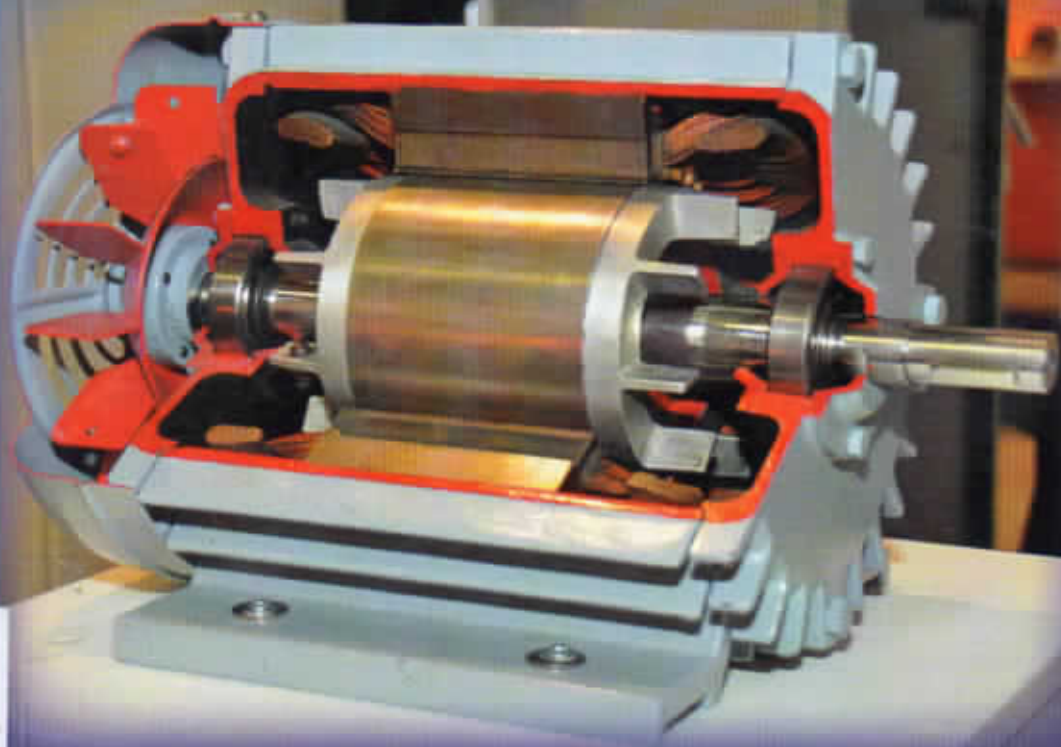
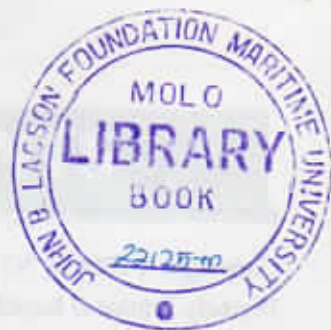


