Program Name : **Civil Engineering Program Group**

Program Code : **CE/CR/CS**

Semester : **Fourth**

Course Title : **Building Planning and Drawing**

Course Code : **22405**

1. RATIONALE

This subject is core technology subject, enabling the principles of planning for drafting the content into graphical form and thereafter its execution. Civil Engineer has to convert design parameters and process details into actual practice. The principles of planning for buildings includes the entire facilities to be provided as per individual's requirements, economical status and suitable to the users. Therefore, students are required to understand, interpret and prepare working drawing. This will further lead into reading and understanding of drawing that will make the execution and implementation easy in the field. In long run construction industry should have orientation towards the skillful design,software skill and energy efficient technique. This will create confidence and share a grain of salt in building nation in a beautiful way of approach.

2. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Prepare engineering drawings as per principles of planning using CAD Software.**

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

a. Interpret the symbols,signs and conventions from the given drawing.
b. Prepare line plans of residential and public buildings using principles of planning.
c. Prepare submission and working drawing from the given requirement for Load Bearing Structure.
d. Prepare submission and working drawing from the given requirement for Framed Structure.
e. Draw Two point perspective drawing for given small objects.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme											
				Theory						Practical					
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
3	-	4	7	4	70	28	30*	00	100	40	50#	20	50	20	100	40

(*): Under the theory PA, Out of 30 marks, 10 marks are for micro-project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain UOs required for the attainment of the COs.

Legends: ***L***-*Lecture;* ***T*** - *Tutorial/Teacher Guided Theory Practice;* ***P*** - *Practical;* ***C*** - *Credit,* ***ESE*** - *End Semester Examination;* ***PA*** - *Progressive Assessment.*

