

BUILDING PLANNING & DRAWING WITH CAD**Course Code : 313009**

Programme Name/s	: Civil Engineering/ Civil & Rural Engineering/ Construction Technology/ Civil & Environmental Engineering/
Programme Code	: CE/ CR/ CS/ LE
Semester	: Third
Course Title	: BUILDING PLANNING & DRAWING WITH CAD
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I. RATIONALE

Building planning and drawing are critical components of the construction process, enabling stakeholders to visualize, communicate, problem-solve, comply with regulations, estimate costs, guide construction, and ensure quality throughout the project lifecycle. In today's era of globalization and technology revolutions, it is necessary to prepare the civil engineering drawings in such a way that it can be prepared with utmost precision and accuracy with ability to modify it as and when required. This is only possible if the said drawing is prepared using the CAD software. This course is therefore planned with the goal of developing such competency among the learners.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Prepare Drawings of the given building structure with required specifications using CAD Software.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Draw the line plans of given type of buildings considering the Principles of Planning.
- CO2 - Use CAD software for drafting and editing of the given type of drawing.
- CO3 - Draw the relevant type of plan/drawings for the given type of building.
- CO4 - Draw perspective drawing for the given type of objects.
- CO5 - Draw the Isometric and 3- Dimensional drawings of the given component of the structure.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme				Credits	Paper Duration	Assessment Scheme										Total Marks							
				Actual Contact Hrs./Week			SLH			Theory			Based on LL & TL				Based on SL										
				CL	TL	LL				Practical		FA-TH		SA-TH		Total		FA-PR		SA-PR							
										Max	Max	Max	Min	Max	Min	Max	Min	Max	Min								
313009	BUILDING PLANNING & DRAWING WITH CAD	BDC	SEC	2	-	4	2	8	4	-	-	-	-	-	-	50	20	50#	20	25	10	125					

Total IKS Hrs for Sem. : 1 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @\\$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	<p>TLO 1.1 Explain the given basic principles of Planning of building (residential and public).</p> <p>TLO 1.2 Propose the relevant dimensions for the given component of building structures.</p> <p>TLO 1.3 Plan the dwelling unit as per the given requirement and specifications</p> <p>TLO 1.4 Plan the dwelling units/building in accordance with the provisions of governing authority in a given area</p> <p>TLO 1.5 Compute the required area of construction using the norms of the local authority.</p> <p>TLO 1.6 Draw line plans for the given residential buildings.</p> <p>TLO 1.7 Draw line plans for the given public buildings.</p>	<p>Unit - I Principles of Planning</p> <p>1.1 Principles of planning of Residential and Public building: Aspect, Prospect, Orientation, Grouping, Privacy, Elegance, Flexibility, Roominess, Circulation, Furniture requirements, Sanitation, Economy. (IKS-Orientation of Indian Heritage Structures such as Mahalaxmi Temple, Kolhapur)</p> <p>1.2 Space requirement and norms for minimum dimension of different components of building structure.</p> <p>1.3 Planning of residential buildings as per the given requirement using IS 962-1989.</p> <p>1.4 Rules and bye-laws of sanctioning authorities (local authority and town planning department) for construction work.</p> <p>1.5 Plot area, built up area, super built up area, plinth area, carpet area, floor area and FAR (Floor Area Ratio) / FSI.</p> <p>1.6 Line plans for residential building of minimum three rooms including w/c, bath and staircase as per principles of planning</p> <p>1.7 Line plans for public building-primary health center, restaurant, bank, post office, hostel and Library.</p>	<p>Video Demonstrations Presentations Site/Industry Visit Case Study Lecture Using Chalk-Board</p>

