

SYLLABUS FOR CONDUCTING CBT FOR JMOT

A. Subject Knowledge (80%)		
Sl.No	Sub Topic	Detail Description
1	Occupational Safety & Health	<p>Basic Safety Introduction, Personal Protection: - Basic Injury Prevention, Basic First Aid, Hazard Identification And Avoidance, Safety Signs For Danger, Warning, Caution & Personal Safety Message. Use Of Fire Extinguishers. Visit & Observation Of Sections. Various Safety Measures Involved In The Industry. Elementary First Aid. Concept Of Standard</p>
2	Occupational Safety & Health Importance Of Housekeeping & Good Shop Floor Practices.	<p>Health, Safety And Environment Guidelines, Legislations & Regulations As Applicable. Disposal Procedure Of Waste Materials Like Cotton Waste, Metal Chips/Burrs Etc. Basic Safety Introduction, Personal Protective Equipment (PPE):- Basic Injury Prevention, Basic First Aid, Hazard Identification And Avoidance, Safety Signs For Danger, Warning, Caution & Personal Safety Message. Preventive Measures For Electrical Accidents & Steps To Be Taken In Such Accidents. Use Of Fire Extinguishers.</p>
3	Introduction Of National Electrical Code 2011	<p>Explanation, Definition And Properties Of Conductors, Insulators And Semi-Conductors. Voltage Grading Of Different Types Of Insulators, Temp. Rise Permissible Types Of Wires & Cables Standard Wire Gauge Specification Of Wires & Cables-Insulation & Voltage Grades -Low , Medium & High Voltage Precautions In Using Various Types Of Cables / Ferrules</p>
4	Ohm's Law, Resistors Kirchhoff's Laws and applications.	<p>Ohm's Law - Simple Electrical Circuits And Problems. Reading Of Simple Electrical Layout. Resistors -Law Of Resistance. Series And Parallel Circuits. Kirchhoff's - Laws And Applications. Wheatstone Bridge Principle And Its Applications. Effect Of Variation Of Temperature On Resistance. Different Methods Of Measuring The Values Of Resistance</p>
5	Common Electrical Accessories	<p>Common Electrical Accessories, Their Specifications In Line With NEC 2011- Explanation Of Switches Lamp Holders, Plugs And Sockets. Developments Of Domestic Circuits, Alarm & Switches, With Individual Switches, Two Way Switch .Security Surveillance, Fire Alarm, MCB, ELCB, MCCB.</p>
6	Chemical Effect Of Electric Current	<p>Chemical Effect Of Electric Current- Principle Of Electrolysis. Faraday's Law Of Electrolysis. Basic Principles Of Electro - Plating And Electro Chemical Equivalents. Explanation Of Anodes And Cathodes.</p>

		Lead Acid Cell-Description, Methods Of Charging-Precautions To Be Taken & Testing Equipment, Ni-Cadmium & Lithium Cell, Cathodic Protection. Electroplating, Anodising. Different Types Of Lead Acid Cells.
7	Rechargeable Dry Cell, Description Advantages And Disadvantages.	Rechargeable Dry Cell, Description Advantages And Disadvantages. Care And Maintenance Of Cells Grouping Of Cells Of Specified Voltage & Current, Sealed Maintenance Free Batteries, Solar Battery.
8	Inverter, Battery Charger, UPS-Principle of Working	Inverter, Battery Charger, UPS-Principle Of Working. Lead Acid Cell, General Defects & Remedies. Nickel Alkali Cell-Description Charging. Power & Capacity Of Cells. Efficiency Of Cells.
9	Alternating Current	Comparison And Advantages D.C And A.C. Related Terms Frequency Instantaneous Value, R.M.S. Value Average Value, Peak Factor, Form Factor. Generation Of Sine Wave, Phase And Phase Difference. Inductive And Capacitive Reactance Impedance (Z), Power Factor (P.F). Active And Reactive Power, Simple Problems On A.C. Circuits, Single Phase And Three-Phase System Etc. Problems On A.C. Circuits. Power Consumption In Series And Parallel, P.F. Etc. Concept Three-Phase Star And Delta Connection. Line And Phase Voltage, Current And Power In A 3 Phase Circuits With Balanced And Unbalanced Load.
10	Earthing	Principle Of Different Methods Of Earthing. I.E. Pipe, Plate, Etc. Importance Of Earthing. Improving Of Earth Resistance Earth Leakage Circuit Breaker (ELCB). In Absence Of Latest Revision In Respective BIS Provision For Earthing It Is Recommended To Follow IEC Guidelines.
11	Basic Electronics	Semiconductor Energy Level, Atomic Structure 'P' Type And 'N' Type. Type Of Materials - P-N-Junction. Classification Of Diodes – Reverse And Forward Bias, Heat Sink. Specification Of Diode PIV Rating. Explanation And Importance Of D.C. Rectifier Circuit. Half Wave, Full Wave And Bridge Circuit. Filter Circuits-Passive Filter.

