No. of Printed Pages : 3

BIEE-023

B.Tech. IN ELECTRICAL ENGINEERING

Term-End Examination

June, 2013

BIEE-023 : SWITCHGEAR AND PROTECTION

Time : 3 hours *Maximum Marks : 70*

Note : *Answer **any seven** questions from ten questions.*

1. Explain Slepian's theory of arc interruption and discuss its limitations. How does energy balance theory explain the process of arc interruption ? 10

2. Explain with a neat sketch the working of cross-jet explosion pot used for arc - quenching in bulk oil circuit breakers. What are its limitations ? 10

3. Explain the construction of an SF_6 breaker. How does it essentially differ from an air - blast circuit breaker ? 10

4. Describe with a schematic diagram the equipment and procedure of testing a breaker in a testing station. Explain the principle of synthetic testing and enumerate its limitations. 10

5. Write short notes on : 5x2=10

(a) Surge impedance and velocity propagation.

(b) Specifications of travelling waves

(c) Reflection and refraction of travelling waves.

(d) Equivalent circuit of travelling wave studies

(e) Bewley lattice or zig-zag diagram

6. Give an idea about lightning voltages and currents that occur in power system. Hence sketch typical voltage wave and explain it. What is the function of a surge absorber ? In what way is it different from lightining arrester. 10

7. How are the following measurements carried out ? 10

(a) Measurement of earth resistance

(b) Measurement of soil resistivity

8. Explain the basic features of a 3-Zone stepped distance protection scheme for a long transmission line, employing mho characteristics for Zone 1 and Zone 2, with an offset mho characteristic for Zone-3 and starting. Briefly comment on the following : 10

(a) high source to line impedance ratio

(b) differing effective impedances with different type of fault at a given point.

9. Describe the block schematic of static - time current relay. Discuss the time current characteristics mathematically for the standard time current characteristics. 10

10. What are the types of faults that are likely to occur in a three-phase induction motor ? If motor is not fully loaded, is it necessary to provide protection against single phasing ? Explain why. 10