9.2 CORE SKILL - ENGINEERING DRAWING

S No.	CONTENTS
1ST Semester	
1	Engineering Drawing: Introduction and its importance • Relationship to other technical drawing types • Conventions • Viewing of engineering drawing sheets. • Method of Folding of printed Drawing Sheet as per BIS SP:46-2003
2	Drawing Instruments : their Standard and uses • Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor. • Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc). • Pencils of different Grades, Drawing pins / Clips.
3	Lines : • Definition, types and applications in Drawing as per BIS SP:46-2003 • Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) • Drawing lines of given length (Straight, curved) • Drawing of parallel lines, perpendicular line • Methods of Division of line segment
4	Drawing of Geometrical Figures: • Definition, nomenclature and practice of angle measurement and its types, method of bisecting. • Triangle - different types • Rectangle, Square, Rhombus, Parallelogram. • Circle and its elements.
5	Lettering and Numbering as per BIS SP46-2003: - • Single Stroke, Double Stroke, inclined, Upper case and Lower case.
6	Dimensioning: • Definition, types and methods of dimensioning (functional, nonfunctional and auxiliary) • Types of arrowhead • Leader Line with text
7	Free hand drawing of: • Lines, polygons, ellipse, etc. • Geometrical figures and blocks with dimension • Transferring measurement from the given object to the free hand sketches.

8	Sizes and Layout of Drawing Sheets: • Basic principle of Sheet Size • Designation of sizes • Selection of sizes • Title Block, its position and content • Borders and Frames (Orientation marks and graduations) • Grid Reference • Item Reference on Drawing Sheet (Item List)
9	Method of presentation of Engineering Drawing • Pictorial View • Orthogonal View • Isometric view
10	Symbolic Representation (as per BIS SP:46-2003) of: • Fastener (Rivets, Bolts and Nuts) - Bars and profile sections • Weld, brazed and soldered joints. • Electrical and electronics element • Piping joints and fittings
2nd Semester	
1	Construction of Scales and diagonal scale
2	Practice of Lettering and Title Block
3	Dimensioning practice: • Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) • Symbols preceding the value of dimension and dimensional tolerance. • Text of dimension of repeated features, equidistance elements, circumferential objects.
4	Construction of Geometrical Drawing Figures: • Different Polygons and their values of included angles. Inscribed and Circumscribed polygons. • Conic Sections (Ellipse & Parabola)
5	Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.
6	Free Hand sketch of hand tools and measuring tools used in respective trades.

7	Projections: • Concept of axes plane and quadrant. • Orthographic projections • Method of first angle and third angle projections (definition and difference) • Symbol of 1st angle and 3rd angle projection as per IS specification.
8	Drawing of Orthographic projection from isometric/3D view of blocks
9	Orthographic Drawing of simple fastener (Rivet, Bolts, Nuts & Screw)
10	Drawing details of two simple mating blocks and assembled view.
3rd Semester	
1	**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.
2	**Electronic components** • Symbols for electronic components. Diode, Transistor, Zener diode, SCR, UJT, FET, IC, Diac, Triac, Mosfet, IGBT etc. • Drawing of half wave, Full wave and Bridge rectifier circuit. • Drawing circuit for a single stage Amplifiers and Multi stage Amplifies and types of signals. • Drawing of circuit containing UJT, FET & Simple power control circuits. • Free hand drawing of Logic gates and circuits.
3	**Electric wirings & Earthing** • Detailed diagram of calling bell, & Buzzers etc • Free hand sketching of Staircase wiring. • Drawing the schematic diagram of plate and pipe earthing. • Diagram for electroplating from A.C / D.C source.
4	**DC 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.

5	**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.
6	**Illumination** • Free hand sketching of Mercury vapour lamp, sodium vapour lamp, fluorescent tube (Single & Twine), MHL lamp and their connection.
4th Semester	
1	**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.
2	**Alternator** • Tracing of panel wiring diagram of an alternator. • Drawing the schematic diagram of automatic voltage regulators of A.C. generators.
3	**Winding** • Drawing the development diagram for D.C. Simplex Lap & Wave winding • with brush position. Drawing the development diagram of A.C 3 – Phase, 4 Pole 24 slots single layer winding.
4	**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.
5	**Domestic Appliances** • Fire, Alarms, Electric Iron, Heater, Electric Kettle, Heater / Immersion Heater, Hot Plate, etc.
6	**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.