

**ANNEXURE 1 - CIVIL ENGINEERING - MODEL CURRICULUM**

**Qualification Title: Certificate in Civil Engineering**

NSQF Level: 4						Total Hours - 2880	
Subject Name and Code	Topics/Module	Theory Hours	Practical Hours	Objective of module	Outcome of module	Methodology	Tools Required
<b>Basic Mathematics &amp; Science (1001)</b>	<b>Module M1</b> Basic Mathematics calculations & Algebra	40	0	OB 1.1 To understand principles of basic mathematics and calculation including Fraction, Ratio & Proportions, Basic Algebra	<b>Will be able to:</b> MO-1.1 Perform basic mathematical calculations in Fraction, Ratio & Proportions, Basic Algebra	- Lecture - Use of smart class rooms - Use of instructional guidelines	- Laptop & Projector - Guideline documents
	<b>Module M2</b> Mensuration and Trigonometry	40	0	OB 2.1 To understand principles of Mensuration and Trigonometry	MO-2.1 Perform basic mathematical calculations and solve sample problems related to Mensuration and Trigonometry	- Lecture - Use of smart class rooms - Use of instructional guidelines	- Laptop & Projector - Guideline documents
	<b>Module M3</b> Basic Science	40	0	OB 3.1 To understand principles of basic Science including System of units, Unit Conversion Mass/weight/volume/density, Work/power/energy, Velocity/Speed, elasticity	MO-3.1 Understand the concepts of basic science including : System of units, Unit Conversion MO-3.2 Define - Mass/weight/volume/density, Work/power/energy, Velocity/Speed, elasticity	- Lecture - Use of smart class rooms - Use of instructional guidelines	- Laptop & Projector - Guideline documents
	<b>Module M4</b> Basic Science	40	0	OB 4.1 To understand principles of basic Science including Heat, Pressure & Temperature and their applications. OB 4.2 To Understand the concepts of Basic electricity - AC/DC/Voltage, Current , Resistance, Ohms law	MO-4.1 Define - Heat, Pressure & Temperature and their applications MO-4.2 Explain - AC/DC/Voltage, Current , Resistance, Ohms law	- Lecture - Use of smart class rooms - Use of instructional guidelines	- Laptop & Projector - Guideline documents
	<b>Module M1</b> Introduction to Engineering Drawing Practice	8	0	OB 1.1 To understand different instruments used in engineering drawing	MO-1.1 List various instruments used in engineering drawing MO-1.2 State uses of various drawing instruments MO-1.3 Use various instruments to draw sample exercises	- Lecture - Demonstration	

<b>Engineering Drawing (1002)</b>		10	0	OB 1.2 To understand freehand sketching, lettering and dimensioning	MO-1.4 Understand the application of freehand sketching, lettering and dimensioning, Layouting and title block MO-1.5 List various dimensioning methods MO-1.6 Solve problems based on different dimensioning methods	- Lecture - Demonstration	- Scales, Compass, Drawing board, Clips, Mini drafter, Pencils, Drawing sheets, Stencils, Instrument box
	<b>Module M2</b> Geometrical Drawing	20	0	OB 2.1 To understand Geometric constructions and drawings of various objects and shapes	MO-2.1 Draw lines, angles, triangles, squares, polygons, threads, fasteners based on sample exercises	- Lecture - Demonstration	- Laptop & Projector
	<b>Module M3</b> Orthographic Projection	20	0	OB 3.1 To draw orthographic projections of various objects	MO-3.1 State the concept of quadrants in engineering drawing MO-3.2 Differentiate first angle and third angle projection MO-3.3 Prepare orthographic projection of given sample objects	- Lecture - Demonstration	
	<b>Module M4</b> Shop floor drawing	22	0	OB 4.1 To understand and draw shop floor drawings	MO-4.1 State the importance of shop floor drawing in industry MO-4.2 Prepare isometric drawings of given sample objects MO-4.3 Prepare assembly drawing of given sample products	- Lecture	
<b>MODULE I - MATERIALS</b> <b>1. Stone</b> - classification - uses - characteristics of good stones - common varieties of stones - quarrying of stones <b>2. Brick</b> - constituents and composition of good brick earth - manufacturing of brick - preparation of brick earth - tempering moulding - burning of bricks - fire bricks - characteristics of good bricks <b>3. Concrete Blocks</b> - hollow and solid concrete building blocks <b>4. Steel</b> - steel used for RCC works - plain and ribbed bars - grades of steel <b>5. Timber</b> - common varieties used in engineering construction. Defects in timber, seasoning and preservation of timber				OB 2.1 To attain the basic knowledge about the building materials	MO-2.1.1. The student should be able to identify the different types of building materials. MO- 2.1.2 The student should define the properties, composition, exploration and uses of different building materials		

