**14EE704**

**Hall Ticket Number:**

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| **IV/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **Jan/Feb, 2021** | **Electrical and Electronics Engineering** | | |
| **Seventh Semester** | **Switch Gear and Protection** | | |
| **Time:** Three Hours | | **Maximum :** 60 Marks | |
| *Answer ALL Questions from PART-A.* | | | (1X12 = 12 Marks) |
| *Answer* ***ANY FOUR*** *questions from PART-B.* | | | (4X12=48 Marks) |
| **Part - A** | | | |

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| 1 | Answer all questions | | (1X12=12 Marks) | |
|  | a) | What is pick up value | |  |
|  | b) | Mention any 2 applications of differential relays. | |  |
|  | c) | Name the parts of attracted armature relay | |  |
|  | d) | Write any two types of static relays. | |  |
|  | e) | What is instantaneous relay | |  |
|  | f) | What is Time setting multiplier | |  |
|  | g) | Name any two Bus bar protection Schemes | |  |
|  | h) | Name the method used to for protection against Large internal faults in an alternator. | |  |
|  | i) | Why neutral resistor is added between neutral and earth of an alternator | |  |
|  | j) | What is resistance switching | |  |
|  | k) | What is RRRV | |  |
|  | l) | Write the classification of circuit breakers based on the medium used for arc extinction | |  |
| **Part - B** | | | | |
| 2 | a) | Explain in detail the primary and back-up protection. What are the unit system of protection and non-unit system of protection? | | 6M |
|  | b) | Explain principle operation of Buchholz relay. | | 6M |
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| 3 | a) | Show that the torque on the disc of an induction disc relay is maximum when the phase difference between the two fluxes is 900. | | 6M |
|  | b) | Compare the characteristics of impedance relay and reactance relay. Also, give their applications. | | 6M |
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| 4 | a) | Compare electromagnetic and static relays | | 6M |
|  | b) | Briefly Explain construction and working of static impedance relay | | 6M |
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| 5 | a) | Discuss how an amplitude comparator can be converted to a phase comparator | | 6M |
|  | b) | Explain static instantaneous over current relays with block diagram? | | 6M |
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| 6 | a) | Explain Merz-price protection of a star- Delta transformer | | 6M |
|  | b) | A 3-phase, 66/11 kV star-delta connected transformer is protected by Merz-price system. The CT’s on low voltage side have a ratio of 420/5 A. Find the ratio of CT’s on the high voltage side. | | 6M |
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| 7 | a) | Give various schemes of protection for feeders. | | 6M |
|  | b) | Determine the value of reactance to be connected in the neutral connection to neutralize the capacitance current of an overhead line having line to ground capacitance of each line equal to 0.015μ f , Frequency = 50Hz. | | 6M |
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| 8 | a) | Explain the restriking phenomenon for circuit breakers. | | 6M |
|  | b) | What is the principle of operation of air blast circuit breaker? | | 6M |
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| 9 | a) | What is a minimum oil circuit breaker? What are its main advantages and disadvantages? | | 6M |
|  | b) | A 11 kV, 50 Hz, 3 −φ alternator is connected to a C.B the inductive reactance up to the C.B is 10 ohms per phase. The distributed capacitance up to C.B between phase and neutral is 0.03 µF . Determine the following. i) Maximum restriking voltage across the C.B contacts. ii) Frequency of restriking voltage transient. iii) Average RRRV up to peak restriking voltage. | | 6M |

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Scheme of Evaluation

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| 2a) | Definition of primary and back-up protection -2M.  Definition of unit system of protection and non-unit system of protection – 2M  Explanation -2M |
| b) | Circuit diagram of Buchholz relay – 2 M  Explanation of operation—3M  Advantages and drawbacks -1M |
| 3a) | Diagram of induction disc relay -2M  Explanation of operation 2M  Derivation of torque equation – 2M |
| b) | R-X diagram of impedance relay and reactance relay -2M  Operation -2M.  Applications-2M |
| 4a) | Advantages and dis advantages of electromagnetic relays -3M  Advantages and dis advantages of static relays -3M |
| b) | Circuit Diagram -2M  Explanation of operation -4M |
| 5a) | Circuit diagram -2M  Phasor diagram –2M  Explanation-2M |
| b) | Circuit diagram -2M  Explanation-4M |
| 6a) | Circuit diagram -2M  Phasor diagram –1M  Explanation-3M |
| b) | Problem solution -6M |
| 7a) | Scheme-1 circuit diagram and explanation -3M  Translay relay circuit diagram and explanation protection for feeders.-3M |
| b) | Problem solution -6M |
| 8 a) | Phenomena of arcing -2M  Arc interruption phenomena -2M  Restriking phenomenon-2M |
| b) | Circuit diagram -2M  Explanation-3M  Applications-1M |
| 9 a) | Circuit diagram -2M  Explanation-3M  Advantages and disadvantages -1M |
| b) | . i) Maximum restriking voltage across the C.B contacts- 2M  ii) Frequency of restriking voltage transient 2M  iii) Average RRRV up to peak restriking voltage 2M |