12	Electric Wirings	<p>I.E. Rules. Types Of Wirings Both Domestic And Industrial. Specifications For Wiring. Grading Of Cables And Current Ratings. Principle Of Laying Out In Domestic Wiring. Voltage Drop Concept. Wiring System - P.V.C., Concealed System. Maintenance And Repairing Data Sheet Preparation. Specifications, Standards For Conduits And Accessories</p> <ul style="list-style-type: none"> - Power Wiring - Control Wiring - Information Communication - Entertainment Wiring. <p>Testing Of Wiring Installation By Meggar.</p>
13	D.C. Machines	<p>General Concept Of Electrical Machines. Principle Of D.C. Generator. Use Of Armature, Field Coil, Polarity, Yoke, Cooling Fan, Commutator, Slip Ring Brushes, Laminated Core. Explanation Of D.C. Generators-Types, Parts. E.M.F. Equation-Self Excitation And Separately Excited Generators-Practical Uses. Brief Description Of Series, Shunt And Compound Generators.</p>
14	D.C. Motors	<p>Terms used In D.C. Motor-Torque, Brake Torque, Speed, Back-E.M.F. Etc. And Their Relations, Types Of D.C. Motor. Starters Used In D.C. Motors Related Problems Characteristics Of D.C.Motor, Losses & Efficiency, Application Of D.C. Motors. Care, Routine & Preventive Maintenance.</p>
15	Transformer	<p>Working Principle Of Transformer. Classification C.T., P.T. Instrument And Auto Transformer(Variac), Construction, Single Phase And Poly Phase. E.M.F. Equation, Parallel Operation Of Transformer, Their Connections. Regulation And Efficiency. Type Of Cooling For Transformer. Protective Devices. Specifications, Simple Problems On E.M.F. Equation, Turn Ratio, Regulations And Efficiency. Special Transformers. Transformer –Classification Of Transformer. Components, Auxiliary Parts I.E. Breather, Conservator, Buchholze Relay, Other Protective Devices. Transformer Oil Testing And Tap Changer (Off Load And On Load). Dry Type Transformer. Bushings And Termination.</p>
16	Electrical Measuring Instruments	<p>Electrical Measuring Instruments - Types, Indicating Types. Deflecting Torque, Controlling Torque And Damping Torque , PMMC & MI Meter (Ammeter, Voltmeter)</p> <ul style="list-style-type: none"> -Range Extension -Multimeter (Digital/Analog) -Wattmeter - P.F. Meter - Energy Meter (Digital/Analog) <p>–Insulation Tester (Megger), Earth Tester. -Frequency Meter -Phase Sequence Meter -Multimeter –Analog And Digital</p>

