

Curriculum of Diploma Programme
in
Architectural Assistantship



**Department of Science, Technology and Technical Education
(DSTTE), Govt. of Bihar**

**State Board of Technical Education
(SBTE), Bihar**

Semester – III Teaching & Learning Scheme

CourseCodes	CourseTitles	Teaching & Learning Scheme (Hours/Week)					
		Classroom Instruction (CI)		Lab Instructio n(LI)	Notiona lHours (TW+ SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
		L	T				
2437301	Perspective, Sciography & Free hand Sketch	3	-	4	2	9	6
2437302	Building Materials for Architecture	3	-	4	2	9	6
2437303	Architectural Design & Drawing-I	3	-	4	2	9	6
2437304	Climatology	3	-	-	2	5	4
2437305	Computer Application in Architecture	3	-	4	2	9	6
2437306	Summer Internship – I (After 2nd Sem) (Common for all programmes)	-	-	2	2	4	2
Total		15	-	18	12	45	30

Note: Prefix will be added to Course Code if applicable (T for theory Paper, P for Practical Paper and S for Term work)

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours) **For Non exam course institute have option to choose any one course (Cisco/KYP/ST)**

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

Semester - III Assessment Scheme

Course Codes	Course Titles	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
		Theory Assessment (TA)		Term work & Self-Learning Assessment (TWA)		Lab Assessment(LA)		
		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2437301	Perspective, Sciography & Free hand Sketch	30	70	20	30	20	30	200
2437302	Building Materials for Architecture	30	70	20	30	20	30	200
2437303	Architectural Design & Drawing-I	30	70	20	30	20	30	200
2437304	Climatology	30	70	20	30	-	-	150
2437305	Computer Application in Architecture	30	70	20	30	20	30	200
2437306	Summer Internship – I (After 2nd Sem) (Common for all Programmes)	-	-	10	15	10	15	50
Total		170	280	135	165	100	150	1000

Note: Prefix will be added to Course Code if applicable (T for theory Paper, P for Practical Paper and S for Term work)

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.)

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities

- A) **Course Code** : 2437301 (T2437301/P2437301/ S2437301)
 B) **Course Title** : Perspective, Sociography & Freehand Sketch
 C) **Pre- requisite Course(s)** :
 D) **Rationale** :

The Subject will help the students to understand various facts, concepts and procedures of perspective drawing. The subject will also help in making models of different materials, free hand sketching of monuments etc.

E) **Course Outcomes (COs):**

The Student will be able to:-

- 1) Understand different methods of drawing perspective views
- 2) Understand free hand coloured drawings of buildings and monuments
- 3) Make models
- 4) Sketch free hand coloured perspective.

After completion of the course, the students will be able to-

- CO-1** Draw various perspective drawing by using perspective different types
CO-2 Draw and execute colour washes in different drawings.
CO-3 Perform relevant operations related to making of mural designs
CO-4 Learn free hand sketching techniques
CO-5 Learn standard dimension of furnitures and human different postures

F) **Suggested Course Articulation Matrix (CAM):**

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
CO-1	1	-	1	-	-	-	-		
CO-2	1	2	2	1	-	1	-		
CO-3	1	2	2	1	-	1	-		
CO-4	1	2	2	1	-	1	2		
CO-5	1	2	2	1	-	1	-		

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional

G) Teaching & Learning Scheme:

Course Code	Course Title	Scheme of Study (Hours/Week)					
		Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+ SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
		L	T				
2437301	Perspective, Sociography & Freehand Sketch	03	-	04	02	09	06

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Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

H) Assessment Scheme:

Course Code	Course Title	Assessment Scheme (Marks)						Total Marks (TA+LA)
		Theory Assessment (TA)		Term Work & Self-Learning Assessment (TWA)		Lab Assessment (LA)		
		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2437301	Perspective, Sociography & Freehand Sketch	30	70	20	30	20	30	200

Note: Prefix will be added to Course Code if applicable (T for theory Paper, P for Practical Paper and S for Term work)

Legend:

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Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, and seminar and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/ presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

- I) **Course Curriculum Detailing:** This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J) **Theory Session Outcomes (TSOs) and Units: T2437301**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 1a.</i> To know different terms related to perspective design</p> <p><i>TSO 1b.</i> Various types of perspective drawing</p> <p><i>TSO 1c.</i> Draw drawing with relation to picture plane and perspective.</p> <p><i>TSO 1d.</i> Considering different light source position and draw it's shadowing.</p> <p><i>TSO 1e.</i> Height of building shown by bird eye view</p>	<p>Unit-1.0 Perspective :-</p> <p>1.1 Characteristics of perspective construction, determining vanishing points</p> <p>1.2 Two point perspective - Two point perspective of a simple building with or without overhang roof, two points perspective of a small house</p> <p>1.3 Relationship between station point (spectator), picture plane and perspective. Comparative study of perspective by changing position of station point from one side and front of picture plane</p> <p>1.4 Shadows in perspective Front lighting, side lighting, back lighting, point lighting from one light source and reflections in perspective</p> <p>1.5 Only simple square edge figures not to include rounded or curved bodies. Birds eye view</p>	<p>CO-1</p>
<p><i>TSO 2a.</i> Explanation of different colour techniques enhance the drawing.</p> <p><i>TSO 2b.</i> Enables drawings to look realistic.</p>	<p>Unit-2.0</p> <p>Water Colour Washes:-</p> <p>2.1 Washes</p>	<p>CO-2</p>

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 2c.</i> Developing different washes of colours put drawing on right direction to enhance and beauty of drawing</p>	<ul style="list-style-type: none"> i) Flat Wash ii) Graded washes Colour iii) Graded Washes (Two Colour) iv) Grades Washes (Three Colour) v) Grades washes with a vertical shine in the center vi) Grades washes with diagonal shine vii) Glare wash viii) Two glare washes one over the other <p>2.2 Skies Three types</p> <p>2.3 Architectural trees</p> <p>Simple building landscapes</p>	
<p><i>TSO 3a.</i> By knowing mural and collarge design student able to create any kind of surface attractive</p>	<p>Unit-3.0 Mural Design :-</p> <p>3.1 Mural design and collage</p>	CO-3
<p><i>TSO 4a.</i> Describe free hand sketching process provide the ability to draw something without depending on instruments or something else to draw.</p> <p><i>TSO 4b.</i> Provide enhancement on observational skills.</p> <p><i>TSO 4c.</i> Draw free hand sketching of set of figures and objects.</p> <p><i>TSO 4d.</i> Enabling the knowledge of sketching of human figures, trees, and vehicles etc.</p>	<p>Unit-4.0 Free Hand Sketching :-</p> <p>4.1 Free hand exercise of different types of lines (horizontal, vertical,diagonal grid)</p> <p>4.2 Free hand sketching of sets of figures and objects.</p> <p>4.3 Free hand sketching of human figures, trees, and vehicles etc.</p> <p>4.4 Free hand sketching of small building with shade and shadow. Free hand sketches of various scenes such as railway station, Parking,bus stand, market place etc.</p>	CO-4
<p><i>TSO 5a.</i> Draw sketches of different postures human with standard dimensions.</p>	<p>Unit-5.0 Human anthropometry :-</p>	CO-5

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 5b.</i> Draw different furniture's with their standard sizes.	5.1 5.1 Sketching of different posture of humans with standard Dimensions. 5.2 5.2 sketch different furniture's	

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2437301

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 1.1.</i> Learn and draw sheets using colour wash in drawings <i>LSO 1.2.</i> Learn and draw sheets using method of perspective (one, two and three) in drawings <i>LSO 1.3.</i> Draw free hand sketching of human ,furniture's and organic or inorganic shapes	1.	Different techniques and medium Colour wash Perspective Free hand sketches of organic and inorganic objects	CO-1
<i>LSO 2.1.</i> Prepare sheets of monumental buildings using free hand sketching techniques	2.	Any one historical monuments a) INDIA GATE b) RED FORT c) TAJ MAHAL d) KAILASH TEMPLE	CO-2
<i>LSO 3.1.</i> Prepare sheet of pattern using scribbling	3.	Draw and execute a) Scribble	CO-3
<i>LSO 4.1.</i> Prepare sheet of pattern using doodle	4.	Draw and execute a) Doodle	CO-4
<i>LSO 5.1.</i> Draw in sheet Toran (Gateway) of any historic monuments	5.	Draw and execute a) Toran (Gateway)	CO-5
<i>LSO 6.1.</i> Prepare sheets of different architectural elements like line space shape form colour and texture	6.	Draw and execute sketches of a) Architectural Elements & Conceptual Views	CO-6

Note: in addition to above listed practical, students are suggested to practice all the examples covered by the teacher during theory sessions.