<b>CE 02- Materials, Construction &amp; Surveying</b>	<p><b>6. Aggregates</b> - Coarse and Fine -different types of coarse and fine aggregates - qualities of coarse and fine aggregates</p> <p><b>7 Clay, Lime,Cement, Mortar and Concrete</b> - Clay- Sources and properties . Lime - sources -classification and properties - rich , fat and poor lime, slaking lime - preparation of lime mortar - lime for white washing. Cement - Ingredients - Grades- Field tests-Varieties of cement -natural and artificial cement - portland cement, special varieties like quick setting, rapid hardening, slow setting, fire resisting, white and coloured cement, their uses. Concrete</p> <p><b>8. Tiles</b> - Flooring and Roofing - earthenware tiles, stoneware tiles and vitrified tiles - uses and characteristics of good tiles</p> <p><b>9. Paints, Varnishes and Distempers</b> - types of paints - characteristics of an ideal paint - ingredients of an oil paint - characteristics and ingredients of varnish - properties and ingredients of distemper</p> <p><b>10. Miscellaneous Materials</b> - Plastics, Fibre, Aluminium, Asphalt, Bitumen, Rubber, Abrasive , Adhesives, Plaster of Paris, ferro cement, Thermocol, Cork, Veneers, Ply woods, Fiber Board and Hard Board, - types, properties , uses and applications in building industries</p>	70	NIL				
	<b>MODULE II - COMPONENTS OF BUILDING</b>						
	<p><b>1. Component parts of the building</b>- Super structure and sub structure.</p> <p><b>2. Foundation</b> - objects of foundation, bearing capacity of soil, types of soil, types of foundations - spread footing, well and pile foundation, raft foundation, grillage foundation</p> <p><b>3. Masonry</b> - Brick masonry and Stone masonry, bonds - english, flemish and rat trap bond in brick masonry - precautions to be taken in bricks and stone masonry</p> <p><b>4. Arches</b> - types - flat, segmental, elliptical and circular</p> <p><b>5. Damp proof courses</b> - Necessity and material used for DPC</p> <p><b>6. Doors and windows</b> -types of doors and windows</p>	50	NIL	<p>OB 2.2 To identify various components of buildings and their functions.</p>	<p>The student should be able to discuss MO-2.2.1 Foundation, Masonry, DPC, Form work, Shoring, Underpinning, Plastering and Pointing MO-2.2.2 the functions of components of a building, Positioning of doors and windows with respect to lighting and Ventilation. MO-2.2.3 Know types of lintels and arches, sunshades MO-2.2.4 Functions of staircase, lift and escalators and ramp. MO-2.2.3 Ceiling and its types, the Roof components</p>		
	<b>MODULE III - BUILDING CONSTRUCTION</b>						
<p><b>1. Formwork, scaffolding, shoring and underpinning</b> - definitions and types, objectives &amp; uses</p> <p><b>2. Staircase, Lift, Escalators &amp; Ramps</b> - parts of stair case, types of staircase, location of stair, requirement of stairs as per KMBR, Types of Escalators , Ramps and their specifications as per KMBR</p>	50		<p>OB 2.3 Know the procedure for execution of various construction activities.</p>	<p>MO-2.3.1. the use of form work, materials &amp; requirements of formwork, Scaffolding, shoring and under pinning MO 2.3.2. Plastering, Pointing types and its specification.</p>			