		-Tong Tester -Techometer.
17	Three Phase Induction Motor	Working Principle –Production Of Rotating Magnetic Field, Squirrel Cage Induction Motor, Slip-Ring Induction Motor. Construction , Characteristics And Speed Control, Slip & Torque. Control & Power Circuit Of Starters D.O.L Starter, Star /Delta Starter, Autotransformer Starter, Rotor Resistance Starter, Etc Single Phasing Preventer. Losses & Efficiency. Application Of Induction Motor Care, Routine & Preventive Maintenance.
18	Single Phase Induction Motor	Working Principle, Different Method Of Starting And Running (Capacitor Start, Permanent Capacitor, Capacitor Start & Run, Shaded Pole Technique). FHP Motors, Repulsion Motor, Stepper Motor, Hysteresis Motor, Reluctance Motor. Application Of Single Phase Induction Motor Universal Motor -Advantages, Principle, Characteristics, Applications In Domestic And Industrial Appliances, Fault Location And Rectification. Braking System Of Motor.
19	Alternator	Explanation Of Alternator, Types Of Prime Mover, Efficiency, Regulations, Phase Sequence, Parallel Operation. Specification Of Alternators And Brushless Alternator. Verify The Effect Of Changing The Field Excitation And Power Factor Correction Of Industrial Load. Tracing Of Panel Wiring Diagram Of An Alternator. Drawing The Schematic Diagram Of Automatic Voltage Regulators Of A.C. Generators.
20	Synchronous Motor	Working Principle, Effect Of Change Of Excitation And Load. V And Anti V Curve. Cause Of Low Power Factor. Method Of Power Factor Improvement.
21	Transformer Winding	Small Transformer Winding Techniques
22	AC Machine Winding	Motor Winding Terminology – Classification Of Conducting And Insulating Materials Used In Winding – Types And Methods Of Winding In Single And Three Phase Motors.
23	Illumination	Laws Of Illuminations, Terminology Used, Illumination Factors, Intensity Of Light –Importance Of Light, Human Eye Factor, Units. Types Of Illumination Type Of Lamps -Neon Sign Halogen, Mercury Vapour, Sodium Vapour, Fluorescent Tube, CFL, LED, Solar Lamp & Photo Cell Applications, Decoration Lighting, Drum Switches, Efficiency In Lumens Per Watt, Calculations Of Lumens. Estimating Placement Of Lights, Fans And Ratings. Free Hand Sketching Of Mercury Vapour Lamp, Sodium Vapour Lamp, Fluorescent Tube (Single & Twine), MHL Lamp And Their Connection.
24	Industrial Wiring	Code Of Practice And Relevant Span. Wiring Of Electric Motors, Control Panel, Etc.

		Types, Specifications, Advantages Of Different Types Of Circuit Brackets Construction And Maintenance. Working Principle And Construction Of Domestic And Agricultural Appliances-Their Maintenance.
25	Control Elements	Isolator, Pushbutton Switches, Indicating Lamps, MCB, Fuse, Contactor, Relays, Overload Relay, Timers, Rectifier, Limit Switches, Control Transformers. Wiring Accessories: Race Ways/ Cable Channel, DIN Rail, Terminal Connectors, Thimbles, Lugs, Ferrules, Cable Binding Strap & Buttons, Nylon Cable Ties, Sleeves, Gromats & Clips
26	Domestic Appliances	Working Principles And Circuits Of Common Domestic Equipment And Appliances. – Calling Bell, Buzzer, Alarms, Electric Iron, Heater, Light. Electric Kettle, Heater / Immersion Heater, Hot Plate, Oven, Geyser, Cooking Range, Mixer, Washing Machine, , Motor Pump Set, Etc. Concept Of Neutral And Earth.
27	Power Generation	Generation Sources Of Energy, Comparison Of Energy Resources. Types Of Fuels. Advantages Of Liquid Fuel & Solid Fuel. Various Ways Of Electrical Power Generation. • Thermal • Hydroelectric • Nuclear • Non-Conventional Thermal Coal Based, Diesel Based & Gas Based Turbine. Constituents In Steam Power Station.
28	Hydro Electric	Schematic Arrangement Of Hydro-Electric Power Station. Constituents Of Hydro Electric Plant. Types Of Hydro Electric Power Station. Advantages & Disadvantages.
29	Non-Conventional	An Introduction To Power Generation Through Non-Conventional Power Generation Such As Solar, Bio-Gas, Wind Energy And Micro-Hydel, Tidal Waves, Etc. Basic Principal, Advantages & Disadvantages Of Each.
30	Transmission Of Electrical Power	Electrical Supply System Comparison Of AC And DC Transmission. Advantages Of High Transmission Voltage. Introduction To Single Phase , Three Phase-3 Wire System In Transmission Lines Overhead Lines Main Components Of Overhead Lines-Types Of Power Line Low Voltage Line Medium Voltage Line & High Voltage Line Voltage Standard Conductor Materials, Line Supports, Insulators, Types Of Insulators.
31	Under Ground Cable	Construction Of Cables. Material For Cables, Its Insulation. Classification Of Cables, Cables For 3-Phase Service, Laying Of Underground Cable. Types Of Cable Faults And Their Location.
32	Distribution of Power	Function And Equipment Used In Substation. Classification Of Distribution System-AC Distribution, Overhead V/S Underground Distribution System. Essential Features Of Switchgears. Isolator, Switch Gear Equipments, Bus-Bar Arrangement, Short Circuit, Faults In Power System.
33	Circuit Breakers	Introduction & Classification Of Circuit Breakers Lightening Arrestors Used In HT Lines.
34	Basic Electricity	Introduction, Use Of Electricity, How Electricity Is Produced, Types Of Current_ AC, DC, Their Comparison, Voltage, Resistance, Their Units. Conductor, Insulator, Types Of Connections – Series, Parallel, Electric Power, Horse Power, Energy, Unit Of Electrical Energy

