

22524

24225

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following : 10**
- a) State the need of current limiting reactors in power system.
 - b) Define normal and abnormal conditions in electrical system.
 - c) Define the following terms :
 - i) Arc voltage
 - ii) Recovery voltage
 - d) Draw time - current characteristics of IDMT relay.
 - e) List any four protection scheme used for alternator.
 - f) State any two requirements of transmission line protection.
 - g) State the difference between short circuit and overload.

P.T.O.

2. Attempt any THREE of the following : 12

- a) What are the causes of faults in power system ? State any four harmful effects of faults.
- b) With the help of neat diagram explain arc extinction phenomenon for high resistance current interruption.
- c) State following four basic relay terminologies –
 - i) Relay time
 - ii) Fault clearing time
 - iii) Pick up
 - iv) Reset
- d) Draw and explain microprocessor based transformer protection.

3. Attempt any THREE of the following : 12

- a) A 10 MVA, 6.6 KV, 3-phase star connected alternator having a reactance of 20% is connected through a 5 MVA, 6.6 KV/33 KV transformer of 10% reactance to a transmission line having a resistance and reactance per conductor of 0.2Ω and 1Ω respectively. Fifty kilometer along the line, a short circuit occurs between the three conductor. Find the current fed by the fault by the alternator.
- b) “ELCB is must for a residential installation.” Justify the statement.
- c) With the help of suitable diagram explain working of thermal relay.
- d) A star connected 3-phase 10 MVA, 6.6 KV alternator is protected by circulating current protection. The star point being earthed via a resistance r . Estimate the value of earth resistor if 85% of the stator winding is protected against earth fault. Assume earth fault setting of 20%. Neglect the impedance of the alternator winding.

4. Attempt any THREE of the following :**12**

- a) Compare Isolator and Circuit Breaker on the basis of –
 - i) Function
 - ii) Arc quenching media
 - iii) Types
 - iv) Application
- b) With a neat sketch, explain the operation of voltage balanced differential relay.
- c) What is Buchholz relay ? Which equipment is protected by it ? State its any two limitations.
- d) Explain with sketch protection of 3-phase induction motor during single phasing.
- e) Describe differential protection of Bus-bar with neat labelled diagram.

5. Attempt any TWO of the following :**12**

- a) Explain construction and working of SF6 gas circuit breaker with neat diagram.
- b) Explain any six quality requirements for better protective relaying.
- c) A 3-phase 66/11 KV, star-delta connected transformer is protected by Merz-price protection scheme. The CT's on the 11 KV side have a ratio of 420/5A. Find the ratio's of the CT's on the 66 KV side. Also draw a neat connection diagram of the complete scheme and indicate the given values at appropriate places.

6. Attempt any TWO of the following :

12

- a) Explain working of H.R.C. fuse with neat diagram. Also state their two application.
 - b) Explain working of induction type directional over-current Relay.
 - c) Explain how 'Pilot Wire protection is given to transmission line.
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