 p.u. The machine operates on a 10 Kv infinite bus delivering 2000 A at 0.9 power-factor leading. Determine the internal voltage E, and the power angle δ of the machine. Draw a phasor diagram depicting its operation. | CO2 | L3 | 7M |
| **(OR)** | | | | | |
| 5 | a) | Explain the short-circuit currents and reactance‘s of synchronous machines | CO2 | L3 | 7M |
|  | b) | Analyse symmetrical faults using bus impedance matrix | CO2 | L4 | 7M |
| **P.T.O**  **20EE502**  **Unit-III** | | | | | |
| 6 | a) | Explain briefly about symmetrical components used in power system fault analysis. | CO3 | L3 | 7M |
|  | b) | Develop an expression for fault current when line to line fault occurs on the terminals of an unloaded alternator. | CO3 | L2 | 7M |
| **(OR)** | | | | | |
| 7 |  | A 50 MVA, 12.6 kV, 3-phase, 50Hz generator has its neutral earthed through a 7% reactor. It is in parallel with another identical generator having its neutral earthed through a 5% reactor. Each generator has positive, negative and zero sequence reactance’s which are 10%, 7% and 5% respectively. When line to ground short circuit occurs in the common bus bar, find the fault current. | CO3 | L3 | 14M |
| **Unit-IV** | | | | | |
| 8 | a) | Explain the uniformly distributed load fed at one end. | CO4 | L3 | 7M |
|  | b) | A single phase, ring distributor PQR is fed at P. The loads at Q and R are 50A at p.f. 0.8 lag and 80A at p.f. 0.707 lag respectively, both expressed relative to the voltage at P. The total impedance of the three sections PQ, QR and RP are (1.5 + j 1.5) Ω, (2+j3)Ω and (2+j1) Ω respectively. Determine the current in each section with respect to the voltage at P. | CO4 | L2 | 7M |
| **(OR)** | | | | | |
| 9 | a) | A 2-wire, DC distributor 500 m long is loaded uniformly at the rate of 0.4A/m. If the voltage drop in the distributor is not to exceed 5V, Calculate the area of cross section of each conductor required when the distributor is fed at one end. Take resistivity of a conductor material as 1.7 ×10-8 Ω-m. | CO4 | L4 | 7M |
|  | b) | Explain the double bus-bar system with sectionalization and list their merits and demerits | CO4 | L3 | 7M |

