ARCHITECTURAL DESIGN - I **Course Code : 323001**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Third**
Course Title	**: ARCHITECTURAL DESIGN - I**
Course Code	**: 323001**

I. RATIONALE

Architectural Design is one of the key courses necessary in Architectural Education. This course enables a learner to understand the various layers that are integral part of Architectural Profession. It also enables learner to understand & attain basic skills required for architectural design course. The learner will develop the graphical skills required to express design.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

A learner shall be able to design an architectural project having an area upto 50-75 Sq. Meters

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Apply basic concepts of Architectural Design for the given project.
- CO2 - Prepare Architectural Drawings for the given project.
- CO3 - Present reports on Case Study and Site Visit undertaken during the course.
- CO4 - Prepare drawings for the given project using CAD Software.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
323001	ARCHITECTURAL DESIGN - I	ADE	DSC	2	-	4	2	8	4	-	-	-	-	-	50	20	50@	20	50	20	150

Total IKS Hrs for Sem. : 1 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

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

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Explain the principles of architectural design TLO 1.2 Explain the elements of architectural design TLO 1.3 Interpret scale relevant for the architectural design . TLO 1.4 Apply Anthropometric Data in architectural design	**Unit - I Basics of Architectural Design** 1.1 Principles of Design - Pattern, Contrast, Emphasis, Balance, Scale, Harmony, Rhythm Movement and Unity 1.2 Elements of Design - Line, Volume, Form Shape, Texture, Colour, Value, Space and Light 1.3 Scale for the architectural design - Different types of scale, Criteria for proper selection for scale to be adopted for a drawing 1.4 Read and interpretation of Architectural Drawings, visualization of Architectural Drawings in three dimensions along with scale and proportion. 1.5 Human Scale and proportion and their relationship with space.	Case Study Video Demonstrations Lecture Using Chalk-Board Presentations Site/Industry Visit
2	TLO 2.1 Draw plans, elevations and sections on a appropriate scale and proportion TLO 2.2 Draft scaled drawings in two dimensions for design project portfolio . TLO 2.3 Render drawings using various mediums	**Unit - II Sketching , Drafting and Rendering Techniques** 2.1 Free Hand drawings of various objects by using appropriate grids and graph papers . 2.2 2D Scaled drafted architectural drawings. 2.3 Mediums and Techniques required for rendering drawings 2.4 Horizonal-vertical and intersecting planes to quantify space.	Demonstration Case Study Presentations Hands-on Lecture Using Chalk-Board

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Explain the importance and relevance of Case Study / Site Visit TLO 3.2 Perform live sketching during the Site Visit / Case Study TLO 3.3 Prepare report of Site Visit / Case Study TLO 3.4 Prepare measured drawings associated with the design project	**Unit - III Case Study and Site Visit** 3.1 Importance of Site Visit and Case Project in education 3.2 Live Sketching during site visit and case study associated with design project 3.3 Preparation of report of site visit and case study 3.4 Preparation of measured drawings associated with the design project	Video Demonstrations Demonstration Case Study / site visit Presentations Hands-on
4	TLO 4.1 Apply various commands for developing CAD based drawings. TLO 4.2 Make Plan, Section & Elevations with all the elements and components of the Project using CAD Software TLO 4.3 Render CAD based drawing for presentation	**Unit - IV Architectural Drawings by using CAD Software.** 4.1 Initial settings to start CAD based drawings. 4.2 Basic commands such as line, fillet, trim, offset, copy, paste associated with CAD Software 4.3 Use of layers in the CAD software for making drawings. 4.4 Incorporation of Texts and dimensions in CAD Drawings	Role Play Hands-on Demonstration Video Demonstrations

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

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Prepare Report / Presentation on Topics of Elements of Design	1	Preparation of a report, presentation or sheets based on topics of Elements of Design	4	CO1 CO2 CO3
LLO 2.1 Draw free hand sketch of outdoor facade, landscape	2	Preparation a report, presentation or sheets based on topics of Principles of Design	4	CO1 CO2 CO3
LLO 3.1 Draft objects to various scale LLO 3.2 Draft object to a scale for given size of sheet	3	Drafting of objects to various scale Drafting of objects at a scale to decide the size of paper	3	CO1 CO2 CO4
LLO 4.1 Interpret design brief for the Arch. Design project	4	Preparing a report and preliminary sketches of Design	3	CO1
LLO 5.1 Prepare preliminary design solution for the Arch. Design project	5	Drawing conceptual preliminary design at a scale of 1:50 of Arch. Design project	3	CO1
LLO 6.1 Prepare pre-final design of the Arch. Design project	6	*Drafting of Design proposal at a scale of 1:50 of the Arch. Design project	3	CO1 CO2 CO4
LLO 7.1 Sketch Building Elements and Components LLO 7.2 Sketch Furniture Pieces LLO 7.3 Sketch various small objects	7	*Free hand sketches of various objects using grids and graph papers. Free hand sketches of furniture pieces. (IKS) Free hand sketches of small objects.	2	CO1 CO2 CO3

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 8.1 Render sketches using pencil & pen LLO 8.2 Render sketches using color pencil & watercolors	8	*Rendering sketches using Pencil and Pen as medium to make sketches. Rendering sketches using Color Pencils and Watercolors as medium to make sketches.	4	CO1 CO2 CO3
LLO 9.1 Draft Plans at scale 1:50 LLO 9.2 Draft Elevation at Scale at scale 1:50 LLO 9.3 Draft Sections at Scale at scale 1:50	9	*Drafting Plans at scale 1:50 Drafting Elevation at Scale at scale 1:50 Drafting Sections at Scale at scale 1:50	9	CO1 CO2 CO4
LLO 10.1 Render drafted Plan, Section and Elevation at Scale 1:50	10	Rendering drafted Plan, Section Elevation at scale 1:50	3	CO1 CO2
LLO 11.1 Write a report for the case study conducted for the Arch. Design Project.	11	Preparation of report for the case study conducted for the Arch. Design Project.	3	CO1 CO3
LLO 12.1 Write a report of site visit conducted for the Arch. Design Project	12	Preparation of report for the site visit conducted for the Arch. Design Project.	3	CO1 CO3
LLO 13.1 Prepare a Site Plan in a given scale for the Arch. Design Project using CAD	13	Preparation of site plan at scale 1: 50 for the design project using CAD	4	CO2 CO4
LLO 14.1 Prepare a Ground Floor Plan in a given scale for the Arch. Design Project using CAD	14	Preparation of ground floor plan at scale 1: 50 for the design project using CAD	4	CO2 CO4
LLO 15.1 Prepare Elevation in a given scale for the Arch. Design Project using CAD	15	Preparation of elevations at scale 1: 50 for the design project using CAD	4	CO2 CO4
LLO 16.1 Prepare Sections in a given scale for the Arch. Design Project using CAD	16	Preparation of sections at scale 1: 50 for the design project using CAD	4	CO2 CO4