L) Suggested for Self Learning: S2437301 Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. **Assignments:** Questions/Problems/Exercises to be provided by the course teacher in line with the targeted COs.

b. Micro Projects:

1. To draw sketches with different techniques
2. To draw diagram from one point perspective composition of 3D geometrical objects
3. To draw diagram from two point perspective composition of 3D geometrical objects
4. To draw diagram from three point perspective composition of 3D geometrical objects

5. To draw sketches with different techniques of free hand sketching to enables visualization
6. To draw different posture of human with dimension and furniture's with dimensions
7. Do rendering of all drawing to make it realistic

(Students may use file and sequence data types to develop above listed applications)

c. Other Activities:

1. Seminar Topics:
 - Presenting full development process of any mural design.
 - Preparing free hand sketches of human posture and furniture's dimensions.

M) Suggested Course Evaluation Matrix: The course teacher has to decide and use appropriate assessment strategy and its weightage in theory, laboratory and Term Work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test	End Theory Assessment (ETA)	Term Work & Self Learning Assessment			Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)
			Assignments	Micro Projects	Other Activities*		
CO-1	10%	10%	15%	16%	16%	10%	16%
CO-2	15%	15%	15%	16%	16%	15%	16%
CO-3	25%	25%	20%	18%	18%	25%	18%
CO-4	15%	15%	15%	16%	16%	15%	16%
CO-5	25%	25%	25%	18%	18%	25%	18%
CO-6	10%	10%	10%	16%	16%	10%	16%
Total Marks	30	70	20	20	10	20	30
			50				

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

**.: Mentioned under point- (N)

#: Mentioned under point-(O)

Note:

- The percentage given are approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each COs.

N) Suggested Specification Table for End Semester Theory Assessment: Specification table represents the reflection of sample representation of assessment of cognitive domain of full course.

Unit Title and Number	Total Classroom Instruction (CI) Hours	Relevant COs Number(s)	Total Marks	ETA (Marks)		
				Remember (R)	Understanding (U)	Application & above (A)
Unit-1.0 Perspective	13	CO-1	20	3	2	2
Unit-2.0 Water Colour Washes	13	CO-2	20	3	3	4
Unit-3.0 Mural Design	06	CO-3	10	5	3	10

Unit-4.0 Free Hand Sketching	10	CO-4	15	3	3	4
Unit-5.0 Human anthropometry	08	CO-5	5	4	5	9
Total	50	-	70	20	18	32

Note: Similar table can also be used to design class/mid-term/ internal question paper for progressive assessment.

O) Suggested Assessment Table for Laboratory (Practical):

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
1.	Perspective a) Prepare sheet and make different term related to perspectives like vanishing point picture plane station point observer etc, b) Draw sheets of one ,two and three point perspectives c) Draw sketches of human and furniture's dimensions	CO-1	40	50	10
2.	Draw sketches of monumental structures of India a) India gate b) Taj mahal c) Red fort d) Kailash temple	CO-2	40	50	10
3.	Prepare Mural Design :- a) Draw for college b) Draw for kinder garden schools c) Draw mural design for hotels	CO-2	40	50	10
4.	Prepare Scribble and doodle :- a) Draw geometric shapes b) Draw organic shapes c) Draw inorganic shapes d) Draw human faces	CO-3,CO-4	40	50	10
5.	Architectural Elements & Conceptual Views Draw architectural sheet of elements of design a) line b) shapes c) form d) space e) colour and textures	CO-5	40	50	10

Legend:

PRA*: Process Assessment

PDA**: Product Assessment

Note: This table can be used for both end semester as well as progressive assessment of practical. Rubrics need to be prepared by the course teacher for each experiment/practical to assess the student performance.

R) Suggested Learning Resources:**(a) Books:**

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Practical Perspective Drawing	Philip J Lawson,	Mc Graw Hill Book Corporation, London
2.	Theory and practice of perspectives	W. Abbott	Balckie & sons Ltd. London
3.	Architectural Drawing Perspective & rendering	Civil A Farey	B.T. Batsford Ltd. London
4.	Handbook of Perspective drawing	James More head	Elsever Press, Inc. Texas

(b) Online Educational Resources:

1. <https://www.tomboweurope.com/en/inspiration/perspective-drawing>
2. <https://www.artistsnetwork.com/art-mediums/learn-to-draw-perspective/>
3. <https://etchrlab.com/blogs/news/freehand-techniques>

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educational recourses before use by the students.

- A) **Course Code** : 2437302(T2437302/P2437302/S2437302)
- B) **Course Title** : Building Material for Architecture
- C) **Pre- requisite Course(s)** : Class 10th level basic knowledge
- D) **Rationale** :

The Diploma in Architectural Assistantship course focuses on building materials, including wood, concrete, glass, and composites. It provides students with a comprehensive understanding of these materials, enabling them to design safe, efficient, and aesthetically pleasing structures. The course also emphasizes sustainable and innovative materials, addressing environmental impact and resource efficiency. Mastery of building materials is crucial for future architects, as it directly influences the durability, functionality, and sustainability of built environments.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of following course outcomes by the learners. For this, the learners are expected to perform various activities related to three learning domains (Cognitive, Psychomotor and Affective) in classroom/ laboratory/ workshop/ field/ industry.

After completion of the course, the students will be able to:

CO-1 Choose appropriate materials for a certain building project.

CO-2 Make use of contemporary building supplies for the specified construction circumstances.

CO-3 Describe the many parts and how they work together to form a certain architectural structure.

CO-4 determines the appropriate kind of foundation for a certain building construction.

CO-5 Oversee different building construction project activities.

- F) **Suggested Course Articulation Matrix (CAM):**

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
CO-1	3	2	-	2	2	-	2		
CO-2	3	1	2	2	2	1	2		
CO-3	2	1	-	-	-	-	1		
CO-4	3	2	2	-	1	-	2		
CO-5	2	2	-	-	2	2	2		

Legend: High (3), Medium (2), Low (1) and No mapping (-)

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I) **Course Curriculum Detailing:** This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self-Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J) **Theory Session Outcomes (TSOs) and Units: T2437302**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p>TSO1.1 Describe the term, “Stone as Building Material” with its classifications.</p> <p>TSO1.2 Explain the various methods of manufacturing of bricks</p> <p>TSO 1.3 Select suitable aggregates for a given construction work</p> <p>TSO 1.4 Conduct various tests on bricks in the laboratory as per IS code provisions</p>	<p>Unit 1- Stones, Aggregate and Bricks</p> <p>Stones: Stone as building material – Classification of Stones, Deterioration and Preservation of stone work</p> <p>Aggregates: Aggregates- Classification, Characteristics, Grading of Aggregates,</p> <p>Bricks: – Classification – Manufacturing of clay bricks, Tests on bricks- (Dimension- Compressive Strength – Water Absorption – Efflorescence)</p>	CO1
<p>TSO 2.1 Select suitable type of cement for a given construction work.</p> <p>TSO 2.2 Classify lime based on its properties.</p> <p>TSO 2.3 Conduct various tests on cement in laboratory.</p> <p>TSO 2.4 Suggest suitable mortar based on its application in the construction site</p>	<p>Unit 2- Lime, Cement and Mortar</p> <p>Lime: Lime – Properties uses and Classification</p> <p>Cement: Cement, Ingredients, Manufacturing of Cement, Test on Cement (Consistency test, Initial and Final Setting Time, Soundness,)</p> <p>Mortar: Mortar, Classification and properties of Mortar</p>	CO1
<p>TSO 3.1 Classify various types of timber based on its properties.</p> <p>TSO 3.2 Identify defects in a given timber.</p> <p>TSO3.3 Differentiate between ferrous material & non-ferrous metals.</p> <p>TSO 3.4 Suggest suitable type of modern construction material based on its application.</p>	<p>Unit 3- Timber and Modern Materials</p> <p>Timber: Timber, Classification, Structure of Timber, Properties of Timber, Characteristics of Good Timber, Defects in Timber, Use of different types of timber in various parts of buildings.</p> <p>Modern Materials:</p> <p>Glass, Ferrous and Non-Ferrous Metals, Ceramics Geotextile and Geomembrane, Fiber glass reinforced plastic</p>	CO1, CO2

