

B.TECH SEM – VI (2007 COURSE) (ELECTRICAL ENGG.) :

WINTER - 2017

SUBJECT: SWITCHGEAR & PROTECTION

Day: **Tuesday**
Date: **21/11/2017**

W-2017-2510

Time: **10.00 AM TO 01.00 PM**
Max Marks: 80

N.B:

- 1) **Q. No. 1 and 5 are COMPULSORY.** Out of remaining attempt any **TWO** Questions from each section.
- 2) Answers to both the sections should be written in **SEPARATE** answer book.
- 3) Assume suitable data if necessary.
- 4) Figures to the right indicate **FULL** marks.

SECTION-I

- Q.1**
- a) State the functions of protective system. (05)
 - b) Specify the ratings of circuit breaker. (05)
 - c) What are the requirements of protective relaying? (04)
- Q.2**
- a) Draw & explain construction & working of air break circuit breaker. (07)
 - b) A- 3ph 10,000 KVA 11 kV alternator has a sub transient reactance of 8%. A 3 ph short circuit occurs at its terminals. Determine the fault current & fault KVA. Also Compare HRC fuse with MCB (06)
- Q.3**
- a) What are the adverse effects of current chopping on the power system? Hence explain how resistance switching helps in improving its performance. (07)
 - b) Explain with neat diagram the single puffer SF₆ circuit breaker. Also explain properties of SF₆ gas. (06)
- Q.4**
- a) Explain with neat diagram static over current relay with time - current characteristics. (07)
 - b) Determine the time of operation of a relay having rating of 5A IDMT type and having setting of 125% TSM= 0.6. The relay is connected to a supply circuit through a C.T. of ratio 400/5. The fault current in system is 40000 A. (06)

Refer IDMT curve given below

PSM	5	8	12
Operating time (sec.)	4	3.15	2.8

SECTION-II

- Q.5**
- a) Suggest protection against field failure of 3 phase alternator. Also draw the protection scheme & explain the same. (05)
 - b) What are the abnormalities which may take place in case of 3 phase induction motor? (05)
 - c) What do you mean by resonant earthing? Explain with neat diagram. (04)
- Q.6**
- a) A star connected 3 phases 15 MVA, 6.6 K.V. alternator has to be protected by Merz price circulating current principle. The relay is set to be operating for fault current more than 200 A. Calculate the value of earthing resistance to be provided in order to ensure that only 10% at the alternator winding remains unprotected. Assume phase reactance of alternator to be 10%. (07)
 - b) What do you mean by incipient faults? Explain the protection used against such faults with neat diagram. (06)
- Q.7**
- a) Explain with neat diagram the carrier pilot protection used for 3 phase transmission line. (07)
 - b) Explain the various protection schemes used for bus bar with neat diagram. (06)
- Q.8**
- a) What are various causes of over voltages on power system? Explain in detail. (07)
 - b) What are the functions of substation earthing system ? Also explain what do you mean by step potential & touch potential. (06)

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