5. COURSE MAP (with sample COs, PrOs, UOs, ADOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.

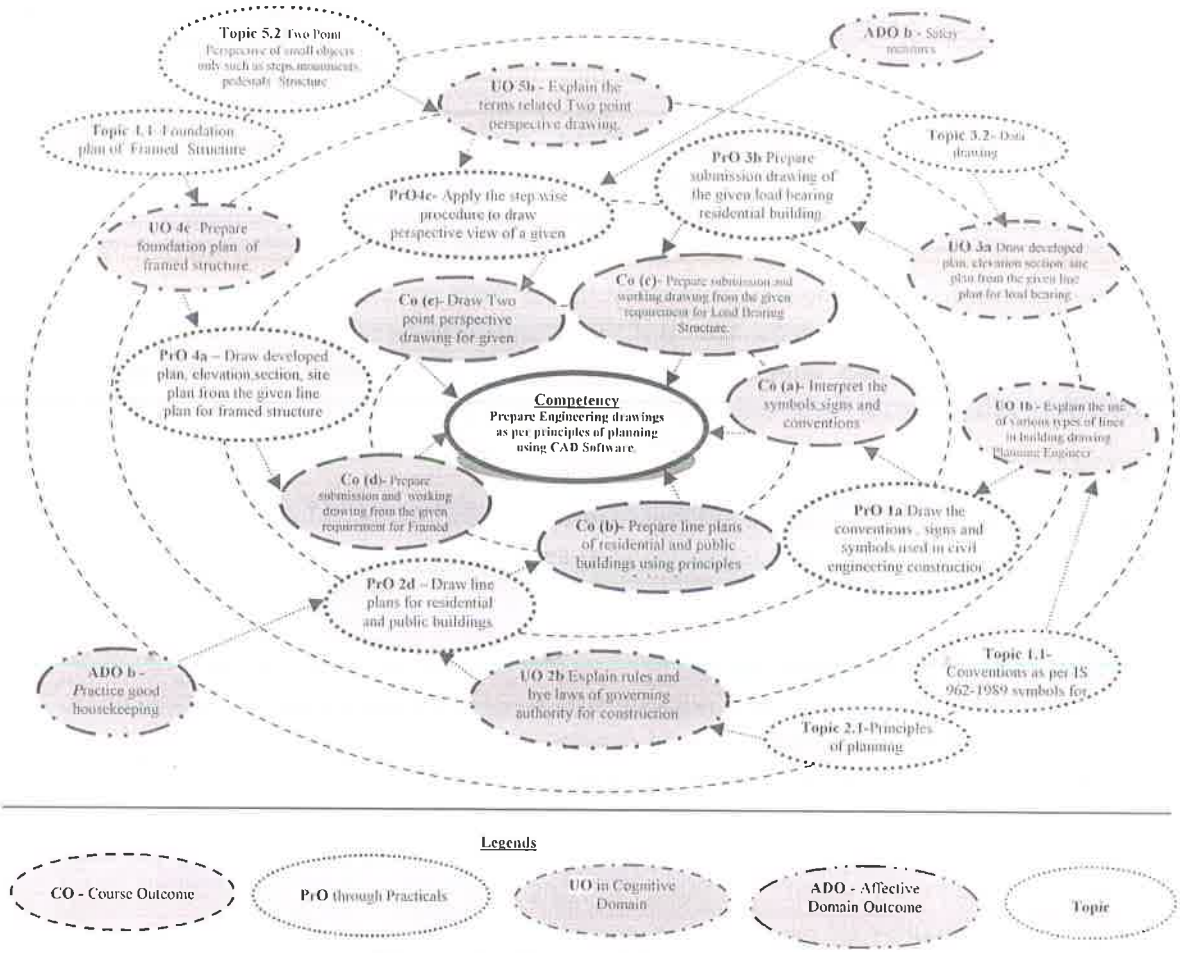

Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
A. Sketch Book			
1	Draw various types of lines, graphical symbols for materials, doors and windows, symbols for sanitary,water supply and electrical installations and write abbreviations as per IS 962:1989.	I	02*
2	Write summary of observations of all technical details from the given drawing (One/Two BHK) obtained from the professional architect or civil engineer. (Group activity in 4 students)	I	02

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
3	a)Measure the units of existing building (Load Bearing / Frame structure) .	II	02*
	b)Draw line plan of measured existing building at **serial no 3a** to the suitable scale.	II	02
4	Draw line plan to suitable scale (Minimum 1BHK,staircase, WC and Bathroom)		
	a) Residential Bunglows (Minimum three plans)	II	02
	b) Apartment (Minimum two plans)	II	02
5	Draw line plans to suitable scale for any **Five** Public Buildings from the following (School Building, Primary Health Centre, Bank, Post Office, Hostel, Restaurant , Community Hall and Library).	II	02
6	Draw the following plans for a Framed Structure (One/Two BHK) from given line plan.		
	a. Developed plan, Elevation,	II,IV	02*
	b. Section for above developed plan.	IV	02
	c. Site plan for above drawings including area statement, schedule of opening and construction notes .	IV	02
B. Full Imperial Size Sheet (A1)			
1	Draw submission drawing to the scale 1:100 of a single storey load bearing residential building (2BHK) with flat Roof and staircase showing … a)Developed plan and elevation	II,III	02*
	b) Section passing through Stair **or** W.C. and Bath	III	02
	c) Foundation plan and schedule of openings.	III	02
	d) Site plan (1:200), area statement, construction notes.	III	02
2	Draw submission drawing, to the scale 1:100, of (G+1) Framed Structure Residential Building (2BHK) with Flat Roof and staircase showing: a) Developed plan .	II,IV	02
	b) Elevation.	IV	02
	c) Section passing through Stair ,W.C. and Bath	IV	02
	d) Section passing through Stair ,W.C. and Bath	IV	02
	e) Site plan (1:200) and area statement	IV	02
	f) Schedule of openings and construction notes.	IV	02
3	Draw the above mentioned drawing at serial number (B-2) using CAD software and enclose the print out. a) Developed plan	II, IV	02*
	b) Elevation.	IV	02
	c) Section passing through Stair,W.C. and Bath	IV	02
	d) Section passing through Stair,W.C. and Bath	IV	02
	e) Foundation plan .	IV	02
	f) Site plan (1:200), area statement, Schedule of openings and construction notes.	IV	02
4	Draw working drawing for above mentioned drawing at serial number (B-2) showing: a)Foundation plan to the scale 1:50	IV	02
	b) Detailed enlarge section of of RCC column and footing with	IV	02

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
	plinth filling		
	c) Detailed enlarge section of of RCC Beam, Lintel and Chajjas.	IV	02
	d) Detailed enlarge section of of RCC staircase and slab.	IV	02
5	Draw two point perspective drawing of small objects - steps, monuments, pedestals (any one) scale 1:50		
	a)Draw plan,elevation,eye level,picture plane and vanishing points	V	02*
	b) Draw perspective view.	V	02
	Total		**64**

Note

i. *A suggestive list of PrOs is given in the above table. More such PrOs can be added to attain the COs and competency. A judicial mix of minimum 12 or more practical need to be performed, out of which, the practicals marked as '*' are compulsory, so that the student reaches the 'Precision Level' of Dave's 'Psychomotor Domain Taxonomy' as generally required by the industry.*

ii. *The 'Process' and 'Product' related skills associated with each PrO is to be assessed according to a suggested sample given below:*

S. No.	Performance Indicators	Weightage in %
1	Preparation of Sketch book	15
2	Prepare drawing sheets	30
3	Safety measures	05
4	Neatness and drawing skills	10
5	Attendance and punctuality	20
6	Answer to sample questions	10
7	Submission of report in time	10
	Total	**100**

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

a. Follow safety practices.
b. Practice good housekeeping.
c. Demonstrate working as a leader/ a team member.
d. Maintain tools and equipment.
e. Follow ethical practices.