<p>TSO4.1 Classify a given building based on NBC code provisions.</p> <p>TSO4.2 Enlist component parts of a given building.</p> <p>TSO4.3 Explain the functions of various components of a given building structure.</p> <p>TSO4.4 Differentiate between the load bearing and framed structure.</p>	<p>Unit 4- Building Components:</p> <p>Classification of Buildings as per National Building Code Group A to I, as per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure.</p> <p>Building Components – Building Components and their Function, Substructure - Foundation, Plinth, and Plinth Filling</p> <p>Superstructure- Walls, Partition wall, Cavity Wall, Sill, Lintel, Doors and windows, Floor, roof, Column Beams and Parapet</p>	CO3, CO4
<p>TSO 5.1 Enlist various composition of concrete.</p> <p>TSO 5.2 Explain various test concrete.</p> <p>TSO 5.3 Explain various steps used in concrete construction.</p>	<p>Unit 5- Concrete</p> <p>Compositions and grades of concrete. Various steps in concrete construction – batching, mixing, transporting, compacting, curing, shuttering, jointing. Test of concreteslump test, Vee- Bee test and Quality control of concrete. Design Mix of concrete.</p>	CO4, CO5

Note: One major TSO may require more than one theory session/period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2437302

Practical/Lab Session Outcomes (LSOs)	S.No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<p>LSO1a. Determine the grading off in aggregate for the given civil engineering work</p> <p>LSO 1b. Calculate the specific gravity of given type of fine aggregate.</p> <p>LSO 1c. Analyze the bulk density of given fine aggregate for compacted and loose state.</p>	1.	<p>Test on Fine Aggregate-</p> <ol style="list-style-type: none"> Determination of Grading of Fine Aggregate Determination of specific gravity of fine aggregate Determination of Compacted and Loose bulk density of fine aggregate 	CO1, CO5
<p>LSO 2a. Calculate the impact value of coarse aggregate.</p> <p>LSO 2b. Determine the elongation and flakiness index of the coarse aggregate.</p> <p>LSO2c. Determine the crushing value of coarse aggregate.</p>	2.	<p>Test on Coarse Aggregate-</p> <ol style="list-style-type: none"> Determination of impact value of coarse aggregate. Determination of Elongation index and flakiness index Determination of crushing value of coarse aggregate 	CO1, CO5
<p>LSO3a. Find the Normal consistency of cements.</p> <p>LSO 3b. Determine the initial and final setting time of given sample of cement</p> <p>LSO3c. Test the given cement sample for the compressive strength</p>	3.	<p>Test on Cement-</p> <ol style="list-style-type: none"> Determination of Normal consistency of cement Determination of Initial and Final setting time of cement Determination of compressive strength of cement sample 	CO1, CO5

LSO 4a. Compare the compressive strength of given samples of the bricks. LSO 4b. Carry out the absorption test on brick to identify its class. LSO 4c. Find the Efflorescence of given sample of brick.	4.	Test on Bricks: - 1. Determination of compressive strength of bricks 2. Determination of water absorption of bricks 3. Determination of Efflorescence of Bricks	CO1, CO5
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B) Suggested Term Work and Self-Learning: S2437302 Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. Assignments: Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

1. Perform a activity by collection of different types of stones and write their properties.
2. Identify different types of cement as per availability at near by location.
3. Prepare a sketch book consisting of different types of stair cases used in building construction.
4. Collect relevant information of recent technologies in manufacturing the cement of various grades and prepare a report on it.
5. Identify the reasons of seepage through the walls of the building and suggest the suitable remedial measures to address it and submit a report.
6. Prepare a summary report with reference to content in anyone part of National Building Code.
7. Check different construction activities by visiting a near by site as per the check list provided.

b. Micro Projects:

- Fly ash bricks
- Strength of different types of bricks
- Physical and chemical properties of cements
- Commercially available timber

c. Other Activities:

1. Seminar Topics:

- Rainwater harvesting
- Foundation for high rise buildings
- Quality control aspects in building construction works.
- Different types of staircases used in building structure
- Modern & green building construction materials

2. Visits: Visit nearby building construction project & Prepare report of visit with special comments on material used.

3. Self-learning topics:

- Different types of stones for different work.
- Cement for hydroelectric project

- L) **Suggested Course Evaluation Matrix:** The course teacher has to decide and use appropriate assessment strategy and its weightage in theory, laboratory and Term Work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test (%)	End Theory Assessment (ETA) (%)	Term Work & Self-Learning Assessment			Progressive Lab Assessment (PLA) (%)	End Laboratory Assessment (ELA) (%)
			Assignments (%)	Micro Projects (%)	Other Activities* (%)		
CO 1	15	10	15	20	20	30	35
CO 2	20	20	20	20	20	30	35
CO 3	20	20	20	20	20	40	30
CO 4	20	25	25	25	20	-	-
CO 5	25	25	20	15	20	-	-
Total Marks	30	70	50			20	30

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

** : Mentioned under point- (N) #: Mentioned under point-(O) Note:

- The percentage given is approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each Cos

- M) **Suggested Specification Table for End Semester Theory Assessment:**
Specification table represents the reflection of sample representation of assessment of cognitive domain of full course.

Unit Title and Number	Total Classroom Instruction (CI) Hours	Relevant COs Number (s)	Total Marks	ETA (Marks)		
				Remember(R)	Understanding(U)	Application & above (A)
Unit 1- Stones, Aggregate and Bricks	08	CO1	10	2	4	4
Unit 2- Lime, Cement and Mortar	10	CO1	16	4	6	6
Unit 3- Timber and Modern Materials	10	CO1, CO2,	14	4	4	6
Unit 4- Building Components	10	CO3, CO4	14	4	4	6
Unit 5- Concrete	10	CO4, CO5	16	4	6	6
Total Marks	48	-	70	18	24	28

Note: Similar table can also be used to design class/mid-term/ internal question paper for progressive assessment.

N) Suggested Assessment Table for Laboratory (Practical):

C)

S. No.	Laboratory Practical Titles	Relevant Cos Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
1.	Determination of Grading of Fine Aggregate	CO1, CO5	30	60	10
2.	Determination of specific gravity of fine aggregate	CO1, CO5	40	50	10
3.	Determination of Compacted and loose bulk density of fine aggregate	CO1, CO5	30	60	10
4.	Determination of impact value of coarse aggregate.	CO1, CO5	30	60	10
5.	Determination of Elongation index and flakiness index	CO1, CO5	30	60	10
6.	Determination of crushing value of coarse aggregate	CO1, CO5	30	60	10
7.	Determination of Normal consistency of cement	CO1, CO5	30	60	10
8.	Determination of Initial and Final setting time of cement	CO1, CO5	40	50	10
9.	Determination of compressive strength of cement sample	CO1, CO5	40	50	10
10.	Determination of compressive strength of bricks and blocks	CO1, CO5	40	50	10
11.	Determination of water absorption of bricks	CO1, CO5	30	60	10
12.	Determination of Efflorescence of Bricks	CO1, CO5	40	50	10

Legend:

O) Suggested Instructional/Implementation Strategies: Different Instructional/ Implementation Strategies may be appropriately selected, as per the requirement of the content/outcome. Some of them are Improved Lecture, Tutorial, Case Method, Group Discussion, Industrial visits, Industrial Training, Portfolio Based Learning, Role Play, Live Demonstrations in Classrooms, Lab, Field, Information and Communications Technology (ICT) Based Teaching Learning, Blended or flipped mode, Brainstorming, Expert Sessions, Video Clippings, Use of Open Educational Resources (OER), MOOCs etc.