<b>Surveying</b> <b>(Trade Theory - I)</b> <b>(1011)</b>	<b>3. Roof, Lintel, Sunshade, Flooring and Ceiling</b> - flat and pitched roof, slopes of pitches, roof covering materials, Lintels, Sunshades, flooring - types of flooring, Ceilings - materials used  <b>4. Plastering, pointing and painting</b> - plastering - types and purposes - plastering on walls and underside of RCC slabs. Pointing - different types of pointing and objectives of pointing. Painting - objective of painting on wood work, steel work and masonry work  <b>5. Colouring Washing and Distempering</b> -purposes - methods of application, materials used.  <b>6. Miscellaneous</b> - Air Conditioning, Fire and Safety, Sound proofing, False Ceiling, Electrification.			MO-2.3.2 Miscellaneous installations/ components mentioned		
	<b>MODULE IV - SURVEYING I</b>					
	<b>1. Surveying</b> - Definition , principles of surveying , Primary divisions of surveying and classifications of survey based on instruments used <b>2. Chain survey</b> 2.1. Instruments used in survey 2.2 Principles of chain survey, reconnaissance survey 2.3 ranging and setting out chain lines, offsetting 2.4 Establishing survey lines and stations. 2.5 recording field book, calculation of area, plotting	20	OB 2.4 To attain the basic knowledge about instruments used. OB 2.5 .to attain the knowledge about chaining, ranging and taking offset in the field  OB 2.6 To attain the knowledge of recording the field notes and preparing maps	MO 2.4.1 The student should able to demonstrate the different types of instruments in chain survey. MO 2.5.1 The student should able to do survey in the field using chain.  MO 2.6.1 The student should able to prepare the map of the plot and calculate the area		
	<b>3. compass survey</b> 3.1 study and use of prismatic compass 3.2 meridians and bearings 3.3 systems of bearings, conversion of one system to another 3.4 traversing- Different types of traverse, included angle from bearing 3.5 detection of local attraction and its elimination 3.6 plotting of traverse and elimination of errors	15	OB 2.7 To attain the basic knowledge about the instruments in compass survey OB 2.8 To attain the knowledge about meridians and bearing . OB 2.9 .to attain the capability of doing traversing. OB 2.10.to plot the details obtained in traversing.	MO 2.7.1 The student should able to identify the parts of prismatic compass. MO 2.8.1 The student should able to describe the systems of bearing and its conversion from one system to other MO 2.8.2 The student should able to describe meridians ,bearings,dip,declination and local attraction.		
<b>4. plane table survey</b> 4.1 description and use of plane table and accessories 4.2 Methods of plane tabling 4.3 Advantages and disadvantages of plane tabling	15	OB 2.11 the student should attain the knowledge about plane table survey and use of various accessories used in plane table survey. OB 2.12 To attain an idea about advantages and disadvantages of plane tabling.	MO 2.11.1 The student should be able to demonstrate the plane table with tripod and various accessories used in plane table survey. MO 2.11.2 The student should describe the methods used in plane table survey. MO 2.12.1 The student should describe advantages and disadvantages of plane tabling.			

<p><b>5 levelling</b>  5.1 definitions in levelling  5.2 study of levelling instruments  5.3 reduction of levels  5.4 preparation of contour maps</p>	20		<p>OB 2.13.the student should attain the knowledge about the definitions in levelling  OB 2.14 the student should Identify the various parts of dumpy level and levelling staff and do the temporary adjustments of level.  OB 2.15 The student should know how to prepare contour maps.</p>	<p>MO 2.13.1.  the student should be able to describe the definitions used in levelling.  MO 2.14.1  the student should be able to discuss the parts of dumpy level and taking reading of levelling staff.    MO 2.15.1  the student should be able to calculate the levels and prepare contour maps</p>		
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**Civil Engineering Drawing I & Survey Practical I - 1019**

**Note for the End of the year examinations in Trade Practicals I: Examiners shall ensure assessment in both Survey Practicals and Drawing with equal weightage**