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	<p>TLO 2.1 Explain the various software available with its importance for drawing through CAD to be used in the given situation.</p> <p>TLO 2.2 Undertake the required initial settings of the relevant software to draw the new drawing.</p> <p>TLO 2.3 Use the relevant command to draw the specific feature of the figure or plan in given situation.</p> <p>TLO 2.4 Modify the given drawing/figure using relevant command in given situation.</p> <p>TLO 2.5 Calculate the parameters like distance, area, perimeter of a given figure.</p> <p>TLO 2.6 Trace the anchor point on the given boundaries of the figure to get the relevant dimension of the figure.</p> <p>TLO 2.7 Use the concept of layer to visualize the specific component of the building/drawing.</p> <p>TLO 2.8 Apply the required dimension command to mark the dimensions in the given drawing.</p> <p>TLO 2.9 Use the output of the in the required format using specific command.</p>	<p>Unit - II Computer aided drawing</p> <p>2.1 Fundamentals : various drafting software for civil engineering applications. System requirement for drawing software. Advantages of computer aided drawing over traditional method of drawing.</p> <p>2.2 Initial setting required to start new drawing.</p> <p>2.3 Draw commands: Line, poly line, construction line, rectangle, polygon, circle, ellipse, hatch, boundary, text, arc, point, make block.</p> <p>2.4 Modify commands: Erase, copy, mirror, offset, trim, move, extend, rotate, array, lengthen, scale, chamfer, fillet, explode, stretch.</p> <p>2.5 Compute area of the given drawing</p> <p>2.6 Changing properties of entity: line type, color, scale, font- size, color, style.</p> <p>2.7 Layer command: Create layers for given components of given drawing.</p> <p>2.8 Dimension toolbar: Quick dimension, linear dimension, and continuous dimension; align dimension, angular dimensions, dimension style.</p> <p>2.9 Use of plot/print command for the output of given drawing.</p>	Video Demonstrations Presentations Hands-on Model Demonstration Lecture Using Chalk-Board
3	<p>TLO 3.1 To prepare Submission Drawing of load bearing and Framed structure in accordance with the provisions of governing authority in a given area.</p> <p>TLO 3.2 Prepare working drawing of the given Load bearing and Framed structure</p> <p>TLO 3.3 Prepare foundation plan of the given Load bearing and Framed structure.</p> <p>TLO 3.4 Prepare structural drawings of given RCC Components of the building structure.</p>	<p>Unit - III Planning of Buildings</p> <p>3.1 Data drawing (for Load bearing and framed structure): Developed plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement. Planning of staircase- Rise and Tread for residential building.</p> <p>3.2 Working drawing: Developed plan, elevation, section passing through staircase or Sanitary Block.</p> <p>3.3 Foundation plan of Load bearing and Framed structure.</p> <p>3.4 Details of RCC Components: Footing, column, Beam, Chajjas, Lintel, Staircase and slab.</p>	Video Demonstrations Demonstration Model Demonstration Site/Industry Visit Lecture Using Chalk-Board
4	<p>TLO 4.1 Explain the principles of perspective drawings in the given situation</p> <p>TLO 4.2 Prepare perspective drawing of the given object using Two-point perspective method</p>	<p>Unit - IV Perspective Drawing</p> <p>4.1 Definition, Types of perspective, terms and principles used in perspective drawing</p> <p>4.2 Two Point Perspective of objects- steps, monuments, pedestals.</p>	Video Demonstrations Hands-on Lecture Using Chalk-Board Model Demonstration

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Justify the need of isometric drawing in civil engineering TLO 5.2 Prepare 3: dimensional drawing using the relevant 3 Dimensional Modify Commands.	Unit - V Introduction to 3-Dimensional drawings 5.1 Isometric drawing: meaning and necessity, use of isometric snap, isometric axes, isocircle, isotext 5.2 3-Dimensional drawing: Use of, Extrude, Press pull, Union, Subtraction command for preparing drawing of components-Beam, Columns etc.	Video Demonstrations Hands-on Lecture Using Chalk-Board Demonstration

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Represent the given door/window section using their standard signs and symbols.	1	* Draw various types of graphical symbols for materials, doors and windows as per IS 962:1989 (Sketch book)	2	CO1
LLO 2.1 Use the symbols to different water supply and Sanitary units of the building in the drawing	2	Draw various types of graphical symbols for sanitary, water supply as per IS 962:1989 (Sketch book).	2	CO1
LLO 3.1 Use the symbols to different Electrical units of the building in the drawing.	3	Draw various types of graphical symbols for electrical installations and write abbreviations as per IS 962:1989 (Sketch book)	2	CO1
LLO 4.1 Illustrate different specifications of the given drawings.	4	Write summary of observations of all technical details from the given drawing (One/Two BHK) obtained from the professional architect or civil engineer (Sketch book)	2	CO1
LLO 5.1 Identify the different units of the building and prepare the plan as per the actual measurements.	5	*Measure the units of existing building (Load Bearing / Frame structure) & Draw line plan of measured existing building-(Part - I) (Sketch book).	2	CO1
LLO 6.1 Identify the different units of the building and prepare the plan as per the actual measurements.	6	* Measure the units of existing building (Load Bearing / Frame structure) & Draw line plan of measured existing building-(Part -II) (Sketch book).	2	CO1
LLO 7.1 Prepare Line Plans of the Residential building as per the requirement.	7	* Draw line plan to suitable scale (Minimum 1BHK, staircase, WC and Bathroom) for Residential Bungalows. (Minimum three) (Sketch book)	2	CO1
LLO 8.1 Prepare Line Plans of the Public building as per the requirement.	8	Draw line plans to suitable scale for Public Buildings - Primary Health Centre (Sketch book)	2	CO1
LLO 9.1 Prepare Line Plans of the Public building as per the requirement.	9	Draw line plans to suitable scale for Public Buildings – Hostel, Library. (Sketch book)	2	CO1
LLO 10.1 Prepare Line Plans of the Public building as per the requirement.	10	*Draw line plans on sketch book to suitable scale for Public Buildings- Bank, Post Office - (Sketch book)	2	CO1