P) List of Major Laboratory Equipment, Tools and Software:

S. No.	Name of Equipment, Tools and Software	Broad Specifications	Relevant Experiment/Practical Number
1.	Sieves	4.75 mm, 10 mm, 20 mm, 40 mm, 80 mm, for coarse aggregates, 2.36 mm, 1.18mm, 600microns, 150microns, for fine aggregates.	All
2.	Weigh Machine	Not less than 3kg and accurate upto 0.5gm, Oven, Pycnometer of about 1 litre capacity, Tray, Airtight container, filter paper.	All
3.	Balance, tamping rod, Shovel, Calibration equipment	Balance weigh not less than 3kg, Tamping rod of 16mm dia and 600mm length, A cylindrical metal measure, preferably provided with the handles, A piece of plate glass, preferably at least 6mm thick and 25mm larger than the diameter of the measure to be calibrated.	1,2,3,4, 6,7,8, 9
4.	Weighing machine, cylindrical steel cup, metal hammer, Tamping rod	Weighing Machine 45 to 60kg, A cylindrical steel cup of internal diameter 102 mm, depth 50 mm and minimum thickness 6.3mm. metal hammer weighing 13.5 to 14.0kg, Tamping rod 10mm diameter and 230mm long, rounded at one end.	4
5.	Standard thickness and length gauge.	Thermostatically controlled oven with capacity upto 250°C., Standard thickness and length gauge	5
6.	steel cylinder, cylindrical metal, Dial gauge	Steel cylinder 15 cm diameter with plunger and base plate, A compression testing machine, cylindrical metal measure of sufficient rigidity to retain its form under rough usage and of 11.5cm diameter and 18cm height, Dial gauge	6,7,8
7.	Vicat apparatus, Gauging trowel, Stop watch	Vicat apparatus confirming IS:5513-1976, Gauging trowel confirming IS:10086-1982, Stop watch	7,8
8	Vibration Machine, Cube Mould, Poking rod, Gauging Trowel, Standard Weights, Graduated Glass Cylinders, Non-porous plate UTM Machine	The vibration machine should be as per the standard IS10080 – 1982, Mould to be used in this test should conform to IS 10080 – 1982, Size of cube mould – 70.6mm. Poking rod should be as per the standard IS 10080 – 1982, Gauging trowel should comprise the blade of length 100-150 mm. it should have straight edges. Its weight should be 210 ± 10 g, Glass cylinders with a capacity of 150-200ml are required, permissible variations shall be ± 1 ml,	9,10
9	Ventilated oven, weighing balance, sample of whole brick	Ventilated oven, weighing balance, sample of whole brick	10,11,12

Q) Suggested Learning Resources:**(a) Books:**

S. No	Titles	Author(s)	Publisher and Edition with ISBN
1.	A Text-Book of Building Construction	S.P.Bindra and S.P.Arora	Dhanpat Rai Publication, Delhi Edition 2013, ISBN: 9788189928803
2.	Building Materials and Construction	Jena and Sahu,	Tata Mc. Graw Hill (2017). ISBN-10: 9339220625 ISBN-13: 978-9339220624
3.	Materials for Civil and Construction Engineers	Mamlouk and Zaniewski	Pearson
4.	Construction Materials	D.N. Ghosh	Tata McGraw Hill, New Delhi
5.	P.C. Varghese	Building Materials	PHI learning, New Delhi
6.	Building Construction	B. C. Punmia	Laxmi Publication

(b) Online Educational Resources:

1. <https://nptel.ac.in/courses/124105013>
2. <https://www.vlab.co.in/broad-area-civil-engineering>
3. https://www.youtube.com/watch?v=EIDXE28_8eQ&list=PL8BA090E69BF01BC2

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educationalrecourses before use by the students.

(c) Others:

1. Engineers Hand book
2. Building Material Handbook
3. Lab Manuals

- A) **Course Code** : **2437303(T2437303/ P2437303/S2437303)**
B) **Course Title** : Architecture design and drawing-I
C) **Pre- requisite Course(s)** :
D) **Rationale** :

Freehand sketching, colouring and rendering like sketching, shades and shadows, lettering and printing forms important components of Architecture discipline. Graphic presentation forms a core subject for preparing perspective drawings, scale drawings, three dimensional views, furniture drawings and layouts. Therefore, this course aims at equipping the students with the skills of graphic presentation and other above mentioned areas. Teachers are expected to lay considerable stress on practical work so that students attain sufficient skills in sketching, lettering and printing and desired competencies for preparing good quality perspectives of interior and exterior of buildings in different media.

Teachers are also expected to stress upon appropriate line work, properties, dimensioning lettering and printing. Diploma holders in Architectural Assistantship find employment with private architects and also majority of them go for Self-employment. Therefore, they are required to develop aptitude / skills to design residential, commercial and other public buildings.

Teachers while imparting instruction / giving assignments to students are expecting to teach various elements of design like form function, balance, light of shadow, shape plane, volume, line, rhythm, proportions, textures and other such related elements. Teachers are also expected to show various types of designs of small building to develop and appreciation for this subject.

Teachers should also motivate students to maintain sketch book / portfolio of all the assignments given to the students.

- E) **Course Outcomes (Cos):** After the completion of the course, teachers are expected to ensure the accomplishment of following course outcomes by the learners. For this, the learners are expected to perform various activities related to three learning domains (Cognitive, Psychomotor and Affective) in classroom/ laboratory/ workshop/ field/ industry.

After completion of the course, the students will be able to-

- CO-1** Prepare drawings and sketches by using **Drawing Techniques:-**
CO-2 prepare Composition of 2D & 3D objects to understand shapes create drawing by using Elements and principle of design
CO-3 Explain proportion of Components of Human Body by help of Le Corbusier **“modular man”**
CO-4 Requirement of space (2-D, 3-D) for various human activities
CO-5 Apply furniture standards (sizes of domestic and public furniture) in architectural drawing
CO-6 Analyze the issues of Vehicular movement and parking space of in any building and reduce the congestion of space
CO-7 Standards for drinking fountains, waiting queues at bus stops, garden seats, waste bins, telephone

booths etc help to prepare architectural drawing

CO-8 selection of plants according to its foliage enhance landscape drawing of any buildings

CO-9 preparing architecture drawings of small unit like 1BHK and prepare presentation by applying architectural elements, principle and combining the spaces

F) Suggested Course Articulation Matrix (CAM):

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
CO-1	1	2	2	2	-	2	-		
CO-2	2	2	2	2	-	1	-		
CO-3	1	2	2	2	-	-	-		
CO-4	1	2	2	2	3	1	2		
CO-5	1	2	2						
CO-6	1	2	2						
CO-7	1	2	2						
CO-8	1	2	2						
CO-9	1	2	2						

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional

G) Teaching and Learning Scheme:

Course Code	Course Title	Scheme of Study (Hours/Week)					
		Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
		L	T				
2437303	Architecture design and drawing-I	03	-	04	02	09	06

Note: Prefix will be added to Course Code if applicable (T for theory Paper, P for Practical Paper and S for Term work)

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term Work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

H) Assessment Scheme:

Course Title	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
	Theory Assessment (TA)		Term Work & Self Learning Assessment (TWA)		Lab Assessment (LA)		
	Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
Architecture design and drawing-I	30	70	20	30	20	30	200

Note: Prefix will be added to Course Code if applicable (T for theory Paper, P for Practical Paper and S for Term work)

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.)