<p align="center"><b>CE-03 Civil Engineering Drawing I &amp; Survey Practical I (Trade Practical I) (1019)</b></p>	<p><b>1.Brick Masonry</b> - English and Flemish bond - Cross wall, junction pillars  <b>2. Arches</b> - flat, segmental, elliptical and circular arches  <b>3. Doors and windows</b> - panelled and glazed    <b>4. Roof truss</b> - king post, queen post and steel truss up to 12m  <b>5. Footings</b> - wall footing, spread footing, column footing  <b>6. Roofs</b> - flat roof, slopped roof - lean to roof, gable end roof, coupled roof, closed couple roof, collar roof  <b>7. Stairs</b> - RCC stairs - dog legged stair, open well stair and half turned stair</p>	NIL	260	<p>OB 3.1  To attain the basic knowledge about  1. brick masonry, arches, roof truss, footing, stairs  2. different types of tiled roof and their components.  3. detailed drawings of fully panelled doors and glazed windows</p>	<p>The student should able to  MO3.1.1.  1. demonstrate main components of a building  MO 3.1.2.  prepare detailed drawings of components of a building</p>			
	<b>MODULE II-SURVEY PRACTICAL I</b>							
	<p><b>1 Chain Survey</b>  1.study of instruments  2.folding and unfolding of chain,ranging survey line  3. Conduct chain survey in the field and record the observations in the field book  4. Conduct triangulation survey in the field and to calculate the area  5.Conduct cross staff survey and find the area</p>		100	<p>OB 3.2  To attain the basic knowledge about instruments used.  OB 3.3  .to attain the knowledge about chaining ranging and taking offset in the field  OB 3.4  .to realise and overcome various obstacles in ranging and chaining  OB 3.5  To attain the knowledge of recording the field notes and preparing maps</p>	<p>MO 3.2.1  The student should able to demonstrate the different types of instruments in chain survey.  MO 3.2.2  The student should able to do survey in the field using chain.</p>			
<p><b>2. compass survey</b>  1.study of instruments  2. Perform the survey work using compass and record it in the field book.</p>		150	<p>OB 3.6  To attain the basic knowledge about the instruments in compass survey  OB 3.7</p>	<p>MO 3.6.1  The student should be able to identify the components prismatic compass .</p>				

<p><b>3. plane table survey</b>  1.Study of instruments  2. Conduct survey in the field to plot the objects by radiation method  3. Conduct survey in the field to plot the objects by intersection method.</p>		150	<p>OB 3.8  the student should attain the knowledge about plane table survey and use of various accessories used in plane table survey.</p> <p>OB 3.9  To attain knowledge about Radiation &amp; Intersection methods of plane table survey</p>	<p>MO 3.8.1  The student should able to demonstrate the plane table with tripod and various accessories used in plane table survey.</p> <p>MO 3.9.1  The student should able to conduct the survey using plane table in the field (Radiation &amp; Intersection methods only)</p>		
<p><b>4. Levelling</b>  1. Perform temporary adjustments , taking observations with a dumpy level.  3. Conduct simple leveling  4. Conduct differential levelling  5. Conduct fly levelling</p>		300	<p>OB 3.10  the student should attain the knowledge about the dumpy level</p> <p>OB 3.11  To attain the knowledge about temporary adjustments of level .</p> <p>OB 3.12  To attain the knowledge about reduction of levels by height of collimation method and rise and fall method and apply arithmetic check.</p>	<p>MO 3.1.0.1  The student should able to conduct levelling, differential levelling, and fly levelling .</p> <p>MO 3.12.1  The student should able to calculate the levels and prepare contour maps</p>		
<b>Year-II</b>						
<p><b>Module M1</b>  English &amp; Communication</p>	5	10	<p>OB 1.1  To understand communication and self management skills</p> <p>OB 1.2  To understand English Literacy - functional English, reading &amp; writing</p>	<p>MO-1.1  Demonstrate knowledge of various methods of communication - verbal, non-verbal-visual; Greetings &amp; self introduction, Asking &amp; responding to question, formal &amp; informal communication</p> <p>MO-1.2  Demonstration of writing sentences and paragraphs on topics related to the subject, discussions on current happenings</p>	<p>- Lecture  - Demonstration  - Use of smart class rooms  - Mock discussions, Interviews</p>	<p>- Laptop &amp; Projector</p>
<p><b>Module M2</b>  Communication &amp; Behavioral Skills</p>	5	10	<p>OB 2.1  To understand Behavioral skills - Personal strength analysis, social responsibility, role modeling</p>	<p>MO-2.1  Identify specific do's and don'ts for avoiding common body language mistakes</p> <p>MO-2.2  Execute time management and planning skills, Skills to crack interviews</p> <p>MO-2.3  Demonstration of impressive appearance and groomed personality, ability to self- explore</p> <p>MO-2.4  Display professionalism at the institute and workplace</p>	<p>- Lecture  - Demonstration  - Use of smart class rooms  - Mock discussions, Interviews</p>	<p>- Laptop &amp; Projector</p>