Note : Out of above suggestive LLOs -

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

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

Assignment

- Elements of Design - Submission in form of A2 or A3 size sheets to cover the topics of Elements of Design in Unit No.-01
- Principles of Design - Submission in form of A2 or A3 size sheets to cover the topics of Elements of Design in Unit No.-01
- Anthropometric data - Submission of a report of about 15 pages of sketches to show physical measures of a person's size, form, and functional capacities.
- Assignments on the topics related to sketching, drafting & rendering techniques

Micro project

- Site Visit / Case Study associated with the given project
- Semester End Final Architectural Design Portfolio

Note :

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

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Basic Drafting Tools such as Tee Square, Set Squares, Triangular Scale, Foot Ruler, Drawing Board and Measuring Tape	All
2	Soft Pencils, Pencil Colors, Artist Watercolors	All
3	Softwares for making presentation, Image processing and video editing, CAD Drawing Software and apps.	All

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

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Basics of Architectural Design	CO1	12	0	0	0	0
2	II	Sketching , Drafting and Rendering Techniques	CO2	6	0	0	0	0
3	III	Case Study and Site Visit	CO3	6	0	0	0	0
4	IV	Architectural Drawings by using CAD Software.	CO4	6	0	0	0	0
Grand Total				**30**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- The assignments are associated with the continuous assessment of the assignments of the learner for the course work.

Summative Assessment (Assessment of Learning)

- Micro Projects assessment which is at the term end is consider as a summative

XI. SUGGESTED COS - POS MATRIX FORM

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

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	V. S. Parmar	Design Fundamentals in Architecture	Somaiyya Publication Mumbai. ISBN-13-978-8170391708
2	Robert Gill	Rendering with pen & INK	Thames & Hudson, London. ISBN-10-9780500680261
3	Denise Costanzo	What Architecture Means: Connecting Ideas and Design	Taylor & Francis ISBN 9781317812142

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	a. Archdaily.com	Architectural News
2	b. www.architecture.com	RIBA aims to support British architects and introduce new people to the world of architecture.
3	c. www.architecturaldesign.com	design details

Note :

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

BASIC SURVEYING (ARCHITECTURE) **Course Code : 323303**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Third**
Course Title	**: BASIC SURVEYING (ARCHITECTURE)**
Course Code	**: 323303**

I. RATIONALE

This course aim to equip students with the basic principles and theories which underlie the systematic study of topographic features, basic skills of landform analysis through map and field observation. The course mainly deals with the preparation and interpretation of survey drawings, methods, tools and equipment necessary to carry out different survey procedures and recent advancements in the field of landforms survey and measurements.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

To prepare drawings & maps of various types of landforms using survey data.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Identify the type of survey required for a given situation.
- CO2 - Apply conventional methods of surveying & levelling for architectural & planning projects.
- CO3 - Create contour map / plan for architectural & planning projects.
- CO4 - Apply modern methods of surveying and levelling for architectural & planning projects.
- CO5 - Apply remote sensing and GIS tools in a given architectural & planning projects.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												Total Marks
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
323303	BASIC SURVEYING (ARCHITECTURE)	BSU	SEC	2	-	6	-	8	4	3	30	70	100	40	25	10	25@	10	-	-	150

Total IKS Hrs for Sem. : 2 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

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

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Classify given type of survey based on purpose, instruments used and nature of field and place. TLO 1.2 Select the type of survey for the given situation. TLO 1.3 Explain scales of existing maps and propose scales for proposed maps / plans. TLO 1.4 Represent landforms graphically using appropriate scale.	**Unit - I Overview and classification of survey** 1.1 Survey – Reading of survey Maps, understanding of features and undulations of Ground purpose and use principles of surveying, definitions, units, scales, symbols and instruments used in Surveying, common errors in surveying and their corrections. 1.2 Types of surveying primary and secondary classification. Plane, geodetic, Cadastral, hydro graphic, photogrammetry, aerial, layout survey, control survey, topographical survey, route survey, reconnaissance survey. 1.3 Scales: Engineers scale, RF and diagonal scale. 1.4 Study of landforms, topography and contours, slope analysis, grading process; graphic representations of landforms.	Presentations Demonstration Lecture Using Chalk-Board Video Demonstrations Hands-on Collaborative learning

BASIC SURVEYING (ARCHITECTURE) **Course Code : 323303**

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 Explain the process of chain surveying as a stepping stone for advanced surveying technology. TLO 2.2 Explain and adopt appropriate techniques for linear measurements. TLO 2.3 Compute horizontal angle using magnetic compass. TLO 2.4 Set out buildings using theodolite. TLO 2.5 Compute height of building using theodolite.	**Unit - II Conventional Methods of Surveying** 2.1 Concise introduction to linear measurements. 2.2 Measurement of distance using chain and tape through ranging and traversing to measure a plot. 2.3 Concise introduction to angular measurements using magnetic compass. 2.4 Angular measurement (both horizontal and vertical) using theodolite. 2.5 Application of theodolite in setting out buildings and land surveying.	Presentations Hands-on Video Demonstrations Lecture Using Chalk-Board Collaborative learning Demonstration
3	TLO 3.1 Explain various terminologies related to leveling. TLO 3.2 Classify leveling instruments. TLO 3.3 Classify leveling staffs. TLO 3.4 Compute reduced levels using HI and Rise and Fall Method. TLO 3.5 Explain contour maps / plans as applicable for landscaping, culverts, road projects etc. TLO 3.6 Plot contour maps / plan as per the necessity of an architectural project from reduced level data.	**Unit - III Levelling** 3.1 Terminologies: level surfaces, level line, horizontal and vertical surfaces, datum, benchmark, GTS, permanent. Arbitrary and temporary, reduced level, rise, fall, line of collimation, level back sight, fore sight, intermediate sight, change point, height of instrument. 3.2 Types of levels: Dumpy, tilting, auto level, digital level. Components of dumpy level and its fundamental axes. Temporary adjustment of levels. 3.3 Types of leveling staff, self-reading staff and target staff. 3.4 Calculation of levels using Height of Instrument, Rise and Fall Method. 3.5 Introduction to contour plan of hills, valleys and sloping terrain. 3.6 Plotting of contours using appropriate contour intervals as required for an architectural project on sloping ground.	Presentations Hands-on Video Demonstrations Lecture Using Chalk-Board Collaborative learning Demonstration