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/ presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

I) Course Curriculum Detailing: This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J) Theory Session Outcomes (TSOs) and Units: T2437303

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 1a.</i> List different architectural instruments (T square, Drafter, scale, mini drafter drawing board)</p> <p><i>TSO 1b.</i> List different types of pencil, know their uses while drawing any sketches.</p> <p><i>TSO 1c.</i> discusses various techniques for rendering tonal values and textures in drawings</p> <p><i>TSO 1d.</i> Explain sizes of paper as per architectural uses</p>	<p>Unit-1.0 Drawing Techniques :-</p> <p>1.1 Use of Architectural Instruments</p> <p>1.2 Use of Pencil tones texture</p> <p>1.3 Use of Colour tones - texture</p>	CO-1
<p><i>TSO 2a</i> differentiate between 2D and 3D shapes and draw composition diagram using both types of shapes.</p> <p><i>TSO 2b</i> explain various types of architectural design principles and prepare practice sheets</p> <p><i>TSO 2c</i> explain various types of architectural design elements draw colour wheels mark different term and prepare practice sheets</p> <p><i>TSO 2d</i> practice to draw drawing of composition elements and principles of architecture</p>	<p>Unit-2.0 Composition of 2D & 3D :-</p> <p>2.1 Composition of 2D surfaces in tone, colours and textures</p> <p>2.2 Principles of design</p> <p>2.3 Elements of design</p> <p>2.4 Composition of 3D surfaces</p> <p>2.5 Problems based on principles & elements of Architecture</p>	CO-2
<p><i>TSO 3a</i> Describe standard of proportion 4b Based on modular man</p> <p><i>TSO 3b</i> planning architectural drawing based on vastu uprush mandala</p> <p><i>TSO 3c</i> Explain movement of sun at different part of building and mark layout of plan</p>	<p>Unit-3.0 Proportion of Components of Human Body: -</p> <p>3.1 The proportions of the different components of the human body; Examples from Le Corbusier Modular Man, Vaastu Pursha Mandala</p>	CO-3
<p><i>TOS 4a</i> Take appropriate measurement to human posture and different uses of space</p> <p><i>TOS 4b</i> Explain single and multiple uses of space</p>	<p>Unit-4.0 Human Activities: -</p> <p>Requirement of space (2-D, 3-D) for various human activities (Single and multiple uses of spaces such as queues etc.</p>	CO-4

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 5a</i> Describe furniture standard both domestic and public furniture's</p> <p><i>TSO 5b</i> list toilet and kitchen equipment's sizes and standard</p> <p><i>TSO 5c</i> describe the standard sizes of doors and windows of different room openings and their position</p>	<p>UNIT -5.0</p> <p>Furniture Standards :- Furniture standards (sizes of domestic and public furniture); Toilet and Kitchen equipment sizes and standards; Doors and windows sizes, standards and locations.</p>	CO-5
<p><i>TSO 6a</i> resolve the problem of accommodation of vehicles and different premises by knowing</p> <p>I Parking space for each vehicle</p> <p>II Turning radius</p> <p>III Two and four wheelers</p>	<p>UNIT – 6.0</p> <p>Vehicles :- Vehicles in motion, parking along with turning radii for two-wheelers,cars, buses, vans etc. Standard road width.</p>	CO-6
<p><i>TSO 7a</i> List and sketch the different standard of garden and street furniture</p> <p><i>TSO 7b</i> Applying these standard while designing of layout of architectural drawing</p>	<p>UNIT – 7.0</p> <p>Furniture :- Standards for drinking fountains, waiting queues at bus stops, garden seats,waste bins, telephone booths, street lights, foot paths, public walkways, railing etc.</p>	CO-7
<p><i>TSO 8a</i> Explain graphical representation of plant materials like ground cover, foliage, shrubs,trees</p> <p><i>TSO 8b</i> discuss drawing application of landscape material their plan and elevation</p>	<p>UNIT – 8.0</p> <p>Graphic Representation of plant material (ground cover, foliage, shrubs,trees) human figures and vehicles.</p>	CO-8
<p><i>TSO 9a</i> Describe each section of residential house portion</p> <p><i>TSO b</i> Explain to draw architectural drawing plan of small unit of different floors and its elevation</p>	<p>UNIT – 9.0</p> <p>Development of architectural drawing from given sketch design of building involving two or more floors and split levels.</p>	CO-9

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2437303

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant Cos Number(s)
<i>LSO 1.1.</i> Perform fundamental drawing techniques with use of architectural instruments	1.	Drawing Techniques 1.4 Use of Architectural Instruments 1.5 Use of Pencil tones texture 1.6 Use of Color tones texture	CO-1
<i>LSO 2.1.</i> Principles have the ability to transform designs, both aesthetically and in terms of performance. <i>LSO 2.2.</i> Elements of design are the basic units of a visual image, they include space, line, balance, color, and shape. The elements also complement each other <i>LSO 2.3.</i> 2D and 3D Surfaces can be created by with the help of both	2.	Composition of 2D & 3D 2.1 Composition of 2D surfaces in tone, colors and textures 2.2 Principles of design 2.3 Elements of design 2.4 Composition of 3D surfaces Problems based on principles & elements of Architecture	CO-2
<i>LSO 3.1.</i> Standard measurement can be created by Le Corbusier Modular Man it become universal standard <i>LSO 3.2.</i> Preparing architectural drawing according to direction of sun movement and positioning different parts of house set on vastu	3.	Proportion of Components of Human Body The proportions of the different components of the human body; Examples from Le Corbusier Modular Man, Vitruvius Marco Pollione, Vastu Pursha Mandala	CO-3
<i>LSO 4.1.</i> Performing different position and sizes measurements of human body with relative to space	4.	Human Activities Requirement of space (2-D, 3-D) for various human activities (Single and multiple uses of spaces such as queues etc.)	CO-4
<i>LSO 7.1.</i> Furniture standard is basic tools for space organization it provide measurement of furniture which help to create space (size and height)	5.	Furniture Standards Furniture standards (sizes of domestic and public furniture); Toilet and Kitchen equipment - sizes and standards; Doors and windows - sizes, standards and locations.	CO-5
<i>LSO 8.1.</i> Prepare space for parking(no of vehicle space) in building like residential, commercial, institutional, recreational etc	6.	Vehicles Vehicles in motion, parking along with turning radii for two-wheelers, cars, buses, vans etc. Standard road width.	CO-6
<i>LSO 9.1.</i> Provide proper understanding of street furniture's which can be incorporated in further architectural drawings	7.	Street furniture Standards for drinking fountains, waiting queues at bus stops, garden seats, waste bins, telephone booths, street lights, foot paths, public walkways, railing etc.	CO-7
<i>LSO 10.1.</i> Provide proper knowledge of graphical representation of plant materials which help for preparing landscape drawing	8.	Graphic Representation of plant material (ground cover, foliage, shrubs, trees) human figures and vehicles.	CO-8
<i>LSO 11.1.</i> Draw basic architectural drawing like studio flats and prepare representation of it	9.	Development of architectural drawing from given sketch design of building involving two or more floors and split levels	CO-9

L) **Suggested Term Work and Self Learning: S2437303** Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. **Assignments:** Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

b. **Micro Projects:**

- I. **Presentation drawing:** prepare layout plan of small unit with furniture of standard sizes
- II. **Slide Presentations:** Prepare slides of small residential unit with all Presentation features such as: plan elevation and section
- III. **Drawing sheets:** Prepare drawing sheet of each architectural elements and principles (like point, line, textures space. Shapes form, balance ,emphasis etc)

c. **Other Activities:** ---

M) **Suggested Course Evaluation Matrix:** The course teacher has to decide and use appropriate assessment strategy and its weightage in theory, laboratory and sessional work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test	End Theory Assessment (ETA)	Term Work & Self Learning Assessment			Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)
			Assignments	Micro Projects	Other Activities*		
CO-1	10%	10%	5%	5%	5%	--	--
CO-2	20%	20%	15%	25%	25%	--	--
CO-3	10%	10%	10%	10%	10%	--	--
CO-4	10%	10%	10%	15%	15%	--	--
CO-5	10%	10%	10%	15%	15%	--	--
CO-6	10%	10%	10%	10%	10%		
CO-7	10%	10%	10%	10%	10%	--	--
CO-8	10%	10%	10%	5%	5%	--	--
CO-9	10%	10%	10%	5%	5%	--	--
Total Marks	30	70	20	20	10		
			50				

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

** : Mentioned under point- (N)

: Mentioned under point-(O)

Note:

- The percentage given are approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each COs.

N) **Suggested Specification Table for End Semester Theory Assessment: (Not Applicable)**

O) **Suggested Assessment Table for Laboratory (Practical): (Not Applicable)**

P) Suggested Learning Resources:

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Time Saver Standards for Building Types	Joseph De Chiara and John Callendera	
2.	Architects Data	Neufert	
3.	Space, Time and Order by	DK Ching	

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educational recourses before use by the students.

