

"PVC" NSSK Govt. Polytechnic Bilaspur at Kalol (H.P.)  
Lesson Planning (Theory)

Branch : Electrical Engg.

Semester: 6th

Subject: Testing & Maintenance of Electrical Machines

Session: Jan 2024 - Jun 2024

Teacher: Ashwani Kumar

Class Room: L-5

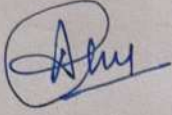
Sr. No	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Rem
1	4	Safety & Prevention of Accidents	Definition of Safety, Hazard, accident, major accident hazard, responsibility, authority, accountability, Monitoring. Need of Safety, I.E. Rules & Statutory regulations for safety of persons & equipment in electrical installation, Dos & don'ts for Substation operators, Causes of electrical accidents, severity of shock, Procedure for rescuing the person who has received an electric shock, methods of providing artificial respiration, Precautions to be taken to avoid fire due to electrical faults, various measures to prevent electrical accidents, types and operation of fire extinguishers.	R1,R2,R3	
2	08	Introduction to Testing & Maintenance of Machines	Objectives of Testing, Concept of tolerance, Routine tests, Special tests, Methods of testing: Direct, Indirect and Regenerative, Concepts of preventive, predictive, and breakdown maintenance, Advantages of maintenance, Preventive maintenance schedule, Introduction to Total Productive Maintenance.	- do -	
3	10	Testing & Maintenance of Rotating Electrical Machines	Type tests, routine tests & special tests of single and three-phase Induction motors, Routine, Preventive, & breakdown maintenance of Single & 3-phase Induction motors as per IS 9001:1992. Maintenance schedule of alternators & synchronous machines as per IS 4884- 1968. Brake test on DC Series motor.	- do -	
4	08	Testing & Maintenance of Transformer s	Procedure for conducting following tests on Transformers: Measurement of winding resistance, no load losses, & no load current, impedance, voltage, load losses, Insulation resistance, Induced over voltage withstand test, separate source voltage withstand test, Impulse voltage withstand test, Temperature rise test of oil & winding. Different methods of determining temp rise in transformer: back to back test, short circuit test, open delta (delta -delta) test. Preventive maintenance & routine maintenance of	- do -	

			distribution transformer as per I.S. Periodic checks for replacement of oil, silica gel, parallel operation of single & 3-phase transformer, load sharing calculations.	
5	04	<b>Testing &amp; Maintenance of Insulation</b>	Classification of insulating materials as per I.S, factors affecting life of insulating materials, measurement of insulation resistance & interpretation of condition of insulating. Methods of measuring temperature of internal parts of windings/machines & applying the correction factor when the machine is hot. Properties of good transformer oil, Causes of contamination of insulating oil, Procedure of acidity test, sludge test, crackle test and flash point test, Need and method of Filtration of Transformer oil, Methods of cleaning the insulation covered with loose, dry dust, sticky dirt, & oily viscous films, procedure for cleaning, washing & drying of insulation, re- varnishing, Methods of internal heating & vacuum impregnation.	- do -
6	10	<b>Trouble Shooting of Electrical Machines &amp; Switchgear</b>	Significance of Trouble Shooting of electrical machines, procedure of trouble shooting, Internal and External causes of Equipment failure. Various types of faults (mechanical, electrical & magnetic) in electrical machines and reason for their occurrence, Use and application of following tools in Troubleshooting: Bearing puller, Filler gauge, Dial indicator, Spirit level, Megger, Earth tester, Growler, Multimeter, Trouble shooting charts for Single & 3-phase Induction Motor, Transformers. Common troubles in electrical installation, maintenance & trouble shooting of LV switchgear like MCCB, ELCB, contactors & batteries.	- do -
7	08	<b>Installation of Electrical Machines &amp; Equipment</b>	Factors involved in designing the machine foundation, Requirement of different dimension of foundation for static & rotating machines, procedure for levelling & alignment of two shafts of directly & indirectly coupled drives, effects of misalignment, Installation of rotating machines as per I.S. Use of various devices & tools in loading, unloading, lifting, and carrying heavy equipment.	- do -

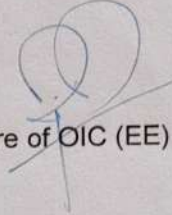


**REFERENCE RESOURCES:**

- R1. Operation and Maintenance of Electrical Machines- Vol-I & II
- R2. Electrical Workshop Practices by Dr. Umesh Rathore & Naresh K. Sharma, KATSON Publication New-Delhi
- R3. [www.electrical4u.com](http://www.electrical4u.com)



Signature of Teacher with Date



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