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
4	TLO 4.1 Compute distances using Electronic Distance Measurement Devices. TLO 4.2 Explain types and principles of total stations. TLO 4.3 Prepare land surveying map/ plan as required for an architectural project using total station. TLO 4.4 Prepare contour map / plan as required for an architectural project using total station. TLO 4.5 Set out a building with levels as per the foundation plan of building using total station. TLO 4.6 Explain the DGPS survey for architectural and planning projects.	**Unit - IV Modern Methods of Surveying** 4.1 Electronic Distance Measurement Devices. 4.2 Total Stations: Types, Working principle and application in surveying. 4.3 Traversing using total station, preparation of land surveying maps / plans. 4.4 Contouring using total station, data analysis for preparation of plan (import and export to and from total station). 4.5 Setting out building, check levels in building construction using total station. 4.6 Introduction to Differential Global Positioning Systems (DGPS) for architectural and planning projects.	Presentations Hands-on Video Demonstrations Demonstration Collaborative learning Lecture Using Chalk-Board
5	TLO 5.1 Explain applications of remote sensing in architecture and planning projects. TLO 5.2 Explain applications of GIS in architecture and planning projects. TLO 5.3 Apply open-source GIS computational tools for architecture and planning projects. TLO 5.4 Explain drone surveying and its applications in architectural and planning projects. TLO 5.5 Use official websites for accessing the land maps for architectural and planning projects.	**Unit - V Remote Sensing and GIS** 5.1 Introduction and applications of remote sensing systems in architecture. 5.2 Introduction and applications of GIS in architecture. 5.3 Use of open-source GIS computer programs for architectural applications. 5.4 Introduction to drone surveying and its applications in architecture. 5.5 Introduction to official websites for Land Maps like BhuNaksha, Bhuvan, Google Earth, Google Earth Pro etc.	Presentations Hands-on Video Demonstrations Lecture Using Chalk-Board Case Study Demonstration

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

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Draw symbols, scales, signs used in the Surveying.	1	Preparation of a report on various types of surveys, symbols and signs used in respective surveys.	2	CO1

BASIC SURVEYING (ARCHITECTURE) **Course Code : 323303**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 2.1 Calculate horizontal angles using Prismatic Compass.	2	Measurent of horizontal angles using Prismatic compass and distances using tape to plot the land with non-orthogonal shape.	6	CO2
LLO 3.1 Calculate horizontal angles using Theodolite.	3	Measurent of horizontal angle using method of repetition and horizontal distances using tape to plot the land with non-orthogonal shape.	4	CO2
LLO 4.1 Calculate vertical angles using Theodolite	4	*Measurement of vertical angles using theodolite forming a basis for floor level calculations using trigonometry. (IKS)	2	CO2
LLO 5.1 Calculate distances using Theodolite.	5	Measurement of vertical distances using trigonometry to check the floor levels of a building, use tape for horizontal distance measurement.	2	CO2
LLO 6.1 Set out the building as per the foundation plan using theodolite.	6	*Setting out the building on plot as per the foundation plan using the theodolite.	6	CO2
LLO 7.1 Calculate the reduced levels for the land	7	Calculation of reduced levels for the proposed site using dumpy level.	2	CO3
LLO 8.1 Calculate reduced levels for land divided in a grid as a basis to draw contours.	8	Calculation of reduced levels for the proposed grid on site using dumpy level to form the basis for contouring.	8	CO3
LLO 9.1 Prepare the contour map/plan using calculated reduced level.	9	Plottting of contour map using calculated reduced level using appropriate contour interval.	4	CO3
LLO 10.1 Calculate the distance using Electronic Distance Measuring Device.	10	Use of EDM to calculate the distances for the site.	2	CO4
LLO 11.1 Calculate horizontal, vertical angles, distances, reduced levels using Total Station.	11	*Use of total station to prepare the survey map / plan of the area / plot.	8	CO4
LLO 12.1 Prepare the contour map /plan using Total Station.	12	Use of total station to prepare the contour map / plan of the area / plot.	2	CO4
LLO 13.1 Set out the building as per foundation plan using Total Station	13	Use of total station to set out the building as per the foundation plan.	6	CO4
LLO 14.1 Prepare report on applications of remote sensing and GIS applications relevant to architecture and planning project.	14	Preparation of report on applications of remote sensing and GIS applications relevant to architecture and planning project.	2	CO5
LLO 15.1 Apply Open-Source GIS tools for effective architectural decision making.	15	Use Open-Source GIS tools prepare a contour map, Digital Elevation Model, Site Section etc. for effective architectural decision making.	4	CO5

Note : Out of above suggestive LLOs -

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

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING /

SKILLS DEVELOPMENT (SELF LEARNING)

Assignment

- Prepare a report on land surveying using conventional surveying methods.
- Prepare a presentation on land surveying using modern surveying methods.
- Prepare a presentation on Applications of Remote Sensing in Architecture.
- Access the land / maps from official website of Maharashtra / Indian as applicable for the given study area

Micro project

- Prepare Site Data required for an Architectural Design / Planning project using GIS tools.
- Plot the contour plan using appropriate levelling method for selected area.

