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BIEEE-006

DIPLOMA-IN-ELECTRICAL ENGINEERING

00235

Term-End Examination

June, 2012

BIEEE-006 : SWITCHGEAR AND PROTECTION

Time : 2 hours *Maximum Marks : 70*

Note : *All the questions to be answered in* ***English*** *language only. Question No. 1 is* ***compulsory****. Remaining* ***four*** *questions are to be attempted out of Question No. 2* ***to 8.***

1. (a) If the time of operation of a relay for unity TMS is 10 secs. the time of operation for 0.5 TMS coil be : **7x2=14**

(i) 20 secs.

(ii) 5 secs.

(iii) 10 secs.

(iv) None of the above

(b) SF6 gas has excellent heat transfer properties because of its :

(i) Higher molecular weight.

(ii) Low gaseous viscosity.

(iii) Higher dielectric strength.

(iv) A Combination of (i) and (ii).

(c) "A fault is more severe from the view point of RRRV if it is a Short line fault." State whether the statement is True or False.

(d) " A Mho relay is a voltage restrained directional relay." State whether the Statement is True or False.

(e) A 3-phase breaker is rated at 2000 MVA, 33 kV, its making current will be :

(i) 35 kA, (ii) 49 kA,

(iii) 70 kA (iv) 89 kA.

(f) If the normal system frequency is 50 Hz and if it is operating at 53 Hz, the equipment on the system, most adversely affected is :

(i) Power transformer

(ii) Alternator

(iii) Turbine

(iv) all the above are equally affected.

(g) Resistance switching is normally resorted in case of :

(i) Bulk oil circuit breakers.

(ii) Minimum oil circuit breakers.

(iii) Air Blast Circuit Breakers.

(iv) All types of breakers.

2. What is Universal Torque Equation ? Using this equation derive the following characteristic of : 14

(a) impedance relay;

(b) Reactance Relay;

(c) Mho relay

Draw the characteristics and indicate clearly the zones of operation and no-operation.

3. What is meant by : 14

(a) time-graded,

(b) current graded and

(c) Time-current graded systems ? Explain why time-current graded system is normally preferred over the other systems of protection ?

4. Explain the Carrier System of Protection. With a block diagram and neat sketches discuss how the phase comparision scheme can be used for protecting a feeder fed from (a) one end, and (b) both the ends. What is the basis for the choice of frequency in power line carrier system ? Explain whether this scheme can be used for the protection of underground cables. 14

5. Explain with reasons the connection of C.Ts for protecting a delta/star transformer. Justify your scheme of protection for (a) internal fault, and (b) external fault by showing current distribution in the scheme. 14

6. (a) Describe the construction, principle of operation and application of SF6 circuit breaker. How this breaker essentially differ from an air blast breaker ? 8

(b) Explain the process of 'Current chopping' in SF6 breakers ? 6

7. (a) Differentiate between type tests and routine tests. What different tests are carried out to prove the ability of a C.B. ? 8

(b) Describe with the help of neat diagram the procedure of testing a C.B. in a testing station. 6

8. Write short notes on *any four* of the following : **4x3½=14**

(a) Voltage race theory of Arc - extinction in C.B.

(b) Energy balance theory of Arc - extinction in C.B.

(c) High resistance are interruption method.

(d) Functional characteristics of a protective relay.

(e) Inverse time-Current Relay.

(f) Inverse definite minimum time.