ELECTRICAL MACHINES



ELSEVIER
LEARNING

Ref
621.31042
E138
244
+



ELECTRICAL MACHINES



3G LEARNING

TABLE OF CONTENTS

1. Winding Insulating Materials	1.9 Types and Shapes of Winding Wires	28
1.1 Electrical Properties.....	1.9.1 Round Wires:	28
1.1.1 Electrical Resistivity	1.9.2 Rectangular straps.....	28
1.1.2 Dielectric Strength	1.9.3 Stranded wires	29
1.2 Classification of Insulating Materials	1.9.4 Gauge Plate.....	30
1.2.1 Classification according to substances and materials	1.10 Details of Winding.....	31
1.2.1 Classification according to temperature	1.10.1 Details about the Winding Coil	31
1.2.3 Characteristics of a Good Insulating Material	1.11 Different Shape of Slots	33
1.3 Insulation Materials	1.12 Slot Insulation	34
1.4 Plastics	1.12.1 Coil Formation	36
1.4.1 Thermoplastic Materials	1.12.2 Revolving (Rotor) Winding	36
1.4.2 Thermosetting Plastics.....	1.12.3 Stationary (Stator) Winding.....	37
1.5 Insulating Varnishes	1.12.4 Dc Armature Windings	37
1.5.1 Types of Insulating Varnishes For Various Applications.....	1.13 Lap Winding	38
1.6 Properties of Conductors	1.13.3 Half Coil Winding	40
1.6.1 Electrical Properties	1.13.4 Concentrated Winding	40
1.6.2 Mechanical Properties.....	1.13.5 Distributed Winding.....	40
1.6.3 Economic Factors:	1.13.6 Single Layer Winding	41
1.6.4 Characteristics of a Good Conductor Material	1.13.7 Double Layer Winding	41
1.7 The choice of a conductor material depends on the following Factors.....	1.13.8 Single Phase Winding	41
1.7.1 Commonly Used Conductor Materials	1.13.9 Three Phase Winding	41
1.8 Enamelled Wire.....	2. Rewinding, Testing of Electric Motors, Instruments and Testing	
1.8.1 Grades of Copper Enamelled Winding Wires	2.1 Method of Rewinding.....	43
1.8.2 Properties of Enamelled Wires.....	2.2 Winding Methods.....	46
	2.3 Testing of Armature	53
	2.4 Insulation Resistance Test	54
	2.5 Growler Test.....	55
	2.5.1 External growler.....	55
	2.5.2 Internal growler	56
	2.6 Drop Test	58
	2.7 Voltage Tester Screwdriver.....	59

2.8	Continuity Test.....	60	5.	Vacuum Cleaner and Washing Machines	
2.8.1	Multimeter/Continuity Test.....	61	5.1	History of Vacuum Cleaner.....	117
2.8.2	Open Circuit Test and Short Circuit Test.....	61	5.2	Types of Vacuum Cleaner.....	125
2.9	Insulation Testing.....	62	5.2.1	Cylinder Vacuum Cleaner.....	125
2.9.1	Insulation Tester (Megger).....	62	5.2.2	Upright Vacuum Cleaner.....	126
2.10	Measurement of Power.....	64	5.2.3	Wet and Dry Vacuum Cleaner.....	128
2.10.1	In a DC circuit.....	64	5.3	Repairing of Vacuum Cleaner.....	129
2.10.2	In 1-phase AC circuit.....	65	5.4	Washing Machine.....	131
2.10.3	Phase AC circuit.....	66	5.4.1	The First Washing Machines.....	132
3.	Electrical Cooking Appliances and Electric Iron Box		5.5	Function of Washing Machine.....	135
3.1	Types.....	69	5.5.1	Types of Washing Machine.....	135
3.1.1	Construction.....	69	5.6	Washing Technique Used.....	137
3.1.2	Electric Toasters.....	72	5.6.1	Working Cycle.....	140
3.1.3	Types of Electric Toasters.....	74	5.6.2	Constructional Details of Semi-automatic Washing Machine.....	140
3.2	Definition of Electric Iron box.....	76	5.6.3	Working of Semi-automatic Washing Machine.....	141
3.2.1	Types of Iron Box.....	76	5.7	Basic Structure of Top Loading Washing Machine.....	142
3.2.2	Non-Automatic Iron Box.....	76	5.7.1	Working of Top Loading Washing Machine.....	144
3.2.3	Automatic Iron Box.....	78	5.7.2	Construction and Working of Front loading washing machine.....	145
3.2.4	Differences between Non-automatic and Automatic Iron Box.....	81	5.7.3	Comparison of Front load and Top load Washing machines.....	145
3.2.5	Steam Iron.....	81	5.7.4	Washing Machine Problems and Remedies.....	146
4.	Water Heaters and Electric Mixer		6.	Electric Fan and Centrifugal Pump	
4.1	Concept of Water Heater.....	86	6.1	Construction of Ceiling Fan.....	150
4.1.1	Types of Water Heaters.....	87	6.1.1	Working of Ceiling Fan.....	152
4.1.2	Immersion Water Heaters.....	89	6.2	Table Fan.....	153
4.1.3	Storage Water Heaters (Geysers).....	91	6.2.1	Parts of Table Fan.....	154
4.2	Coffee Maker.....	96	6.2.2	Exhaust Fan.....	155
4.2.1	Types of Coffee Maker.....	97	6.3	Hair Dryers.....	157
4.2.2	Operation of Coffee Maker.....	98	6.3.1	Types of Hair Dryer.....	158
4.3	Electric Mixer.....	100	6.3.2	Constructional parts of Hair Dryer.....	158
4.3.1	Function of Mixer.....	101	6.3.3	Working of Hair Dryer.....	161
4.4	Egg Beaters.....	105			
4.4.1	The Best Egg Beater.....	107			
4.4.2	Rotary Beater.....	109			
4.4.3	Dough Blender.....	110			
4.5	Essential Kitchen Supplies.....	113			