<b>Employability Skills &amp; Entrepreneurship</b>  <b>(2001)</b>	<b>Module M3</b> Information Technology	20	40	OB 3.1 To understand Information and communication technology skills  OB 3.2 To be familiar with internet and its applications	MO-3.1 Understand the basics of computers, Operating system, MS-Word, MS-Excel software's MO-3.2 Create simple documents like - resume, letter writing, job application etc., MO-3.3 Printing document, Familiar with usage of shortcuts, Creating and Editing of Text, Formatting the Text. MO-3.4 Use Web browsers and search engines, Creating & using e-mail id for communication	- Lecture - Demonstration - Use of smart class rooms	- Laptop & Projector
	<b>Module M4</b> Entrepreneurship	25	5	OB 4.1 To understand Entrepreneurial skills	MO-4.1 Describe the significance of entrepreneurial values and attitude. MO-4.2 Demonstrate the knowledge of attitudinal changes required to become an entrepreneur MO-4.3 Explain the ways to set up an enterprise and different aspects involved viz., legal, compliances, Marketing aspect, Budgeting, etc	- Lecture - Demonstration - Use of smart class rooms	- Laptop & Projector
<b>CE-05 QS, Surveying II</b>	<b>MODULE I - QUANTITY SURVEYING BASICS</b>						
	<b>1. Setting out work - 3-4-5 Rule</b> <b>2 Computation of earth work - Mid section &amp; Mean sectional method, Trapezoidal &amp; Prismoidal Formula</b>	50	NIL	OB 5.1 To attain the basic knowledge about setting out a building, estimation of different items.	MO 5.1.1. The student should be able to set out a small building in the field by three- four- five rule MO 5.1.2 The student should be able to compute the quantity of earthwork		
	<b>MODULE II - BUILDING ESTIMATION</b>						
	Estimation - Centre Line Method and Long wall-short wall Method, Units of work- types of estimate- rough cost estimate, detailed estimate and abstract estimate (single storied building - flat and pitched roof)-problems.	75		OB 5.2 To attain the basic knowledge about estimation of different items in Building	MO 5.1.3 The student should be able to describe about different types and importance of Estimates MO 5.1.4 The student should be able to read the given drawing and compute quantities, Analyse the rates and abstract of estimate.		
<b>MODULE III - THEODOLITE SURVEYING</b>							

<b>(Trade Theory II) (2011)</b>	<b>1. Theodolite survey</b> 1.1 Study of theodolite 1.2 temporary adjustment of theodolite 1.3 measurement of horizontal angles, vertical angles and bearing of lines	50		OB 5.3 To attain the knowledge about various features of theodolite and capable of doing temporary adjustments of theodolite.  OB 5.4 To attain the knowledge of measuring horizontal and vertical angles	MO 5.3.1 The student should be able to describe the various parts of the theodolite. MO 5.3.2 The student should be able to do temporary adjustments MO 5.4.1 The student should be able to measure vertical and horizontal angles		
	<b>MODULE IV- SURVEY USING MODERN INSTRUMENTS</b>						
	<b>1 modern instruments for survey.</b> 1.1 Electronic distance measurement (EDM) Instruments 1.2 Total station - Study of instrument, Distance between points, Height of building & Area of given plot 1.3 Global positioning system (GPS)	25		OB 5.5 The student should attain the basic knowledge about the modern instruments that are used for surveying.	MO 5.5.1 the student should be able to describe the modern equipments that are used in the field nowadays  MO 5.5.2 The student should be able to find out distance between points, height of building & area of given plot using Total Station		

**Survey Practical II, Civil Engineering Drawing II, CAD - 2019**

**Note for the End of the year examinations in Trade Practicals II: Examiners shall ensure assessment in Survey Practicals, Drawing and CAD. Weightage for Survey Practicals, Drawing and CAD shall be in the ratio 40%:40%:20%**