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 11.1 Prepare Developed Plan of the residential building as per the requirement.	11	Draw the Developed plan and Elevation for a Framed Structure (One/Two BHK)-Part I (Sketch book)	2	CO3
LLO 12.1 Prepare Section of the residential building as per the requirement.	12	Draw the Section through WC, Bath or Staircase for Plan in Practical No.11 for a Framed Structure (One/Two BHK) - Part II (Sketch book)	2	CO3
LLO 13.1 Prepare Site Plan and area statement of the residential building as per the requirement.	13	Draw the Site plan including area statement, schedule of opening and construction notes for a Framed Structure (One/Two BHK) - for Plan in Practical No.11 Part III (Sketch book)	2	CO3
LLO 14.1 Prepare Perspective view of the given object.	14	*Draw two-point perspective drawing of small objects - steps, monuments, pedestals (anyone) with suitable scale (Sketch book)	2	CO4
LLO 15.1 Prepare Line Plans of the Residential building as per the requirement.	15	Prepare Line plan of Residential Building with staircase (minimum two) using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO2
LLO 16.1 Prepare Line Plans of the Public building as per the requirement.	16	Prepare Line plan of Public Building with staircase (minimum Two) with using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO2
LLO 17.1 Prepare Plan and sectional elevation of the Staircase as per the requirement.	17	*Draw plan and Sectional Elevation of dog-legged staircase using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO2
LLO 18.1 Prepare Developed Plan of the load bearing structure as per the requirement.	18	*Draw submission drawing to suitable scale of a single storey load bearing residential building (2BHK) with flat Roof and staircase showing Developed plan and elevation using CAD Software.-Part I (A-2 Size Half Imperial Sheet)	2	CO3
LLO 19.1 Prepare Sectional elevation of the load bearing structure as per the requirement.	19	*Draw submission drawing to Suitable scale of a single Storey load bearing residential building (2BHK) with flat Roof and staircase showing - Section passing through Stair or W.C. and Bath using CAD Software - for Plan in Practical No.18 -Part II (A-2 Size Half Imperial Sheet)	2	CO3
LLO 20.1 Prepare Foundation Plan of the load bearing structure as per the requirement.	20	*Draw submission drawing to the suitable scale of a single Storey load bearing residential building (2BHK) with flat Roof and staircase showing - a) Foundation plan and schedule of openings. b) Site plan with suitable scale, area statement, construction notes for Plan in Practical No.18- using CAD Software -Part III- using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO3
LLO 21.1 Prepare Developed Plan of the Framed structure as per the requirement.	21	*Draw submission drawing, to the suitable scale of (G+1) Framed Structure Residential Building (2BHK) with Flat Roof and staircase showing: a) Developed plan b) Elevation - Part I Using CAD Software (A-2 Size Half Imperial Sheet)	2	CO3
LLO 22.1 Prepare Sectional elevation of the framed structure as per the requirement.	22	*Draw submission drawing, to the suitable scale of (G+1) Framed Structure Residential Building (2BHK) with Flat Roof and staircase showing. - Section passing through Stair, W.C. and Bath- For plan in Practical No.21 - Part II-using CAD Software (A-2 Size Half Imperial Sheet)	2	CO3

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 23.1 Prepare site plan and area statement of the framed structure as per the requirement.	23	*Draw submission drawing, to the suitable scale, of (G+1) Framed Structure Residential Building (2BHK) with Flat Roof and staircase showing - a) Site plan and area statement b) Schedule of openings and construction notes - For plan in Practical No.21 - Part III using CAD Software (A-2 Size Half Imperial Sheet)	2	CO3
LLO 24.1 Prepare working drawing the framed structure as per the requirement.	24	Draw Foundation with suitable scale for Practical No.21 using CAD Software (A-2 Size Half Imperial Sheet)	2	CO2
LLO 25.1 Prepare Sectional elevation and plan of footing for framed structure as per the requirement.	25	Draw Detailed enlarge section of RCC column and footing with suitable scale using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO2
LLO 26.1 Prepare Sectional elevation and plan of RCC Beam, Lintel and Chajja of framed structure as per the requirement.	26	*Draw Detailed enlarge section of RCC Beam, Lintel and Chajja with suitable scale using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO2
LLO 27.1 Prepare Sectional elevation and plan of Stair case as per the requirement.	27	Draw Detailed enlarge section of RCC staircase with suitable scale using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO2
LLO 28.1 Prepare Isometric drawings of given object.	28	*Draw isometric drawing of simple objects –Straight Lines and edges (minimum 02 objects) using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO5
LLO 29.1 Prepare Isometric drawings of given object.	29	Draw isometric drawing of simple objects-Curved Edges (minimum 02 objects) using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO5
LLO 30.1 Prepare 3-D view of given object.	30	*Draw 3-D view of simple object. (any one) - using CAD Software. (A-2 Size Half Imperial Sheet)	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)**Micro project**

