Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC– SEMESTER V– • EXAMINATION – SUMMER - 2016

Subject Code: X50904 **Date:19/11/2016**

Subject Name: Switchgear

Time:10:30 AM to 1:00 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 the phenomenon of current chopping and its effects on circuit interruption. What measures are taken to reduce it? **07**

Q.2 **(a)** Explain slepain's theory of arc interruption and discuss its limitations. How does energy balance theory explain the process of arc extinction? **07**

(b) Explain capacitor switching duty of circuit breaker. **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) Define and explain the following characteristics of restriking voltage: **07**

(i) Amplitude factor
(ii) First pole to clear factor
(iii) RRRV

OR

Q.3 **(a)** Explain with neat diagram how the circuit breaker trips the faulty portion of power system when connected to trip circuit. **07**

(b) Define and explain following terms as applied to circuit breakers. **07**

(i) Arc Voltage
(ii) Restriking voltage
(iii) Recovery voltage

Q.4	**(a)**	Explain the construction, working principle of Puffer type SF6 circuit breaker with neat diagram.	**07**
	(b)	In a 132 KV power system the series inductive reactance and capacitance per phase up to the location of circuit breaker is 6Ω and 0.015 μF respectively. A resistance of 600 Ω is connected across the contacts of circuit breaker. Determine the following when the circuit breaker opens: (i) Natural frequency of transient oscillations. (ii) Damped frequency of oscillations (iii)Critical value of damping resistance, which will give no transient oscillations.	**07**

OR

Q.4	**(a)**	Explain the construction, working principle, merits and demerits of minimum oil circuit breaker.	**07**
Q.4	**(b)**	Explain the construction, working principle , merits and demerits of air break circuit breaker	**07**
Q.5	**(a)**	Explain the principle, construction of vacuum circuit breakers. Also state the merits of VCBs.	**07**
	(b)	Explain the construction, working principle , merits and demerits of air blast circuit breaker	**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**

****