	<b>1. Theodolite survey</b> Perform temporary adjustment of theodolite 2. measurement of horizontal angles by repetition method( face left and face right observations). 3. measurement of horizontal angles by reiteration method (face left and face right observations). 4. measurement of vertical angles (face left and face right observations)	160		OB 6.1 To attain the knowledge about various features of theodolite and capable of doing temporary adjustments of theodolite.  OB 6.2 To attain the knowledge of measuring horizontal and vertical angles	MO 6.1.1 The student should be able to perform temporary adjustments  MO 6.2.1 The student should be able to measure vertical and horizontal angles by face left and face right observations and calculate horizontal distance and height		
	<b>2. modern instruments for survey.</b> 1. Study of electronic distance measurement (EDM) Instruments 2. Total station - Study of instrument, Distance between points, Height of building & Area of given plot 3. Study of Global positioning system (GPS)	80		OB 6.3 To attain the basic knowledge about the modern instruments that are used for surveying.  OB 6.4 To attain the basic knowledge about working with Total Station	MO 6.3.1 The student should be able to identify various modern instruments used for Surveying  MO 6.4.1 The student should be able to perform survey work with Total Station (Distance between points, Height of building & Area of given plot)		
<b>MODULE II- CIVIL ENGINEERING DRAWING - II</b>							



CE-06 Survey Practical II, Civil Engineering Drawing II, CAD (Trade Practical II) (2019)	1. <b>Building</b> - Residential - pitched-terraced- partially terraced, Public - schools, hospitals, auditorium, double storied buildings.		360	OB 6.5 Prepare line plan of residential & public buildings for the given plinth area OB 6.6. Developing detailed drawings of residential & public buildings from the given line plan with different types of roofs OB 6.7. Service plan of buildings OB 6.8 different types of culverts, bridges and their components OB 6.9 Prepare submission drawings for residential and public buildings	The student should able to MO 6.5.1 Produce details of residential building, public buildings from line sketches and specifications  MO 6.7.1 . Produce details of service plan - plumbing and electrical MO 6.8.1 produce details of culverts and bridges MO 6.9.1 Prepare submission drawings for residential and public buildings	
	2. <b>Culvert and Bridge</b> - culverts - slab culverts, arch culverts, box culvert, bridge - single span RCC - beam and slab bridges		60			
<b>MODULE III-COMPUTER AIDED DRAFTING</b>						
	<b>1 Introduction to CAD</b> <b>2 Compare conventional drawing and CAD</b> <b>3 Application of CAD in engineering drawing</b> <b>4 Setting of units and limits</b> <b>5 Saving of drawing</b> <b>6 Commands</b> -draw commands- line, circle, arc, ellipse, polygon (2D primitives) hatch etc., modify commands - erase, move, rotate, copy, mirror, break ,trim, extent, scale, stretch, array fillet, chamfer, offset etc. <b>7 Dimensioning and text commands</b> <b>8 Practice</b> - Different methods of drawing lines - Absolute coordinate system- Relative coordinate system - Polar coordinate system - Direct distance entry <b>9 Practice to draw orthographic and isometric views of simple objects.</b> <b>10 Building</b> - Residential - pitched-terraced- partially terraced, Public - schools, hospitals, auditorium, double storied buildings	NIL	300	OB 6.9 To attain the basic knowledge about CAD. OB 6.10 To practice drawing of orthographic and isometric views of simple objects. OB 6.11 To practice Building drawing - Residential - pitched-terraced- partially terraced, Public schools, hospitals, auditorium, double storied buildings	The student should be able to MO 6.9.1 describe applications of CAD and various commands used in CAD. MO 6.10.1 Prepare orthographic and isometric views of simple objects. MO 6.11.1 Prepare building drawings- Residential - pitched-terraced- partially terraced, Public schools, hospitals, auditorium, double storied buildings	
CE-07 Project Wrok (2008)	Project Wrok	0	160	OB 7.1 To be familiar with Construction Industrial Activities  OB 7.2. To be familiar with working in groups to achieve common goals	MO-7.1.1 Develop creative ideas and skills for achieving a common goal  MO-7.2.1 Prepare Drawings and Estimations for different types of buildings	