Note :

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

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Metric Chain made from galvanized mild steel wires 4mm in dia, brass handles with swivel joints, brass tallies provided at every 5 m length of chain - 20 and 30m.	1,2,3,4
2	Pegs of length 400 mm and c/s area of 50 mm x 50 mm	1,2,3,4
3	Arrows 400 mm long and made up of good quality hardened and tempered steel wire of 4 mm in diameter.	1,2,3,4
4	Metallic Ranging rods of 2 m length, circular or octagonal in cross section of 30 mm diameter, Lower shoe of 150 mm long. Painted in black, white and red stripes of 200 mm each.	1,2,3,4
5	QGIS	11
6	Prismatic compass confirming to IS 1957-1961 with stand, made in Gun metal material having diameter of 85-110 mm and the least count of 30 minutes.	2
7	Optical Theodolite confirming to IS 2976 with least count of 20 seconds	3,4
8	Dumpy level and automatic levels confirming to IS: 9613 – 1986 with stand and internal focusing telescope of standard make. and an internal focusing telescope of standard make.	5,6
9	Leveling staff- 2 m and 4 m, telescopic type conforming to IS 11961 -1986 or Folding type conforming to IS 1779 (1961), 5 mm least count	5,6
10	Electronic / Laser Distance Meters	7
11	Total Station with capability to connect with the desktop and transfer CAD files of the conducted surveys.	8,9

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

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Overview and classification of survey	CO1	4	4	4	2	10
2	II	Conventional Methods of Surveying	CO2	10	4	6	10	20
3	III	Levelling	CO3	8	4	8	8	20
4	IV	Modern Methods of Surveying	CO4	4	2	4	4	10
5	V	Remote Sensing and GIS	CO5	4	2	4	4	10
Grand Total				**30**	**16**	**26**	**28**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Term work, Assignment, microproject.

Summative Assessment (Assessment of Learning)

- Written Test, Practical Exam, Oral Exam

XI. SUGGESTED COS - POS MATRIX FORM

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

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Basak N. N	Surveying and Levelling	McGraw Hill Education, New Delhi ISBN 93-3290-153-8

Sr.No	Author	Title	Publisher with ISBN Number
2	Saikia, M.D., Das.B.M. , Das.M.M.	Surveying	PHI learning pvt. Ltd. New Delhi 20014 ISBN : 978-81-203-3985-9
3	Dr. Ramakant Agrawal, Parshottam Sarathe.	Advanced Surveying - Theory and Practice	AICTE, New Delhi, 978-81-959863-3-0

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://nptel.ac.in/courses/105107122	NPTEL Course on Surveying
2	https://youtube.com/playlist?list=PLLy_2iUCG87DwNVc3Mz1yYlRA42jSQ1tB&feature=shared	NPTEL Course lectures on Advanced Geomatics Engineering
3	https://civilplanets.com/compass-surveying/	Compass Surveying and its types, Temporary adjustments
4	https://www.youtube.com/watch?v=UKw1oScYBys&pp=ygUUZ2VvbWF4IHRvdGFsIHN0YXRpb24%3D	Total Station Surveying Tutorial
5	https://qgis.org/en/site/	QGIS Website
6	https://www.google.com/intl/en_in/earth/about/versions/	Google Earth

Note :

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

BUILDING CONSTRUCTION **Course Code : 323304**

Programme Name/s : Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/

Programme Code : AA/ AT/ IX/ IZ

Semester : Third

Course Title : BUILDING CONSTRUCTION

Course Code : 323304

I. RATIONALE

Building Construction is one of the core subjects in Architecture discipline, which deals with the construction activities related to its various components such as sub structure, super structure, building finishes including maintenance of buildings. This course essentially imparts the knowledge to learners regarding building components along with the various activities involved in it.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Perform various construction activities at site for a given building construction project.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Identify components of a given building structure.
- CO2 - Select suitable type of foundation for a given building structure.
- CO3 - Select suitable type of stone masonry for a given building structure.
- CO4 - Illustrate brick masonry work for a given building structure.
- CO5 - Undertake the scaffolding activity for a given building structure.
- CO6 - Identify suitable type of doors, windows, roof, wall and floor finishing items for a given building structure

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
323304	BUILDING CONSTRUCTION	BCT	DSC	2	-	6	-	8	4	4	30	70	100	40	25	10	25@	10	-	-	150

Total IKS Hrs for Sem. : 2 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

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

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Classify the given building on the basis of the nature of construction. TLO 1.2 Identify various components of a given building structure.	**Unit - I Overview of Building components** 1.1 Classification of Buildings As per National Building Code-2016. Load Bearing Structure, Framed Structure, Composite Structure. 1.2 Building Components a. Building Components and their function. b. Substructure— Foundation, Plinth and Plinth Filling. c. Superstructure— Walls, Partition wall, cavity wall, Sill, Lintel, Doors and Windows, Floor, Mezzanine floor, Roof, Columns, beams,& Parapet.	Case Study Model Demonstration
2	TLO 2.1 Perform Layout of a given building plan. TLO 2.2 Demonstrate suitable safety measures required in excavation for the given type of foundation. TLO 2.3 Identify type of foundation suitable for the given building structure. TLO 2.4 Identify suitable pumping method of dewatering for given excavation pit.	**Unit - II Construction of Substructure** 2.1 Building Layout : Site Clearance, Preparing building Layout, Layout For Load Bearing Structure and Framed Structure by Center Line And Face Line Method, Precautions. 2.2 Earthwork: Excavation For Foundation, Timbering and Strutting, Earthwork for Embankment, Material For Plinth Filling. Tools and Plants Used for Earthwork. 2.3 Foundation: Functions of Foundation, Types of Foundation —Shallow Foundation, Stepped Footing, Wall Footing, Column Footing, Isolated And Combined Column Footing, Raft Foundation, Grillage Foundation. Deep Foundation-Pile Foundation, classification based on materials and functions, Well foundation and Caissons. Pumping Methods of Dewatering. wells.& coffer dams.	Case Study Site/Industry Visit

BUILDING CONSTRUCTION **Course Code : 323304**

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Explain various terminologies used in stone masonry work. TLO 3.2 Identify the type of a given stone masonry structure. TLO 3.3 Explain the joints used in stone masonry with sketches. TLO 3.4 Identify the type of stone masonry of a given structure. TLO 3.5 Illustrate the process of erection and dismantling of scaffolding for a given building structure considering safety aspects. TLO 3.6 Identify the type of roof for a given building structure.	**Unit - III Construction of Superstructure** 3.1 Stone Masonry: Terms used in stone masonry- facing, backing heating. through stone, corner stone, cornice. Type of' stone masonry: Rubble masonry. Ashlar Masonry and their types. Joints in stone masonry and their purpose and procedure. Selection of Stone Masonry, Precautions to be observed in stone masonry construction. 3.2 Brick masonry : terms used in brick masonry-header, stretcher, closer, quoins, course. lace. back, Yearling. b bond, joints, lap. frog line, level and plumb. Bonds in brick masonry-header bond, stretcher bond, English bond and Flemish bond. Requirements of good brick masonry, junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone masonry and Brick Masonry. Tools and plants required for construction of stone masonry and brick masonry. Hollow concrete block masonry and composite masonry. 3.3 Scaffolding: Necessity. Component parts and types of Scaffolding, platforms used for multi storied building. Scaffolding and Shoring, Purpose, Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning. Formwork: Definition of Form work, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork. 3.4 Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. and Painted Corrugated G.I. Sheets, Plastic and Fiber Sheets. Types of Roof: Flat roof, Pitched Roof-King Post truss, Queen Post Truss and Lean to Roof. terms used in roofs.	Demonstration Site/Industry Visit

