

01501

**DIPLOMA-IN-ELECTRICAL ENGINEERING**

**Term-End Examination**

**December, 2013**

**BIEEE-006 : SWITCHGEAR AND PROTECTION**

*Time : 2 hours*

*Maximum Marks : 70*

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*Note : Attempt any five questions. Question No. 1 is compulsory.*

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1. Choose correct answer : 7x2=14
- (a) A lighting Arrester connected between the line and earth in a power system :
- (i) protect the thermal equipment against travelling surges.
  - (ii) protect the thermal equipment against lighting strokes.
  - (iii) reflect back the travelling waves approaching it.
  - (iv) none of above.
- (b) Buchholz relay is :
- (i) located in the conservator tank
  - (ii) located in the transformer tank itself
  - (iii) Installed in circuit breaker
  - (iv) connected in the pipe connected main tank of transformer and conservator

- (c) For the ground Fault, which relay is preferred :
  - (i) plain impedance relay
  - (ii) Directional relay.
  - (iii) Reactance Relay.
  - (iv) Over current Relay.
- (d) Isolaters are used for disconnecting a circuit when :
  - (i) line is energised
  - (ii) line is in full load
  - (iii) line carries no current
  - (iv) can be operated under any conditions.
- (e) Under voltage relay is mostly used for :
  - (i) Transformer protection.
  - (ii) Bus bar protection.
  - (iii) Motor protection.
  - (iv) Feeder protection.
- (f) Differential relay are used for the protection of equipment against :
  - (i) Internal Fault
  - (ii) Over current
  - (iii) Reverse Current
  - (iv) Reverse power.
- (g) The torque developed in Induction type relay is :
  - (i) Directly proportional to the current
  - (ii) Directly proportional to the square of the current.
  - (iii) Directly proportional to square root of the current.
  - (iv) Inversely proportional to the current.

2. (a) Describe the protection of ring main feeder with suitable example.  $7 \times 2 = 14$
- (b) Explain the time-graded and current-graded system in over current protection.
3. (a) Draw and explain the characteristics of a MHO relay. Why a MHO relay is preferred for protection of long lines against phase faults.  $5 + 5 = 10$
- (b) Explain with a suitable example of phenomenon of auto reclosing. 4
4. (a) Discuss the different transformer faults. What are the various protection schemes available for transformers ?  $7 \times 2 = 14$
- (b) A 3-phase. 33000/6600V transformer is connected in star/delta and the protecting current transformer is on the low voltage side have a ratio of 300/5. What will be the ratio of the current transformer on the high voltage side.
5. (a) Draw appropriate diagram to show the complete operation of a  $SF_6$  circuit breaker. Give the merits of  $SF_6$  circuit breaker.  $7 \times 2 = 14$
- (b) What is a zone protection? Discuss various zones of protection of a power system with the help of line diagram.

6. (a) What are the usual rating of a circuit breaker ? Why a circuit breaker has different types of voltage current and power ratings. 5
- (b) An 11kV 500MVA circuit breaker suddenly closes on to a fault, determine : 9
- (i) the symmetrical breaking current
  - (ii) the asymmetrical breaking current assuming 50% dc component.
  - (iii) The peak making current as per IEC specification.
  - (iv) Short time current rating.
7. Define recovery voltage and active recovery voltage also define the restriking voltage. Explain why severe voltage oscillation may occurs while a circuit breaker is de-energizing a long transmission line. Which is open circuited at the receiving end. 14
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