Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – SUMMER 2013

Subject Code: 162403 **Date: 28-05-2013**

Subject Name: Switchgear and Fault Analysis

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)**	Define RRRV. Derive the equation for $RRRV_{max.}$	**07**
	(b)	Explain the construction and working of HRC fuse. List the advantages and disadvantages of HRC fuse. Justify the use of silver for the fuse link.	**07**
Q.2	**(a)**	List the advantages and limitations of static relays.	**07**
	(b)	Draw the diagram indicating the protective zones in power system. List and explain the desirable qualities of protective relaying.	**07**
		OR	
	(b)	Define fault. Explain the current interruption in ac circuit breakers. Draw the waveforms of current and voltage during the fault clearing.	**07**
Q.3	**(a)**	Explain Resistance Switching and Current Chopping with necessary diagrams in brief.	**07**
	(b)	Explain the arc-extinction in the single pressure puffer type SF_6 circuit breaker. List the advantages and disadvantages of SF_6 circuit breakers.	**07**
		OR	
Q.3	**(a)**	Define electric arc. Explain Slepianôs and Energy Balance theories of arc interruption.	**07**
	(b)	Explain the arc extinction in vacuum interrupters. Draw the neat diagram of vacuum interrupter and explain each part.	**07**
Q.4	**(a)**	Explain positive and negative sequence networks of three-phase alternator. Explain single line to ground fault on unloaded three-phase alternator at rated terminal voltage.	**07**
	(b)	Two 11 kV, three-phase, 3000 kVA generators having sub transient reactance of 15% operate in parallel. The generators supply power to a transmission line through a 6000 kVA transformer of ratio 11/22 kV and having a leakage reactance of 5%. Calculate fault current and fault MVA for three phase fault on (i) H.T. side (ii) L.T. side of transformer.	**07**
		OR	
Q.4	**(a)**	Explain the principle of current limiting reactors. Explain the location of series reactors with necessary diagrams.	**07**
	(b)	A three-phase, four-wire system supplies loads which are unequally distributed in the three phases. The analysis of the current flowing in R,Y and B lines shows that in R line, positive phase sequence component is 200Ž 0°A and the negative phase sequence component is 100Ž 60°A. The total observed current flowing back to the supply in the neutral conductor is 300Ž 300°A. Calculate the currents in the three lines.	**07**

Q.5	**(a)**	Explain the construction and working of electromagnetic induction disc relay. Explain plug setting and time setting in induction disc relay.	**07**
	(b)	Explain characteristics of over current protection relays. Explain the connection scheme of over current protection relays for three-phase system.	**07**

OR

Q.5	**(a)**	Explain the principle of operation of directional relays and explain induction disc type directional relay.	**07**
	(b)	Explain the principle of circulating current differential protection. List the difficulties in differential protection.	**07**

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