

GUJARAT TECHNOLOGICAL UNIVERSITY
B E Sem-VI Examination May 2011

Subject code: 162403

Subject Name: Switch Gear & Fault Analysis

Date : 19/05/2011

Time: 10.30 am – 01.00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What the main difference between a circuit breaker and an isolator? Explain the interlocking provided between isolator and circuit breaker giving proper reasons. (2+5) **07**
- (b) Define fuse. What do you mean by fuse element? State only, the desirable characteristics of a fuse element. **07**

- Q.2** (a) Define the following: (1) Fuse, (2) Arching time, **07**
(3) Peak Short Circuit Current, (4) Autoreclosure,
(5) Pick-up, (6) Reset,
(7) RRRV
- (b) What is short circuit? State different causes of short circuit in power system and explain any one in brief. **07**

OR

- (b) Classify types of protections. Explain the working principle of differential protection and distance protection. **07**
- Q.3** (a) Explain the construction of Buchholz relay with a neat diagram. **07**
- (b) Explain switching operation on RL series circuit. **07**

OR

- Q.3** (a) Derive the Universal torque equation of a relay. **07**
- (b) A 3- ϕ , 11 kV, 5 MVA generator has a steady state reactance X_d of 20%. It is connected to a 3MVA transformer having 5% leakage reactance and ratio of 11/33 kV. The 33 kV side is connected to a transmission line. Calculate the steady state fault current that would occur if a 3- ϕ fault occurs at the other end of the transmission line. The reactance between faulted point and ground is 30 Ω . Assume no load prior to the fault. **07**

- Q.4** (a) Explain the construction and working of SF₆ circuit breaker with a neat diagram. State four demerits of SF₆ C.B. **07**
- (b) State different methods of arc extinction and explain extinction of arc by splitting the arc with a neat diagram. **07**

OR

- Q.4** (a) Explain with a neat sketch, the construction and working of vacuum circuit breaker. **07**
- (b) State the primary functions of current limiting reactors and its drawbacks. **07**

- Q.5** (a) A 3- ϕ 11kV, 25,000 kVA alternator with $X_{g0} = 0.05$ p.u., $X_1 = 0.15$ p.u. and $X_2 = 0.15$ p.u. is grounded through a reactance of 0.3Ω . Calculate the line current for a single line to ground fault. **07**
- (b) Describe the working of thermal relay with a neat diagram. **07**

OR

- Q.5** (a) Explain double line to ground (LLG) fault of unloaded synchronous generator with neat diagram. **07**
- (b) Draw and explain the block diagram of microcontroller based digital relay. **07**