6.3.4	Hair Dryer Safety.....	161	8.2	Different Methods of Drying Out a Transformer	207
6.4	Centrifugal Pump.....	162	8.3	Time of Drying-Out Operation.....	209
6.4.1	The Constructional Features of Centrifugal Pump.....	163	8.3.1	The Qualities Required For Good Transformer Oil.....	210
6.4.2	Working of Centrifugal Pump	165	8.3.2	Different Methods of Purifying and Drying-Out Transformer Oils	211
6.4.3	Friction Head	166	8.3.3	Dielectric Strength for Oil.....	211
6.4.4	Troubles Shooting	169	8.4	The Breakdown Value (BDV) for the Oil	215
7.	Maintenance of Rotating Machines		8.4.1	Action to Be Taken If a Transformer Fails.....	215
7.1	Types of Maintenance	172	8.4.2	Points to Be Attended During Periodical Overhaul.....	217
7.2	Preventive maintenance schedule....	174	8.5	Preventive Maintenance Program ...	218
7.2.1	Annual Maintenance.....	176	8.5.1	Transformer's Temperature	219
7.2.2	The Normal Value of Air Gap: It's Measurement.....	176	8.5.2	Maintenance Procedures for the Insulating Oil	221
7.3	Removing a Bearing.....	177	8.5.3	Deterioration of the Insulating Oil	221
7.3.1	Removing bearings using hydraulic techniques	178	8.5.4	Preventing the Deterioration of the oil	222
7.4	Fitting Bearings	179	8.5.5	Evaluation of the Deterioration of Dielectric Oil	223
7.4.1	Maintenance of Bearings.....	179	8.6	Maintenance and Inspection of the Bushings	223
7.4.2	Frequency of Lubricating Oil Analysis.....	180	8.6.1	Routine inspection.....	223
7.4.3	Checking the alignment of a directly coupled motor.....	181	8.6.2	Regular Inspection.....	224
7.5	Balancing	181	8.6.3	Self Cooling Type Radiator	225
7.6	Preventive Maintenance of Electrical Equipment's	184	8.7	Maintenance and Inspection of the Thermometers	225
7.6.1	General procedure for overhaul of motors.....	186	8.7.1	Dial Type Thermometer	225
7.7	Maintenance of A.C. Motors	187	8.7.2	Maintenance and Inspection of Oil Level Gauge	226
7.8	Common defects in commutators..	195	8.8	Failures and Countermeasures	231
7.9	De-greasing.....	197	8.8.1	Causes of The Failure	231
7.10	Applying insulating varnish on electrical coils and windings.....	198	8.8.2	Types of Failures	232
7.10.1	The Process of vacuum impregnation.....	200	8.8.3	Discovery of the Failures	232
8.	Maintenance of Transformers		8.8.4	Internal Defects of the Transformer	234
8.1	Action to be Taken if the oil Temperature Rises Unduly	205	8.8.5	Internal Defects of the Transformer	234
8.1.1	Maintenance and Lines and Bus bar Inspection	206			
8.1.2	Points to be checked if the Oil Level Tends to Fall Down	206			
				Bibliography	