- A) Course Code : 2437304 (T2437304, S2437304)
 B) Course Title : Climatology
 C) Pre- requisite Course(s) :
 D) Rationale :

Understanding of the basic principles of climatology and environment are very important for diploma holders in Architectural Assistantship. The knowledge of this subject will be very useful in the design of buildings.

Teachers are expected to impart instructions of the above course keeping in view the effect of above course in the design of buildings.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of following course outcomes by the learners. For this, the learners are expected to perform various activities related to three learning domains (Cognitive, Psychomotor and Affective) in classroom/ laboratory/ workshop/ field/ industry.

After completion of the course, the students will be able to-

CO-1 Analyze the issues of Earth and Global Climate and its impact on sustainability

CO-2 Use relevant relationship of Climate and Comfort.

CO-3 Describe Sun movement & orientation of Building Design

CO-4 Explain Wind movement & orientation of Building Design.

CO-5 Apply Architectural Application landscaping, Building orientation & Placement, According to Sun & Wind direction.

F) **Suggested Course Articulation Matrix (CAM):**

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
CO-1	3	-	-	-	2	-	2		
CO-2	3	2	2	2	2	-	2		
CO-3	3	-	-	-	3	-	2		
CO-4	3	3	-	2	2	-	2		
CO-5	3	-	3	3	2	2	2		

Note: Prefix will be added to Course Code if applicable (T for theory Paper, P for Practical Paper and S for Term work)

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional

G) Teaching & Learning Scheme:

Course Code	Course Title	Scheme of Study (Hours/Week)					
		Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+ SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
		L	T				
2437304	Climatology	3	-	-	2	05	04

Note: Prefix will be added to Course Code if applicable (T for theory Paper, P for Practical Paper and S for Term work)

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term Work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

H) Assessment Scheme:

Course Code	Course Title	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
		Theory Assessment (TA)		Term Work & Self-Learning Assessment (TWA)		Lab Assessment (LA)		
		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2437304	Climatology	30	70	20	30	--	--	150

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.)

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

I) Course Curriculum Detailing: This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J) Theory Session Outcomes (TSOs) and Units: T2437304

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 1a.</i> Definition of climatology</p> <p><i>TSO 1b.</i> Explain elements of climate</p> <p><i>TSO 1c.</i> Describe different climate zones</p> <p><i>TSO 1d.</i> Classification of tropical climate</p>	<p>Unit-1.0 Earth and Global Climate</p> <p>1.1 Introduction to climatology</p> <p>1.2 Elements of climate (Wind, temp, humidity, precipitation, pressure).</p> <p>1.3 Different climate zones & Classification of tropical climate</p>	CO1
<p>TSO 2a Explain Micro-Macro climatic effects of local terrain</p> <p>TSO 2b Differentiate between micro macro climate</p> <p>TSO 2c Explain the effects of micro climate on urban heat island</p> <p>TSO 2d Take appropriate measures to prevent phenomenon of heat island</p> <p>TSO 2e Determine the relation of climatic elements to comfort</p>	<p>Unit-2.0 Relationship of Climate and Comfort</p> <p>2.1 Micro-Macro climatic effects.</p> <p>2.2 Concept of comfort zone and bio climatic chart.</p> <p>2.3 Relation of climatic elements to comfort</p>	CO2
<p><i>TSO 3a.</i> Describe sun orientation and building orientation accordingly</p> <p><i>TSO 3b.</i> Explain solar chart and sun path diagram</p> <p><i>TSO 3c.</i> Explain wind energy and its impact on environment</p> <p><i>TSO 3d.</i> Discuss characteristics of vertical and horizontal louvers design</p> <p><i>TSO 3e.</i> Discuss solar passive design and thermal comfort system</p> <p><i>TSO 3f.</i> Differentiate between passive and active solar thermal collector</p> <p><i>TSO 3g.</i> Differentiate between passive solar heating and passive solar cooling.</p>	<p>Unit-3.0 Sun & Building Design :-</p> <p>3.1 Orientation for Sun</p> <p>3.2 Sun chart (sun path diagram)</p> <p>3.3 Design of louvers (horizontal & Vertical)</p> <p>3.4 Natural lighting / Day lighting</p> <p>3.5 Introduction and objectives of solar passive design and thermal comfort.</p>	CO3
<p><i>TSO 4a.</i> Describe Orientation for Wind & Wind scaping of building.</p> <p><i>TSO 4b.</i> Identify the factors of ventilation technique</p> <p><i>TSO 4c.</i> Explain Stack effect and thermally induced air current</p> <p><i>TSO 4d.</i> Explain passive cooling effects</p> <p><i>TSO 4e.</i> discuss the effect of air movement on building</p>	<p>Unit-4.0 Wind & Building Design</p> <p>4.1 Orientation for Wind & Wind scaping of building.</p> <p>4.2 Ventilation Technique</p> <p>4.3 Stack effect and thermally induced air current</p> <p>4.4 Passive solar cooling</p> <p>4.5 Air movement around the building</p>	CO4
<p><i>TSO 5a.</i> Explain Building orientation & Placement, According to Sun & Wind direction consideration.</p> <p><i>TSO 5b.</i> Explain Effect of Landscaping & its benefits</p> <p><i>TSO 5c.</i> Apply orientation of sun wind and landscaping while designing building plan</p>	<p>Unit-5.0 Architectural Application</p> <p>5.1 Building orientation & Placement,</p>	CO5

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	According to Sun & Wind direction consideration. 5.2 Effect of Landscaping 5.3 Site selection and site planning	

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: (Not Applicable)

L) Suggested Term Work and Self Learning: S2437304 some sample suggested assignments, micro project and other activities are mentioned here for reference.

- a. Assignments:** Questions/Problems- Real life problem /Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

What are different elements of climates?

Discuss the day light factors and explain its importance in building

What are different climate zones & Classification of tropical climate?

What is stack effect and how it is helpful in ventilation?

What is solar passive design? How they they help in maintain the thermal comfort in building

b. Major topics

- Show sun and wind effect on building orientation.
- Design of louvers (horizontal & Vertical)
- Factor affecting Micro-Macro climatic in India

c. Self-learning topics:

- Micro-Macro climatic effects.
- Different Climatic zone
- Solar path diagram

M) Suggested Course Evaluation Matrix: The course teacher has to decide and use appropriate assessment strategy and its weightage in theory, laboratory and Term Work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test	End Theory Assessment (ETA)	Term Work & Self Learning Assessment			Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)
		Assignments	Micro Projects	Other Activities*			
CO-1	15%	20%	15%	-	-	--	--
CO-2	10%	20%	--	25%	-	--	--
CO-3	15%	20%	--	25%	33%	--	--
CO-4	30%	20%	--	25%	33%	--	--
CO-5	30%	20%	--	-	-	--	--
Total Marks	30	70	20	20	10	--	--
			50				

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

** : Mentioned under point- (N)

: Mentioned under point-(O)

Note:

- The percentage given are approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each COs.

N) Suggested Specification Table for Laboratory (Practical) :(Not Applicable)**O) Suggested Specification Table for End Semester Theory Assessment:**

Unit Title and Number	Total Classroom Instruction (CI) Hours	Relevant COs Number(s)	Total Marks	ETA (Marks)		
				Remember (R)	Understanding (U)	Application & above (A)
Unit-1.0 Earth and Global Climate	10	CO-1	15	5	5	5
Unit-2.0 Relationship of Climate and Comfort	10	CO-2	15	5	5	5
Unit-3.0 Sun & Building Design	10	CO-3	15	5	5	5
Unit-4.0 Wind & Building Design	10	CO-4	15	5	5	5
Unit-5.0 Architectural Application	08	CO-5	10	5	3	2
Total	48	-	70	25	23	22

Legend:

PRA*: Process Assessment

PDA**: Product Assessment

Note: This table can be used for both end semester as well as progressive assessment of practical. Rubrics need to be prepared by the course teacher for each experiment/practical to assess the student performance.

P) Suggested Instructional/Implementation Strategies: Different Instructional/ Implementation Strategies may be appropriately selected, as per the requirement of the content/outcome. Some of them are Improved Lecture, Tutorial, Case Method, Group Discussion, Industrial visits, Industrial Training, Field Trips, Portfolio Based, Learning, Role Play, Live Demonstrations in Classrooms, Lab, Field Information and Communications Technology (ICT)Based Teaching Learning, Blended or flipped mode, Brainstorming, Expert Session, Video Clippings, Use of Open Educational Resources (OER), MOOCs etc.