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
4	TLO 4.1 Select suitable type of Doors and windows for a given building structure. TLO 4.2 Select suitaible type of fixtures find fasteners for given type of doors and windows. TLO 4.3 Select suitable type of staircase for a given building structure.	**Unit - IV Building Communication and Ventilation** 4.1 Horizontal Communication: Doors — Components of Doors, fully paneled Doors. Partly Paneled and Glazed Doors, Flush Doors, Collapsible Doors, Rolling Shutters, Revolving Doors, Glazed Doors. Sizes of Door recommended by BIS. 4.2 Windows: Component of windows, Types of Windows-fully Paneled. Partly Paneled and G lazed. Wooden, Steel. Aluminum windows, Sliding Windows, Louvered Window, Bay window. Corner window, clear-storey window. Gable and Dormer window, Skylight. Sizes o1 Windows recommended by HIS. Ventilators. Cement grills. 4.3 Fixtures and fastenings for doors and windows. 4.4 Vertical Communication: Means of Vertical Communication- Stair Case, Ramps, Lifts. Elevators and Escalators Terms used in stair case-steps. trade, riser. nosing, soffit, waist slab, baluster, balustrade, hand rails, newel post, landing, headroom, winders. Types of staircase-on the basis of shape: Straight, dog-legged, open well, Spiral, Quarter' turn, Bifurcated, three quarter turn, and Hall turn, On the basis of Material: Stone, Brick, R.C.C., wooden and Metal.	Model Demonstration Case Study Site/Industry Visit
5	TLO 5.1 Explain the methodology involved in painting work. TLO 5.2 Identify the type of plaster used in a given wall surface. TLO 5.3 Explain the procedure of plastering work for a given wall surface. TLO 5.4 Identify suitable type of flooring for a given building structure. TLO 5.5 Explain the procedure involved in laying of floor tiles. TLO 5.6 Select the relevant type of paint for a given building surface.	**Unit - V Building Finishes** 5.1 Wall Finishes: Plastering — Necessity of Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, rough finish, Neeru Finishing and POP. Special Plasters- Stucco Plaster, sponge finish, pebble finish. Plaster Board And Wall Claddings. Precaution to be taken While Plastering. Defects in Plaster. Pointing — Necessity, Types of pointing and Procedure of Pointing, Painting —Necessity, Staircase Preparation for painting, Methods of Application, Selecting Suitable Painting Material. 5.2 .Floors finishes : Types of Floor Finishes and its suitability- Shahabad , Kota, Marble, Granite, Kadappa, Ceramic Tiles, Vitrified, Chequered Tiles, Pavement Blocks, Concrete Floors, wooden Flooring, Skirting And Dado. Process of Laying- Process of laying And Construction, Finishing and Polishing of Floors.	Case Study Site/Industry Visit

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

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Identify various components of a given building structure.	1	Components of building structure	2	CO1
LLO 2.1 Prepare foundation drawings in a suitable scale for a given building structure.	2	*Preparation of foundation drawing in a suitable scale.	2	CO2
LLO 3.1 Prepare the foundation plan for load bearing structure using suitable scale.	3	*Preparation of Foundation plan for load bearing structure.	2	CO2
LLO 4.1 Prepare the foundation plan for framed structure using suitable scale.	4	*Preparation of foundation plan for framed structure	2	CO2
LLO 5.1 Prepare Sketches for a given stone masonry structure.	5	Preparation of sketches showing different type of stone masonry like Rubble Masonry,Ashlar Masonry & Random-Rubble masonry.	2	CO3
LLO 6.1 Prepare sketches for a brick masonry structure .	6	Preparation of sketches for brick wall showing English & Flemish bond. (IKS)	2	CO4
LLO 7.1 Lay brick masonry using English bond.	7	*Demonstration of laying brick wall showing English bond.	2	CO4
LLO 8.1 Lay brick masonry using Flemish bond.	8	*Demonstration of laying brick wall showing Flemish bond.	2	CO4
LLO 9.1 Prepare model of a form work.	9	Preparation of model of formwork using suitable material.	2	CO5
LLO 10.1 Preparate of a Model of staircase using suitable scale.	10	Preparation of model of dog legged staircase using suitable material,	2	CO6
LLO 11.1 Prepare model of king post explaining its components and joints.	11	Preparation of model of King post using suitable media explaing its components and joints.	2	CO6
LLO 12.1 Prepare a model of Queen post showing different components and joints.	12	Preparation of model of Queen post using suitable media showing different components and joints.	2	CO6
LLO 13.1 Prepare a model of a panelled door showing its joinery details using.	13	Preparation of model of panelled door showing its joinery details using suitable material.	2	CO6
LLO 14.1 Preparate a model of a panelled and glazed window.	14	Preparation of model of panelled and glazed window.	2	CO6
LLO 15.1 Demonstrate painting work on a given wall surface.	15	Demonstratation of Painting work on a given surface of wall.	2	CO6

Note : Out of above suggestive LLOs -

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

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

Micro project

- Prepare a sketchbook consisting of components of building (for Sketches which are not included in practical sketchbook).
- Prepare a summary report with reference to content In any one part of National Building Code.
- Prepare a report on Scaffolding and form work by conducting a site visit to a building construction project.

