



## **C.U.SHAH UNIVERSITY – WADHWAN CITY**

**FACULTY OF:** -Technology and Engineering (Diploma Engineering)

**DEPARTMENT OF:** -Electrical Engineering

**SEMESTER:** - VI      **CODE:** - 2TE06MTC1

**NAME** – Maintenance of Transformer and Circuit Breaker (MTC)

### **Teaching & Evaluation Scheme:-**

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evolution Scheme								
		Th	Tu	Pr	Total		Theory				Practical (Marks)				Total Marks
							Sessional Exam		University Exam		Internal		University		
							Marks	Hours	Marks	Hours	Pr	TW	Pr	TW	
2TE06MTC1	Maintenance of Transformer And Circuit Breaker (MTC)	04	00	02	06	05	30	1.5	70	3	---	20	30	----	150

### **Objectives:-**

- Undertake /Apply Preventive Maintenance
- Maintenance and Commissioning Different Types of Transformers
- Maintenance of Different Types of Circuit Breakers.

**Prerequisites:** - Basic Knowledge of Maintenance

- Basic Knowledge of Transformer and Circuit Breaker.

### **Course Outlines:-**

Sr. No.	Course Contents	No Of Hours
1	<b>Maintenance</b> Fundamental of Maintenance and its Types - Preventive and Breakdown Maintenance, Advantages of Preventive Maintenance, Scope of Preventive Maintenance, Economics of Preventive Maintenance.	06
2	<b>Maintenance of Transformers</b> Significance Of Transformer Maintenance, Parts Of Transformer, Factors Affecting The Life Of Transformer, Records and Electrical Test, General/Typical Maintenance Schedule of Power Transformers- Up To 1000 KVA and Above 1000 KVA, Maintenance of Transformer Oil- Characteristic, Interpretation of Tests, Procedure of Testing BDV, Filtering Plant, Causes of Failures of Power Transformers and Preventive Actions, Elective Devices-Buchholz Relay, Pressure Relief Device, Differential Relay, Dial Thermometer Alarm Contact, Over Current Relay, Ground Fault Relay, Check List of Maintenance of Power Transformers, Causes And Methods To Reduce Audible Noise (AN) From Transformer. Maintenance of Distribution Transformer - Reasons for Failure of Distribution Transformers and the Remedial Measures, Inspection and Maintenance Schedule for Distribution Transformers, Inspection and Maintenance of Transformer and Accessories Within the Sub-Station and its Proximity, Procedure of Measuring The Insulation Resistance of Transformer Windings.	18

3	<b>Commissioning and Recharging of Transformers</b> Concept of Commissioning and Recharging of Transformer, General Checks, Insulation Resistance Test, Measurement of Oil Characteristics, Off Circuit Tap Switch, Continuity Test, Measurement of Winding Resistance, Voltage Ratio Tests, Magnetizing Current, Charging of the Transformer, Do's and Don'ts for Transformer, Various Commissioning Tests on a Power Transformers, Procedure of Loading the Transformers, Transformer Grounding.	10
4	<b>Maintenance of Circuit Breakers</b> Steps in Maintenance of Circuit Breaker, Maintenance of Moulded Case Circuit Breakers, Maintenance of Low-Voltage Circuit Breakers, Maintenance of Medium Voltage Circuit Breakers – Air, Oil and Vacuum Circuit Breakers, Safety Practices and Maintenance Procedures for each of the above, Maintenance of High-Voltage Circuit Breakers, External and Internal Inspection Guidelines, Typical Internal Breaker Problems, Influence of Duty Imposed, Types of Tests Performed on Oil Circuit Breaker, Post Fault Maintenance, Steps in Maintenance of Circuit Breaker, Maintenance for Air Circuit Breaker, Maintenance of Air Blast Circuit Breaker, Maintenance Of SF6 Gas Circuit Breakers - Properties of SF6 Gas, Handling Non Faulted SF6, Handling Faulted SF6, Procedure of Filling SF6 Gas in Single Pressure Puffer Type, SF6 Circuit Breaker, Gas Monitoring System and Gas Handling System for SF6 Filled Equipment, Types and Function of SF6 Gas Handling Units, Maintenance of SF6 Circuit Breaker, Maintenance of Vacuum Circuit Breaker, Life of Arcing Contacts in Various Circuit Breaker in Case Of Normal Current Switching and Short Circuit Operation, Causes of Failure of Circuit Breaker, Trouble Shooting and Procedure of Failure Analysis, Typical Record Card for Maintenance Work of Circuit Breaker, Commissioning Tests on HVAC Circuit Breaker, Operating Mechanism Used in, HVAC Circuit Breaker, Safety Precautions to be Taken in Maintenance of Circuit Breaker	18

#### **List of Experiments:-**

- Prepare A Technical Report on The Preventive Maintenance Of Transformer Which Supply Electrical Power To Your College.
- Give Comparison Analysis Between Preventive And Breakdown Maintenance.
- Prepare Detail Specifications Data Sheet For Different Transformer.(Use Name Plate)
- Prepare A Technical Report On Various Accessories Of A Power Transformer.
- Perform Various Tests Applied To Insulating Oil.
- Prepare A Technical Report On Various Causes Of Troubles And Failures Of Power Transformer.
- Prepare Typical Maintenance Schedule For Transformers Up To 1000 KVA
- Prepare Typical Maintenance Schedule For Transformers Above 1000 KVA
- Prepare A Technical Report On Filtering Process And Filtering Plant For Transformer Oil Filtration.
- Prepare Test Report Of A Power Transformer After Commissioning.
- Read And Interpret I.E. Rules Pertaining To Testing Of Transformer.
- Perform Insulation Resistance Test Of Transformer.
- Perform Voltage Ratio Tests Of Three Phase Transformer.
- Read And Interpret I.E. Rules Pertaining To Commissioning Of Transformer.
- Prepare Detail Specifications Data Sheet For Different Circuit Breaker.(Use Name Plate)
- Prepare A Technical Report On Various Types Of Tests Performed On High Voltage Ac Circuit Breakers.
- Prepare A Technical Report On Maintenance Of SF<sub>6</sub> Circuit Breaker.

- Prepare A Technical Report On Maintenance Of Vacuum Circuit Breaker.
- Prepare Test Report Of Tests On HVAC Circuit Breaker After Commissioning.

**Learning Outcomes:-**

- Importance of maintenance
- Importance of transformer maintenance and Circuit Breaker Maintenance
- Commissioning and Recharging of Transformers

**Books Recommended:-**

- Thesis on Self learning package on maintenance of 33 KV class Transformer for diploma course in Electrical Engineering by **Shri Chouhan R.P.** Guided by **Shri. Gupta S.K.**, TTTI Western Region, Bhopal. (NITTTR)
- Testing Commissioning Operation and Maintenance of Electrical Equipments. by **Rao S.**, Khanna Publication (latest edition)