R) Suggested Learning Resources:**(a) Books:**

S. No.	Titles	Author(s)
1.	Tropical Architecture	CP Kukreja.
2.	Environmental Engg. And Management	Suresh K. Dhameeja.
3.	Ecology	E.P. Odem.
4.	Design with climate.	Arvind Krishan and others

(b) Online Educational Resources:

1. <https://imdpune.gov.in/training/training%20notes/Climatology-IMTC.pdf>
2. <https://en.wikipedia.org/wiki/Climatology>
3. <https://sustainabilityworkshop.venturewell.org>
4. <https://sustainability.williams.edu/green-building>
5. <https://theconstructor.org/building/passive-solar-cooling-work/562705/>
6. <https://civil.poriyaan.in/topic/shading-devices-40094>

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educational recourses before use by the students.

- A) **Course Code** : 2437305 (T2437305/P2437305/S2437305)
 B) **Course Title** : Computer Application In Architecture
 C) **Pre- requisite Course(s)** : Engineering Drawing & Graphics
 D) **Rationale** :

In the present times an architectural assistant should be capable of drafting drawings on the computer as most of the architects lay greater stress on computerized drawings for their ease of drafting, editing, managing and presentation. At the end of the course the students should be able to make 2-D & 3- D architectural drawings for presentation and construction purposes. The student should get familiar with the latest Auto CAD software. Note: Relevant theory may be taught along with practical exercises as sessional records in each topic. The aim of this course is to help the student to comprehend the importance of computer added design and apply the principles of Computer Application In Architecture to solve engineering problems.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of following course outcomes by the learners. For this, the learners are expected to perform various activities related to three learning domains (Cognitive, Psychomotor and Affective) in classroom/ laboratory/ workshop/ field/ industry.

After completion of the course, the students will be able to-

- CO-1** Demonstrate basic concept of CAD software.
CO-2 Explain the interface and basic commands of sketch up software.
CO-3 Draw the basic 2D entities using Autocad software.
CO-4 Modify an existing drawing using different modify commands.
CO-5 Create Block and use library for block.

- F) **Suggested Course Articulation Matrix (CAM):**

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
CO-1	3	-	-	2	1	-	-		
CO-2	2	3	3	3	2	-	-		
CO-3	3	3	3	2	2	1	1		
CO-4	3	3	3	2	2	1	1		
CO-5	3	2	2	3	3	1	2		

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional

- G) **Teaching & Learning Scheme:**

Course Code	Course Title	Scheme of Study (Hours/Week)					Total Credits (C)
		Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+ SL)	Total Hours (CI+LI+TW+SL)	
		L	T				
2437305	Computer Application In Architecture	03	-	04	02	09	06

Note: Prefix will be added to Course Code if applicable (T for theory Paper, P for Practical Paper and S for Term work)

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term Work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

H) Assessment Scheme:

Course Code	Course Title	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
		Theory Assessment (TA)		Term Work & Self-Learning Assessment (TWA)		Lab Assessment (LA)		
		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2437305	Computer Application In Architecture	30	70	20	30	20	30	200

Note: Prefix will be added to Course Code if applicable (T for theory Paper, P for Practical Paper and S for Term work)

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.)

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

- I) Course Curriculum Detailing:** This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J) Theory Session Outcomes (TSOs) and Units: T2437305

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 1a.</i> Explain use of computer in drafting and designing.</p> <p><i>TSO 1b.</i> Describe the hardware and software requirements of AutoCAD .</p> <p><i>TSO 1c.</i> Understand the use of different input devices</p> <p><i>TSO 1d.</i> Apply different object selection methods in given situation.</p> <p><i>TSO 1e.</i> Work with the user coordinates system and World coordinate system.</p> <p><i>TSO 1f.</i> Open, Save and close a new drawing and existing drawing.</p>	<p>Unit-1.0 Introduction to 2-D CAD / 3-D Basic CAD Software</p> <p>1.1 Fundamental of Computer aided drafting and its application, Various software for CAD</p> <p>1.2 Hardware and software requirements for Auto CAD</p> <p>1.3 Input Devices</p> <p>1.4 Graphics output devices</p> <p>1.5 Object Selection methods</p> <p>1.6 Coordinate system- UCS, WCS</p> <p>1.7 Opening, Saving and closing a new drawing and existing drawing</p>	CO1
<p><i>TSO 2a.</i> Describe the interface of sketch up software.</p> <p><i>TSO 2b.</i> Understand the camera controls in sketch up.</p> <p><i>TSO 2c.</i> Define the basic draw tools in sketch up.</p> <p><i>TSO 2d.</i> Understand basic concept of modelling windows & doors.</p> <p><i>TSO 2e.</i> Explain the uses of warehouse.</p> <p><i>TSO 2f.</i> Describe the different views of building drawings.</p> <p><i>TSO 2g.</i> Explain the concept of rendering using V-Ray plugin</p>	<p>Unit-2.0 Introduction to Sketch UP -3-D basic software</p> <p>2.1 Sketch up Interface- Title Bar, Menu bar, Toolbars</p> <p>2.2 Camera controls – Pan, Zoom & orbit</p> <p>2.3 Basic tools – Rectangle, Circle, Select pencil, push / pull, groups, Components, Move, Rotate, Copy, Paint bucket, Offset, Array & Polar array</p> <p>2.4 Modelling practice – Walls + floor, Windows & Doors etc.</p> <p>2.5 Warehouse</p> <p>2.6 Shadows, views,</p> <p>2.7 Rendering - V-ray plugin</p>	CO2
<p><i>TSO 3a.</i> Describe the interface of Autocad software .</p> <p><i>TSO 3b.</i> Understand the various drafting settings.</p> <p><i>TSO 3c.</i> Describe the setting steps of drawing limit.</p> <p><i>TSO 3d.</i> Explain the process of unit settings.</p> <p><i>TSO 3e.</i> Create user defined dimension styles.</p> <p><i>TSO 3f.</i> Draw basic 2D shape like rectangle, circle</p>	<p>Unit 3.0 Start drawing with Auto CAD</p> <p>3.1 Autocad interface- Menu Bar, Tool Bar</p> <p>3.2 Drafting settings</p> <p>3.3 Setting of Drawing Limit</p> <p>3.4 Unit Setting</p> <p>3.5 Dimension style & Option</p> <p>3.6 Drawing basic 2D shape -Circle , Arc , Ellipse , Polygon , Spline, Rectangle</p>	CO3
<p><i>TSO.3a</i> Use Zoom & Pan command in various</p>	<p>Unit 4.0 Modifying an Existing Drawing</p>	CO4

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p>way.</p> <p>TSO.3b Differentiate between Oops and Undo .</p> <p>TSO.3c Use different modify command in existing Drawing.</p> <p>TSO.3d Elaborate various useful command like Array, scale & multileader.</p> <p>TSO.3e Describe importance of ortho mode.</p> <p>TSO.3f Explain the change command using to change properties.</p> <p>TSO.3g Perform saving and plotting procedure.</p>	<p>4.1 Zoom & Pan</p> <p>4.2 Undo, Redo /Oops</p> <p>4.3 Modifying Commands:- Move, Copy, Multiple Copy , Rotate , Erase ,Trim, Extend , Champher, Fillet, Stretch , Divide, Offset, Mirror, Divide</p> <p>4.4 Centre mark , Point, Array , Scale & Multileader</p> <p>4.5 Ortho mode</p> <p>4.6 Dimension & Mtext</p> <p>4.7 Change (Change properties)</p> <p>4.8 Layers</p> <p>4.9 Plot, Save & Save as,</p> <p>4.10 Explode</p>	
<p>TSO.5a Create block of basic drawing entities.</p> <p>TSO.5b Use created block in same drawing and in other drawing.</p> <p>TSO.5c Explain the features of tool palettes.</p> <p>TSO.5d Use library for inserting desired block.</p> <p>TSO.5e Explain the properties of W-Block.</p>	<p>Unit-5.0 Making and Inserting Blocks</p> <p>5.1 Creating Blocks</p> <p>5.2 Insert block</p> <p>5.3 Tool palettes</p> <p>5.4 Using library for blocks</p> <p>5.5 W-block</p>	<p>CO1, CO5</p>