35	D.C. Machines	Graphic Symbols For Rotating Machines. Sketching Of Brush And Brush Gear Of D.C. Machines. Sketching Of D.C. 3-Point And 4-Point Starter . Layout Arrangement Of D.C. Generators & Motors, Control Panel. Exercises On Connection To Motors Through Ammeter, Voltmeter & K.W. Meters Of Electrical Wiring Diagram. Drawing The Schematic Diagram Of D.C. Motor Speed Control By Thyristor / DC Drive.
36	Transformer	Graphic Symbols For Transformers. Free Hand Sketching Of Transformer And Auxiliary Parts And Sectional Views. Sketching A Breather. Drawing The Diagram Of Typical Marking Plate Of A Distribution Transformer.
37	Three Phase Induction Motor	Free Hand Sketching Of Slip-Ring And Squirrel Cage Induction Motor. Typical Wiring Diagram For Drum Controller Operation Of A.C. Wound Rotor Motor. Drawing The Schematic Diagram Of Autotransformer Starter, DOL Starter And Star Delta Starter. Drawing The Schematic Diagram Of A.C. Motor Speed Control By SCR /AC Drive.
38	Distribution of Power	Types Of Insulator Used In Over Head Line. (Half Sectional Views) Different Type Of Distribution Systems And Methods Of Connections. Layout Diagram Of A Substation. Single Line Diagram Of Substation Feeders
39	Control Panel	Practice In Reading Panel Diagram. Local & Remote Control Of Induction Motor With Inching. Forward & Reverse Operation Of Induction Motor Automatic Star Delta Starter Automatic Star Delta Starter With Change Of Direction Of Rotation Sequential Control Of Three Motors.
40	Sign & Symbol Trade Related Alternating Current	Drawing Of Simple Electrical Circuit Using Electrical Symbols. Drawing Of Sine Square & Triangular Waves. Diagram Of Battery Charging Circuit. Practice In Reading Typical Example Of Circuit Containing R, L & C. Reading Of Electrical Drawing.
41	Magnetism	Classification Of Magnets, Methods Of Magnetising, Magnetic Materials. Properties, Care And Maintenance. Para And Diamagnetism And Ferro Magnetic Materials. Principle Of Electro-Magnetism, Maxwell's Corkscrew Rule, Fleming's Left And Right Hand Rules, Magnetic Field Of Current Carrying Conductors, Loop And Solenoid. MMF, Flux Density, Reluctance. B.H. Curve, Hysteresis, Eddy Current. Principle Of Electro- Magnetic Induction, Faraday's Law, Lenz's Law. Electrostatics: Capacitor- Different Types, Functions And Uses.
B. NUMERICAL, GK and REASONING (10%)		
C. ENGLISH KNOWLEDGE (10%)		