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organising Level' in 2nd year
- 'Characterising Level' in 3rd year.

7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Pro. No.
1	Computer with specification as 2GB Ram,HDD 500GB,LCD Monitor with relevant CAD software.	B 3
2	Laser Printer preferably for the output of A3 size.	B 3

8. UNDERPINNING THEORY COMPONENTS

The following topics are to be taught and assessed in order to develop the sample UOs given below for achieving the COs to attain the identified competency. More UOs could be added.

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit – I Conventions and Symbols	1a. Draw the conventions , signs and symbols used in given civil engineering drawings. 1b. Explain the use of various types of lines in the given building drawing. 1c. Select relevant scale in given situation. 1d. Interpret the given drawings for the given civil structures.	1.1 Conventions as per IS 962-1989, symbols for different materials such as earthwork, brickwork, stonework, concrete ,woodwork and glass used in civil engineering. 1.2 construction, Graphical symbols for door and window, Abbreviations, symbols for sanitary and electrical installations 1.3 Types of lines- visible lines, centre line, hidden line, section line,dimension line, extension line, pointers, arrow head or dots. Appropriate size of lettering and numerals for Titles,sub titles , notes and dimensions . 1.4 Types of scale- Monumental, Intimate, criteria for Proper Selection of scale for various types of drawing. 1.5 Sizes of various standard papers/sheets. 1.6 Reading and interpreting readymade Architectural building drawing (To be procured from Architect, Planning Consultants, Planning Engineer)

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit-II Planning of Building	2a. Apply the norms for minimum dimensions to various units in a given residential building. 2b. Desribe rules and bye laws of governing authority in a given area for construction. 2c. Compute built up, carpet and plinth ,super built up area for the given building. 2d. Draw line plans for the given residential and public buildings.	2.1. Principles of planning of Residential and Public building- Aspect,Prospect ,Orientation,Grouping, Privacy, Elegance, Flexibility, Roominess, Circulation, Furniture requirements, Sanitation,Economy. 2.2. Space requirement and norms for minimum dimension of different. 2.3. units in the residential and public buildings as per IS 962-1989. 2.4. Rules and bye-laws of sanctioning authorities for construction work. 2.5. Plot area, built up area, super built up area, plinth area, carpet area, floor area and FAR (Floor Area Ratio) / FSI. 2.6. Line plans for residential building of minimum three rooms including w/c, bath and staircase as per principles of planning. 2.7. Line plans for public building-school building, primary health centre, restaurant, bank, post office, hostel, Function Hall and Liabrary.
Unit– III Drawing of Load Bearing Structure	3a. Draw developed plan, elevation,section, site plan from the given line plan for load bearing residential building. 3b. Prepare submission drawing of the given load bearing residential building. 3c. Prepare working drawing of the given load bearing residential building. 3d. Prepare foundation plan of the given load bearing residential building.	3.1. Drawing of Single storey Load Bearing residential building (2 BHK) with staircase. 3.2. Data drawing – developed plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement. Planning and design of staircase-Rise and Tread for residential and public building. 3.3. Working drawing – developed plan, elevation, section passing through staircase or w.c. and bath. 3.4. Foundation plan of Load bearing structure.
Unit– IV Drawing of Framed Structure	4a Draw developed plan, elevation,section, site plan from the given line plan for framed structure residential building. 4b Prepare submission drawing of the given	4.1 Drawing of Two storey Framed Structure (G+1) residential building (2 BHK) with staircase. 4.2 Data drawing – developed plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement. Planning and design of staircase-

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	framed structure residential building. 4c Prepare foundation plan of framed structure. 4d Draw component parts of the given framed structure. 4e Explain the functions of Draw and modify commands in the given CAD software. 4f Prepare the given drawing in minimum three layers using CAD software.	Rise and Tread for residential and public building. 4.3 Working drawing of Framed Structure – developed plan, elevation, section passing through staircase or w.c. and bath. 4.4 Foundation plan of Framed Structure. 4.5 Details of RCCfooting , column, Beam, Chajjas Lintel ,Staircase and slab. 4.6 Drawing with CAD- Draw commands, modify commands, layer commands.
Unit–V Perspective Drawing	5a. Explain the principles of perspective drawings in the given situation. 5b. Apply the step wise procedure to draw perspective view of the given object. 5c. Draw perspective drawing of the given object.	5.1 Definition, Types of perspective , terms used in perspective drawing , principles used in perspective drawing 5.2 Two Point Perspective of small objects only such as steps,monuments, pedestals.