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2437305

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 1.1.</i> Prepare a template of with required data.	1.	Prepare a template of your institute of A2/A3 size with title block and institute name .	CO1, CO2
<i>LSOs 2.1</i> Prepare drawing of simple 2D entities using Sketch up. <i>LSOs 2.2</i> Prepare drawing of composite shape of two or more using sketch up.	2.	Use the Sketch up software to draw one simple 2-D entities using Draw commands individually. Part I .	CO1, CO2
	3	Use the Sketch up software to draw another simple 2-D entities using Draw commands individually Part II.	
	4	Use the Sketch up software to draw another simple 2-D entities using Draw commands individually . Part III	
<i>LSO 3.1.</i> Prepare drawing of simple 2D entities using Autocad. <i>LSO 3.2.</i> Prepare the simple building components as per specification given.	5	Use the AutoCAD software to draw four complex 2-D entities assigned by the teacher using Draw, Edit and Modify commands. Part I	CO2, CO3
	6	Use the AutoCAD software to draw simple building components assigned by the teacher using Draw, Edit and Modify commands. Part II	
	7	Draw the given 2D shape of required area using AutoCAD .	
<i>LSO 4.1.</i> Use Modify commands to edit existing drawing. <i>LSO 4.2.</i> Plot the drawing file in desired size paper	8	Modify the given geometrical plane figures (squares, rectangle, triangle) using modify command. Part I	CO4
	9	Modify the given geometrical plane figures (squares, rectangle, triangle) using modify command. Part II	
	10	Plot the above working drawing in A2/A3 size paper with institute logo and name.	
<i>LSOs 5.1</i> Create Block in drawing file and insert in same file. <i>LSOs 5.2</i> Use Block in another drawing file <i>LSOs 5.3</i> Plot the drawing file in desired size paper.	11	Create block in given drawings in AutoCAD.	CO1, CO5
	12	Use block in same file and in other file.	
	13	Plot the above working drawing in A2/A3 size paper with institute logo and name	

L) Suggested Term Work and Self Learning: S2437305 Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. **Assignments:** Questions/Problems/ Exercises to be provided by the course teacher in line with the targeted COs.

b. **Micro Projects:**

- Maintain a separate folder on Computer workstation allotted, in which all above mentioned practical should be saved and will be submitted / mailed as a part of term work.
- Collect at least one 2D drawing like building plan or Layouts from nearby workshops/industries/builders/contractors and develop them using computer aided drafting approach.
- Explain at least one problem for drafting to all batch colleagues. Teacher will assign the problem to be explained by student.
- Assess at least one 2D drawing of other students (A group of 5-6 students may be identified by teacher) and note down the mistakes committed by the group. Selected students will also guide other students for correcting mistakes. if any.

c. Other Activities:

1. Seminar Topics:

- Importance of Warehouse in Sketch up
- Concept of Rendering in CAD.
- Various plugin available with Auto Cad

2. Visits: Visit nearby auditorium. Prepare report of visit with special comments of facilities needed in planning of building.

3. Self-learning topics:

- Various advanced command used by professionals.
- Various types of building.
- Different Shadows and views of structures

M) Suggested Course Evaluation Matrix: The course teacher has to decide and use appropriate assessment strategy and its weightage in theory, laboratory and Term Work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test	End Theory Assessment (ETA)	Term Work & Self Learning Assessment			Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)
			Assignments	Micro Projects	Other Activities*		
CO-1			15%	-	-	20%	20%
CO-2			10%	25%	-	10%	20%
CO-3			15%	25%	33%	15%	20%
CO-4			30%	25%	33%	15%	20%
CO-5			30%	25%	34%	40%	20%
Total Marks			20	20	10	20	30
			50				

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

** : Mentioned under point- (N)

#: Mentioned under point-(O)

Note:

- The percentage given are approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each COs.

N) Suggested Specification Table for End Semester Theory Assessment: (Not Applicable)

Note: Similar table can also be used to design class/mid-term/ internal question paper for progressive assessment.

O) Suggested Assessment Table for Laboratory (Practical):

SN	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
1.	Prepare a template of your institute of A2/A3 size with title block and institute name .	CO1	40	50	10
2.	Use the Sketch up software to draw one simple 2-D entities using Draw commands individually. Part I .	CO2	40	50	10
3.	Use the Sketch up software to draw another simple 2-D entities using Draw commands individually Part II.	CO2	30	60	10
4.	Use the Sketch up software to draw another simple 2-D entities using Draw commands individually . Part III	CO1, CO2	30	60	10
5.	Use the Autocad software to draw four complex 2-D entities assigned by the teacher using Draw, Edit and Modify commands. Part I	CO2, CO3	40	50	10
6.	Use the Autocad software to draw four complex 2-D entities assigned by the teacher using Draw, Edit and Modify commands. Part II	CO2, CO3	40	50	10
7.	Draw the given 2D shape of required area using Autocad .	CO2, CO3	30	60	10
8.	Modify the given geometrical plane figures (squares, rectangle, triangle) using modify command. Part I	CO4	40	50	10
9.	Modify the given geometrical plane figures (squares, rectangle, triangle) using modify command. Part II	CO4	40	50	10
10.	Plot the above working drawing in A2/A3 size paper with institute logo and name.	CO2, CO5	30	60	10
11.	Create block in given drawings in Autocad.	CO2, CO5	30	60	10
12.	Use block in same file and in other file.	CO2, CO5	30	60	10
13.	Plot the above working drawing in A2/A3 size paper with institute logo and name	CO1, CO5	40	50	10

Legend:

PRA*: Process Assessment

PDA**: Product Assessment

Note: This table can be used for both end semester as well as progressive assessment of practical. Rubrics need to be prepared by the course teacher for each experiment/practical to assess the student performance.

P) Suggested Instructional/Implementation Strategies: Different Instructional/ Implementation Strategies may be appropriately selected, as per the requirement of the content/outcome. Some of them are Improved Lecture, Tutorial, Case Method, Group Discussion, Industrial visits, Industrial Training, Field Trips, Portfolio Based, Learning, Role Play, Live Demonstrations in Classrooms, Lab, Field Information and Communications Technology (ICT)Based Teaching Learning, Blended or flipped mode, Brainstorming, Expert Session, Video Clippings, Use of Open Educational Resources (OER), MOOCs etc.

Q) List of Major Laboratory Equipment, Tools and Software:

S. No.	Name of Equipment and Tools with Broad Specifications	Exp. No.
1.	Networked Licensed latest version of any Parametric Computer Aided Design and Drafting software.	ALL

S. No.	Name of Equipment and Tools with Broad Specifications	Exp. No.
2.	CAD workstation with latest configurations (i3-i5 preferable), RAM minimum 4 GB onwards, for each student	ALL
3.	Operating system: Windows XP/Windows 7/Windows 8/Windows 10 onwards.	ALL
4.	Plotter/Printer with latest versions. (A3 and A4) LCD projector and Screen/Interactive board	ALL
5.	LCD projector and Screen/Interactive board	ALL

R) Suggested Learning Resources:

(a) Books:

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Engineering Drawing	Bhatt N. D .	Charotar Publishing House Pvt. Ltd.
2.	Machine Drawing	Bhatt N. D. Panchal V.M	Charotar Publishing House Pvt. Ltd.
3.	Engineering Graphics with Autocad	Kulkarni. D.M Rastogi A. P	PHI Learning, New delhi
4.	Autocad user guide	Autodesk	Autodesk Press USA
5.	Sketch up user guide	Trimble	
6.	AutoCAD 2014 for Engineers Volume 1 (For Polytechnic Student)	Dey, Sankar Prasad	Vikash Publication House Pvt. Ltd., New Delhi, 2014, ISBN-13: Vikash Publication House Pvt. Ltd., New Delhi, 2014, ISBN-13: 9789325983373

(b) Online Educational Resources:

1. <http://www.asnu.com.au>
2. www.youtube.com for videos regarding Sketch up and autocad
3. www.nptel.ac.in
4. www.discoveryforengineers.com

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educational recourses before use by the students.