Note :

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

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Optical Square, Ranging rod, Pegs. Arrows line dori, Lime powder,Measuring Tape, hammer of' suitable size and specification as per civil engineering application	2,5
2	Plum bobs, Mason Square. Level tube. Line dori. Trowel.	3,4,7,8,9

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

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Overview of Building components	CO1	2	2	4	4	10
2	II	Construction of Substructure	CO2	8	4	6	6	16
3	III	Construction of Superstructure	CO3,CO4,CO5	12	4	6	12	22
4	IV	Building Communication and Ventilation	CO6	4	2	4	6	12
5	V	Building Finishes	CO6	4	2	4	4	10
Grand Total				**30**	**14**	**24**	**32**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- End term Viva Voce, Lab performance

Summative Assessment (Assessment of Learning)

- End term Viva Voce, Lab performance

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	1	-	-	-	-	2			
CO2	3	2	-	-	1	-	2			
CO3	3	1	-	-	1	-	2			
CO4	2	-	-	2	1	-	2			
CO5	2	2	2	1	1	-	1			
CO6	3	1	1	-	-	-	2			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	S.P. Arora and Bindra	Building Construction	Dhanpat Rai Publication, Delhi Edition 2013.ISBN: 9788189928803
2	Francis D.K. Ching.	Building construction illustrated	Wiley India, USA, 2014,ISBN: 978-1- 118- 45834-1
3	S.C.Rangawala	Building Construction	CharotarPublication,Dist-AnandISBN-13: 978-
4	B. C. Punmia and A.K Jain	Building Construction	firewall Media, 2005 ISBN 9788170080534
5	S.K.Sma	Building Construction	S. Chand and Co. Pvt. Ltd., New Delhi (ISBN:978-8 l -219-0479-7
6	Sandip Mantri	A to Z Building Construction	Satya Prakashan; New Delhi (2015) ISBN-13: 978-8176849692

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.letsbuild.com/blog/substructure-superstructure	building superstructure
2	https://thegraduateengineer.com/	brick and stone masonary
3	https://www.oreilly.com/library/view/building-construction-m aterials	building finishes

Note :

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

BUILDING CONSTRUCTION **Course Code : 323304**

MSBTE Approval Dt. 02/07/2024 **Semester - 3, K Scheme**

BUILDING SERVICES **Course Code : 323301**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Third**
Course Title	**: BUILDING SERVICES**
Course Code	**: 323301**

I. RATIONALE

Regardless of the personal factors, aspects of human comfort include thermal environment, visual ambiance, acoustics, indoor air quality, and hygienic comfort. Building services are the systems installed in buildings to make them comfortable, functional, efficient and safe. These systems include lighting, sanitary & water supply, fire safety, HVAC (heating, ventilation and air conditioning) ICT (information and communications technology) and so on. This course is designed to develop required skills in the above mentioned areas which inturn will enhance the employability in the construction industry.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The learner will be able to undertake various activities related to the building services for given building project.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Plan kitchen & toilet blocks in various types of buildings as per UDCPR and NBC provisions.
- CO2 - Design water supply system for a given building project.
- CO3 - Design sanitary system for a given building project.
- CO4 - Design electrical wiring and lighting system for a given building project..
- CO5 - Explain the importance of BMS, HVAC, Acoustics, Firefighting systems for a given building project.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												Total Marks
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL			
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA			
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min		
323301	BUILDING SERVICES	BSE	DSC	3	-	3	-	6	3	3	30	70	100	40	25	10	25@	10	-	-	150	

Total IKS Hrs for Sem. : 2 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

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

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Justify the roles & responsibilities of an architect & interior decorator to accomplish building services TLO 1.2 List the relevant type of services required for the given building TLO 1.3 Explain planning aspects related to kitchen & toilet blocks in various types of buildings as per UDCPR .and NBC	**Unit - I Overview of building services and classification of buildings as per National Building Code.** 1.1 Role and Responsibilities of an architect and interior designer to accomplish building services. 1.2 Functional requirements of building and different types .of services. 1.3 Planning of kitchen and toilet of various types of buildings-Residential, Commercial, Public, institutional etc. w.r.t. NBC and UDCPR.	Presentations Lecture Using Chalk-Board

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 Explain the importance of Indian standards, byelaws & UDCPR approval in laying the plumbing system in the given type of building project. TLO 2.2 Select suitable pipes & fixtures for a given type of building project. TLO 2.3 Describe different types of water sources. TLO 2.4 Explain water treatment process required for drinking purpose. TLO 2.5 Describe different types of water distribution system for a residential building. TLO 2.6 Enlist toilet fixtures & accessories required for designing a typical toilet block. TLO 2.7 Explain importance of Rain water harvesting systems	**Unit - II Building Water Supply and Rainwater Harvesting Systems .** 2.1 Importance of water supply system and services, Indian standards & bylaws for water supply and distribution, approval from local authorities as per UDCPR. 2.2 Terminology used in water supply & sanitary system, different types of pipes, fittings & fixtures 2.3 Types of water sources, pumping & transportation of water 2.4 Treatment of water, qualities of potable water 2.5 Domestic water distribution system from the source of the water to the building, water supply system layouts, overhead and underground water tanks, water demand calculations, Cold and hot water distribution: mixing systems using loft tanks, geysers, boilers, mixers, diverters. Different types of taps, faucets. 2.6 Cold and hot water distribution: mixing systems using loft tanks, geysers, boilers, mixers, diverters, different types of taps, faucets. 2.7 Introduction to Rain water Harvesting System, various types and its advantages	Model Demonstration Case Study Presentations Lecture Using Chalk-Board Site/Industry Visit
3	TLO 3.1 Explain the importance of building and sanitation services for a given building project. TLO 3.2 Identify various sanitary wares required for a building project . TLO 3.3 Describe elements of external drainage system of a given building project. TLO 3.4 suggest the relevant plumbing system (drainage) for the given type of building and site condition with justification. TLO 3.5 Describe the process of sewage disposal for a given building project. TLO 3.6 Calculate capacity of a septic tank for a given building project.	**Unit - III Building Sanitation Services.** 3.1 Principles & importance of building & sanitation services, collection and disposal of various kinds of refuse from deferent types of buildings. 3.2 Drainage system terminology, different types , sizes of sanitary wares such as wash hand basin, kitchen sink, urinals, water closets (Indian and western) pans, flushing cisterns, bath tubs, shower cubicles, quality of pipes, connections of pipes and fittings used for drainage system. 3.3 External drainage systems, one & two pipe system, different types of traps, Inspection chambers, manhole, disconnecting chamber, soak pit, municipal sewer. 3.4 Disposal of sewage from various types of buildings, gradients used in laying of pipes for sewage disposal, septic tank details & capacity calculation.	Model Demonstration Case Study Presentations Lecture Using Chalk-Board Site/Industry Visit

