Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: X 50904 **Date: 06-12-2014**

Subject Name: Switchgear

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 is resistance switching? Prove, with derivation, that the restriking voltage can be reduced by incorporating resistance switching in an air blast circuit breaker. **07**

(b) Explain slepain's theory of arc interruption and discuss its limitations. How does energy balance theory explain the process of arc extinction? **07**

Q.2 **(a)** Explain the phenomenon of current chopping and its effects on circuit interruption. What measures are taken to reduce it? **07**

(b) Distinguish clearly between recovery voltage and restriking voltage and explain the significance of RRRV in the operation of circuit beaker. **07**

OR

(b) Explain the duty of circuit breaker for capacitor bank or unloaded transmission line switching. **07**

Q.3 **(a)** Discuss the following term with reference to circuit breaking: **07**

1) Rated Breaking capacity
2) Rated Making capacity
3) Rated Operating Duty

(b) In a 220 KV power system the series inductive reactance and capacitance per phase up to the location of circuit breaker is 8Ω and 0.025μF respectively. A resistance of 600 Ω is connected across the contacts of circuit breaker. Determine the following when the circuit breaker opens: **07**

(i) Natural frequency of transient oscillations.
(ii) Damped frequency of oscillations
(iii)The value of Resistance which will give damped frequency of oscillations, one-fourth of the natural frequency of oscillations

OR

Q.3 **(a)** Define the following time quantities related to circuit breaker: **07**

(i) Total fault clearing time
(ii)Break time
(iii)Arcing time
(iv)Opening time

(b) A 3 pole circuit breaker is rated as 1250 A, 500 MVA, 12 KV, 3 second vaccum circuit breaker. **07**

Find : (i) Rated service voltage (b) Rated normal current (iii) Rated symmetrical breaking current (iv) Rated Making current (v) Rated short time withstand current

Q.4	**(a)**	Explain the construction, working principle , merits and demerits of air break circuit breaker	**07**
	(b)	Explain the construction, working principle , merits and demerits of air blast circuit breaker	**07**

OR

Q.4	**(a)**	Explain the construction, working principle of Puffer type SF6 circuit breaker with neat diagram.	**07**
	(b)	Explain the construction, working principle , merits and demerits of minimum oil circuit breaker.	**07**
Q.5	**(a)**	Explain the construction, working principle of vaccum circuit breaker with neat diagram.	**07**
	(b)	Explain the classification of restriking transients in detail.	**07**

OR

Q.5	**(a)**	With neat diagram explain the principle of synthetic testing of circuit breaker. State its advantages.	**07**
	(b)	Explain working principle, construction, applications of HVDC circuit breaker.	**07**

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