- Collect and study building Bye laws, rules and regulation for planning any two competent authority such as Gram-Panchayat/Municipal Corporation/Metro Cities/Town Planning Department.
- Prepare report on Provisions given in National Building Code 2005
- Prepare list of the documents required for obtaining permission for construction of residential building/apartment from competent authority and write report.
- Prepare a report on IS-962:1989 - Code of practice for architectural and building drawings
- Prepare Developed Plan and Elevation for a any one Public Building using CAD Software.

Self Learning

- List any five software's used for building planning and drawing and prepare one developed plan using any one Free opensource software.

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- Prepare a model of a simple building using cardboard showing different components with suitable color.
- Prepare line plan as per given requirement Using CAD Software. (Any THREE -- other than mentioned in curriculum)
- Free Online Courses on Auto CAD by NPTEL /Coursera/IGNOU/SWAYAM

Assignment

- State and explain the classification of residential buildings with respect to Planning such as Row house/Apartments/detached /Semi-detached Buildings
- Explain the Role of Architect, Structural Engineer and Supervisor in Planning of Building.
- Prepare a report on BUILDING PLAN MANAGEMENT SYSTEM -By Urban Development Department Government of Maharashtra.
- Prepare a report on Building Plan Approval Process as per NBC -2005

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Computer with specification as 8GB RAM, Graphics Card 4 GB, HDD/SSD 500GB, LCD Monitor with relevant CAD software. (with latest configuration)	All
2	Printer preferably for the output of A-3 size, paper	All
3	LCD projector.	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Principles of Planning	CO1	6	0	0	0	0
2	II	Computer aided drawing	CO2	4	0	0	0	0
3	III	Planning of Buildings	CO3	12	0	0	0	0
4	IV	Perspective Drawing	CO4	4	0	0	0	0
5	V	Introduction to 3-Dimensional drawings	CO5	4	0	0	0	0
Grand Total				30	0	0	0	0

X. ASSESSMENT METHODOLOGIES/TOOLS**Formative assessment (Assessment for Learning)**

- Term work, Assignment, Microproject (60% Weightage to process and 40% weightage to product)

Summative Assessment (Assessment of Learning)

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- Practical Exam, Oral Exam

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	02	01	02	01	02		02			
CO2	02	02	02	03	02	01	02			
CO3	02	02	02	02	02			02		
CO4	02	01	02	02	02			02		
CO5	02	01	01	03	02			01		

Legends :- High:03, Medium:02,Low:01, No Mapping: -

*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Shah. M.G., Kale C.M., Patki S.Y.	Building Drawing	Mcgraw Hill Publishing company Ltd. New Delhi 2002 ISBN: 9780074638767
2	Dr. Swamy Kumara N; Rao Kameshwara A .	Building Planning and Drawing	Charotar Publication, ANAND ISBN : 978-93-85039-12-6 (Ed.2015)
3	Mantri Sandip	A to Z Building Construction	Satya Prakashan; 2nd edition (2015), New Delhi, ISBN: 978-8176849692
4	Nighat Yasmin Ph.D.	Introduction to AutoCAD 2024 for Civil Engineering Applications	SDC Publications, ISBN: 978-1-63057-607-3
5	Malik R.S., Meo G.S.	Civil Engineering Drawing	Computech Publication Ltd New Asian Publishers, 2009, New Delhi ISBN:978-8173180026

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?app=desktop&v=E6TE9u1XgAg	2D Commands - NITTTR Chandigarh- NCTEL
2	https://www.youtube.com/watch?v=rX6XfCMRYU0	Demonstration video 2-Point Perspective View-Basics.
3	https://www.youtube.com/watch?app=desktop&v=N4FUbpGAWNA	3D Commands in Autocad - NITTTR Chandigarh -- NCTEL

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students