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
4	TLO 4.1 Describe sources of electricity and principles of distribution system for the given building project. TLO 4.2 Select suitable type of cables for the given building project. TLO 4.3 Explain different types of wiring for a given building project. TLO 4.4 Describe factors affecting the lighting design of a given building project.	**Unit - IV Electricity and Lighting.** 4.1 Sources of electricity, principles of distribution system from the source of the electricity to the building and limitations of electrification (leakage, fluctuation, safety, excess, loading, interferences). 4.2 Importance of wiring, wiring standards,specification,sizes and their, types of cables,sheathing,shielding ,cross section area ,colour coding. 4.3 Single and three phase wiring, circuit wiring and installation system, open and concealed wiring, types of switches, holders, sockets, switch boards, safety devices MCB,ELCB. 4.4 Introduction, concept of lighting (natural and artificial), factors influencing the brightness of room, factors affecting selection of artificial lighting installation (direct, indirect, diffused, reflected, glare), transmission of light, recommended illuminances, Daylight luminance, utility factors..an	Video Demonstrations Case Study Presentations Lecture Using Chalk-Board Site/Industry Visit
5	TLO 5.1 Explain importance of natural and mechanical ventilation, HVAC ,fire safety and firefighting system. TLO 5.2 .Explain importance of vertical transportation system, acoustics and building management systems.	**Unit - V Advanced Building Services.** 5.1 Introduction to natural and mechanical ventilation, HVAC ,fire safety and fire fighting system. 5.2 Importance of vertical transportation system, acoustics and building management systems.	Video Demonstrations Case Study Presentations Lecture Using Chalk-Board Site/Industry Visit

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

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Prepare a sketch book consisting of modern building service components.	1	Preparation of sketchbook consisting of modern building service components.	3	CO1
LLO 2.1 Collect the relevant information with reference to water supply system based on video/market survey and prepare report.	2	Collection of anthropometric data required for planning and designing of toilets and kitchens for a given building project.	3	CO1
LLO 3.1 Prepare a drawing portfolio for a site layout of water supply system of a residential building.	3	Preparation of a drawing portfolio of a water supply system to scale 1:100 on A1 size drawing sheet for a given residential building project.	3	CO2

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 4.1 Calculate capacity of under ground and over head water tank for a given residential building project.	4	*Calculation of capacity of overhead and underground water tank for a given residential building project.	3	CO2
LLO 5.1 Prepare drawing in plan and section for water supply and drainage of typical toilet block to scale 1:25 indicating services.	5	Preparation of drawing in plan and section for water supply and drainage system of a typical toilet block for a given residential building	6	CO2 CO3
LLO 6.1 Prepare drawing for water supply & vertical stack system (one and two pipe) and its connections in a residential building.	6	*Preparation of drawing for water supply & vertical stack system (one and two pipe) and its connections in a residential building.	3	CO2
LLO 7.1 Prepare drawing of typical house drain system for a given residential building project.	7	Preparation of a site layout plan of ground and two storied residential building indicating house drain system with invert levels of the inspection chambers for a given residential building project.	3	CO3
LLO 8.1 Prepare calculation table for invert levels of the inspection chambers for a given residential building project.	8	Preparation of a calculation of the invert levels of the inspection chambers and gradients of the pipe for a given residential building project.	3	CO3
LLO 9.1 prepare detail drawing of under ground and over head water tank for a given residential building project	9	Preparation of a drawing indicating typical details of underground and overhead water tank for a given residential building project	3	CO2
LLO 10.1 Prepare a drawing indicating typical details of septic tank and soak pit for a given residential building project	10	*Preparation of a drawing indicating typical details of septic tank and soak pit for a given residential building project	3	CO3
LLO 11.1 Prepare a drawing indicating electrical layout for a given residential building project.	11	Preparation of drawing indicating electrical layout for a given residential building project.	3	CO4
LLO 12.1 Prepare a drawing indicating lighting layout for a given residential building project.	12	Preparation of drawing indicating lighting layout for a given residential building project.	3	CO4
LLO 13.1 Prepare a drawing indicating fire fighting layout a typical office premises in a office building project.	13	*Preparation of drawing indicating firefighting layout a typical office premises in an office building project.	3	CO5
LLO 14.1 Prepare plan indicating relevant data related to BMS, HVAC system for a given office building project.	14	Collection of data related to BMS, HVAC system required for planning and designing of a given office building project. (IKS)	2	CO5
LLO 15.1 LLO 14.1 Prepare plan indicating relevant data related to acoustics & fire fighting system for an office building.	15	Collection of data related to acoustics & fire fighting system required for planning and designing of an office building.	1	CO5

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs

Note : Out of above suggestive LLOs -

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

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

Assignment

- Conduct market survey for water supply and sanitary fittings and fixtures. collect technical information brochures and submit a report.
- Visit & study the water filtration plant and various resources of water supply and prepare a report.
- Visit & study the installation of fire fighting systems in commercial buildings and prepare a report.

Micro project

- Visit any three buildings near by institute and classify them in accordance with the provisions made in National Building Code & submit a report.
- Conduct market survey for electric fittings and acoustical materials. Collect technical information brochures and submit report.

Note :

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

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Display panel for various electrical fittings and fixtures used in residential and commercial buildings.	1,11
2	Model of various materials/samples, used in water supply and drainage system such as fixtures, fittings, pipe sections, joints and valves.	1,3,4,5
3	Model of various materials/samples, used in lighting system, acoustical materials, schematic flow chart explaining HVAC system	14,15
4	Schematic flow chart explaining water filtration plant and sewage treatment plant.	7,9
5	A 1 Size Drawing Sheets /tracing /gateway papers /sketch book, pencil, eraser, drawing boards etc.	All

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
6	Model of a civil engineering structure depicting various components , building services	All,4,5

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

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Overview of building services and classification of buildings as per National Building Code.	CO1	6	2	2	6	10
2	II	Building Water Supply and Rainwater Harvesting Systems .	CO2	10	4	8	8	20
3	III	Building Sanitation Services.	CO3	10	4	7	9	20
4	IV	Electricity and Lighting.	CO4	10	4	2	4	10
5	V	Advanced Building Services.	CO5	9	2	2	6	10
Grand Total				**45**	**16**	**21**	**33**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Some of the assignments given in the course will be formative assessment.

