6E3111

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B.Tech VI Sem. (Main & Back) Exam., May. 2013
Electrical Engg.
6EE 3 Protection of Power Systems

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. _____   2. _____

UNIT – I

Q.1. (a) Explain what are primary protection and back-up protection? Discuss the remote back-up protection by Simple time graded relays. [8]

(b) Explain the following Scheme's with basic requirement of protection system, used in Circuit Breakers.

(i) Trip circuit with relay of make type contact.

(ii) Trip circuit with relay of brake type contact. [8]

OR

Q.1. (a) Describe the transient errors in current Transformer. [8]

(b) A particular bar type current transformer has 300 secondary turns. The secondary winding carries a burden of ammeter having resistance of 1Ω and inductive reactance of 0.53Ω, while secondary winding resistance is $0.25~\Omega$ and reactance $0.35~\Omega$. The magnetising mmf. required is 85A; while current component for core losses is 50A. Find [8]

(i) The primary current when secondary carries 5A.

(ii) The ratio error.

(iii) The reduction in the number of turns of secondary to obtain zero ratio error.

UNIT – II

Q.2. (a) Explain with the help of neat sketch, the principle, construction and working of directional induction type overcurrent relay. rtuonline.com [8]

(b) The current rating of an overcurrent relay is 5A. It has PMS=2; TSM=0.3, CT ratio is 400/5; fault current = 4000A. Determine the time of operation of the relay assuming normal IDMT characteristics. [8]

PSM	2	4	5	8	10	20
Operating Time (s)	10	5	4	3	2.8	2.4

OR

Q.2. (a) To use the directional relay what are the conditions to be satisfied? Explain briefly. [7]

(b) Describe the combined "Current and time" grading protective scheme of overcurrent relays. How the protection of ring-main feeder is provided by directional and non-directional over current relay. [9]

UNIT – III

Q.3. (a) Draw and Explain the Merz-Price protection of Alternator Stator Winding - State its advantages. [7]

(b) Explain, with the aid of neat diagram of connections, the principle of operations of current balance type differential protection of generator against earth and inter phase fault. [9]

OR

Q.3. (a) Which are the various abnormal running conditions which may exist in generator? What are their effects and how these effects can be minimized? [9]

(b) Why restricted earth fault protection is provided to alternators through it leaves a portion of winding unprotected against earth fault. Justified? [7]

UNIT – IV

Q.4. (a) State and Explain the Various possible faults in transformer. Why the faults are less in transformer than the generators? [7]

(b) Describe with the help of a neat diagram the connections of differential protection of transformer. A 3-phase 33/6.6 KV star/delta connected transformer is protected by differential system. The CT's on LT side have a ratio of 300/5. Show that the CT's on HT side will have a ratio $60:5\sqrt{3}$. [9]

OR

Q.4. (a) Explain the Buchholz relay with reference to

   (i) Principle of operation

   (ii) Installations. [7]

   (iii) Difficulties.

   (iv) Merits.

   (v) Limitations.

(b) Draw neat circuit diagram showing high impedance three-phase bus bar differential protection and what are the difficulties encountered in their protection?

UNIT – V

Q.5. (a) Explain how an impedance relay is used for distance protection, obtain its operating characteristics. Draw its operating characteristics on R-X diagram. [8]

(b) Explain with diagram the working principle of MHO relay. Deduce the torque equation of the same. [8]

OR

Q.5. (a) Describe the scheme for single phasing protection of Induction Motor. [6]

(b) Explain abnormal conditions and possible failure of induction Motors. [5]

(c) What is phase reversal? What is its effect? How it is prevented in induction Motors. [5]