***Note**: To attain the COs and competency, above listed UOs need to be undertaken to achieve the 'Application Level' and above of Bloom's 'Cognitive Domain Taxonomy'.*

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Conventions And Symbols	04	02	04	-	06
II	Planning of Building	16	02	06	10	18
III	Drawing of Load Bearing Structure	08	-	04	12	16
IV	Drawing of Framed Structure	14	-	06	12	18
V	Perspective Drawing	06	-	-	12	12
Total		**48**	**04**	**20**	**46**	**70**

***Legends:** R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)*
***Note**: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question papers may vary from above table.*

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

a. Prepare two line plans of bunglows using CAD.
b. Prepare two line plans of Flat system using CAD.
c. Prepare two line plan of public building using CAD.
d. Collect detailed set of drawings of flat scheme .

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a. Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b. ***'L' in item No. 4*** does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
c. About ***15-20% of the topics/sub-topics*** which is relatively simpler or descriptive in nature is to be given to the students for ***self-directed learning*** and assess the development of the COs through classroom presentations (see implementation guideline for details).
d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.
e. Use Flash/Animations to explain various theorems in circuit analysis
f. Guide student(s) in undertaking micro-projects

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be ***individually*** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should ***not exceed three.***

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than ***16 (sixteen) student engagement hours*** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects are given here. Similar micro-projects could be added by the concerned faculty:

a. Prepare report on Provisions given in National Building Code 2005.
b. Collect and study building Bye laws , rules and regulation for planning as per local competent authority.
c. Prepare list of the documents required for obtaining permission for construction of residential building/apartment from competent authority and write report.
d. Draw developed plan, Elevation, section, site plan, area statement, schedule of opening and construction notes for public building.

e. Prepare list of the documents required for obtaining permission for construction of commercial building from competent authority and write report.
f. Prepare a model of a simple building using card board showing different components with suitable colour.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Building Drawing	Shah. M.G. Kale, CM, Patki, S.Y.	Mcgraw Hill Publishing company Ltd. New Delhi 2002 ISBN: 9780074638767
2	Civil Engineering Drawing	Malik and Mayo	Computech Publication Ltd New Asian Publishers, 2009, New Delhi ISBN:978-8173180026
3	Principles of Perspective Drawing	M. G. Shah and C. M. Kale	Mcgraw Hill Publishing company Ltd. New Delhi, Edition 2002
4	Building Planning and Drawing	Swamy, Kumara; Rao, N, Kameshwara, A .	Charotar Publication, ANAND ISBN : 978-93-85039-12-6 (Ed.2015)
5	MRTP Act	Governmnet of Maharashtra	Governmnet of Maharashtra
6	Building Construction	Bhavikatti, S. S.	Vikas Publication House Pvt. Ltd., New Delhi, ISBN: 978-93259-6079-4
7	A to Z Building Construction	Mantri, Sandip	Satya Prakashan; 2nd edition (2015), New Delhi, ISBN: 978-8176849692
8	Working with Auto CAD 2000	Singh, Ajit	Mcgraw Hill Publishing company Ltd. New Delhi, Edition 2002
9	Planning and design of Building	Sane, Y.S.	Allied Publishers, New Delhi ASIN : B0007JVH92

14. SOFTWARE/LEARNING WEBSITES

a. https://www.youtube.com/watch?v=bCn0X9RRjN0andlist=PL060E3166E87E1FD5
b. https://www.youtube.com/watch?v=VYiVjVulnm4
c. https://www.youtube.com/watch?v=HTrZurVyHmw
d. https://www.youtube.com/watch?v=rX6XfCMRYU0
e. https://www.youtube.com/watch?v=RpLJT_SHqpU
f. https://www.youtube.com/watch?v=2l8ToJIFQwo
g. https://www.youtube.com/watch?v=NZ0IgP25sV8
h. https://www.youtube.com/watch?v=Ib213mnC8hA
i. https://www.youtube.com/watch?v=bCn0X9RRjN0
j. https://www.youtube.com/watch?v=mind4POSagcandlist=PLUjXrjdMJ1cxUKgVHhqbMnDMBo_ybJ-fb
k. www.drawingnow.com
l. www.learn-to-draw-.com