Summative Assessment (Assessment of Learning)

- Some of the assignments will be submitted by the learner at the term end and will be summative assessment

XI. SUGGESTED COS - POS MATRIX FORM

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

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Deolalikar . S.G.	Plumbing Design and Practice	Mc-Grew Hill New Delhi 2004 ISBN 9780074620694
2	Bag.S.P.	Fire Services in India : History, Detection, Protection, Management	Mittal Publications New Delhi 1995 ISBN 8170995981
3	Anil Kumar Das	Principle of fire safety engineering : understanding Fire and fire protection	PHI learning pvt. Ltd. New Delhi 20014 ISB : 9788120350380
4	BIS	National Building Code Part : 1,4,8,9	Bureau of Indian Standards – New Delhi
5	BIS	IS 12183 (part I) 1987 Code of Practice for Plumbing in multi storied buildings	Bureau of Indian Standards – New Delhi
6	BIS	2008 Uniform Plumbing Code – INDIA (UPC-I)	Bureau of Indian Standards – New Delhi

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.pas.org.in/Portal/document/ResourcesFiles/pdfs/Module_1%20Basics%20of%20water%20supply%20system.pdf	Basics of water supply systems training module for local water supply and management
2	https://en.wikipedia.org/wiki/Building_services_engineering	MEP engineer with experience in the installation of equipment in Buildings Construction, Building Maintenance, Management, integration of electrical, mechanical, fire, hydraulic, security and communications building services, who manages and delivers the integrated detailed design of multiple disciplines so as to ensure that the building is delivered in a "least cost technically acceptable" manner, with emphasis on both the construction costs and the operational costs.

Note :

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

COMPUTER AIDED DRAWING - I **Course Code : 323002**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Third**
Course Title	**: COMPUTER AIDED DRAWING - I**
Course Code	**: 323002**

I. RATIONALE

An essential skill of a diploma holder is to use computer-aided drawing software as a drafting tool to draw, read, and interpret architectural drawings. Through this system, students will be able to edit the existing drawings and create new 2 dimensional drawings as per requirements. This will facilitate the speed, accuracy, and repetitive use of drawings as and when needed.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

A diploma holder will be able to prepare architectural drawing for a given project using computer aided software.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Explain basics of computer aided drawing software.
- CO2 - Perform various commands of computer aided drawing software.
- CO3 - Draw objects using computer aided drawing software.
- CO4 - Create architectural drawings using computer aided drawing software.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
323002	COMPUTER AIDED DRAWING - I	CAD	SEC	-	-	2	-	2	1	-	-	-	-	-	25	10	25@	10	-	-	50

Total IKS Hrs for Sem. : 2 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

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

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Explain the necessity of the CAD software for preparation of architectural drawing. TLO 1.2 Use line command for creation of architectural drawings. TLO 1.3 Use CAD commands for architectural drafting. TLO 1.4 Modify architectural drawings using CAD command.	**Unit - I Introduction to Computer Aided Drawing software & commands.** 1.1 Concept of drawing toolbar. 1.2 Drawing & modification of command such as line, polyline & circle. 1.3 Concepts of tools & Layers. 1.4 Text & rectangle command, Use of erase command, Selection of multiple objects.	Demonstration Video Demonstrations Presentations
2	TLO 2.1 Use CAD drafting command for architectural drawing. TLO 2.2 Apply various tools & commands for architectural drawing. TLO 2.3 Apply appropriate annotations & material indications in architectural drawing.	**Unit - II Use of Designed Plans for drafting** 2.1 Drawing of a designed plan in computer aided drawing software. 2.2 Use of various CAD commands. 2.3 Properties of CAD tools & command. 2.4 Application of various tools & commands.	Demonstration Video Demonstrations Presentations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Draw architectural plans using computer aided software. TLO 3.2 Apply dimensions & lettering in architectural plans. TLO 3.3 Apply door, windows & openings in architectural plans using computer aided software's.	**Unit - III Architectural 2D drawing using computer aided drawing software.** 3.1 Drafting plan in computer aided drawing software. 3.2 Application of line weight, hatching in architectural drawings. 3.3 Preparation of door, window & opening schedule in computer aided software.	Presentations Video Demonstrations Presentations

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

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Draw an introduction sheet using computer aided drawing software.	1	Introduction to computer aided drawing software.*	2	CO1 CO2
LLO 2.1 Prepare a sheet for basic commands of computer aided drawing software.	2	Introduction to commands of computer aided drawing software.*	2	CO1 CO2
LLO 3.1 Prepare a sheet of basic tools of computer aided drawing software.	3	Draw & modify tools in computer aided drawing software.*	2	CO1 CO2
LLO 4.1 Prepare a sheet of 2D objects using computer aided drawing software.	4	Basics of 2D objects using computer aided drawing software.	2	CO1 CO2
LLO 5.1 Create a 2D architectural drawing using computer aided software.	5	Basics of 2D drawing techniques.*	2	CO1 CO2
LLO 6.1 Apply the dimensions & labels in architectural drafted drawing.	6	Dimensioning & Labelling in architectural drawings.*	2	CO2 CO3
LLO 7.1 Prepare a sheet for layers & modifications of layers in architectural drawing.	7	Layers management in computer aided drawing software.*	2	CO2 CO3
LLO 8.1 Prepare a sheet for snap tool & precision setting in computer aided software.	8	Snap tool & precision in drawing techniques.*	2	CO2 CO3
LLO 9.1 Create a sheet for common cad commands & short keys.	9	Common cad commands & short keys reference.	2	CO2 CO3
LLO 10.1 Prepare a sheet for annotations & hatching incorporating in architectural drawings.	10	Annotations & hatching using computer aided software.*	2	CO2 CO3
LLO 11.1 Draft a plan of small scale residence using computer aided drawing software.	11	Drafting of designed architectural plan.* (IKS)	2	CO3 CO4
LLO 12.1 Prepare a sheet on drawing organization techniques in computer aided software.	12	Drawing organization techniques.	2	CO3 CO4
LLO 13.1 Prepare a sheet of 1 BHK residential unit using computer aided drawing software.	13	Draft a plan for 1 BHK residential unit.*	2	CO3 CO4

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 14.1 Draft a sheet of residential 1 BHK unit with dimensions, labelling & text.	14	Dimensioning, Labeling & text insertion in designed residential unit.*	2	CO3 CO4
LLO 15.1 Prepare a sheet of layout & print settings in software.	15	Layout & print setting in computer aided drawing software.*	2	CO3 CO4

Note : Out of above suggestive LLOs -

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

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

Micro project

- Draw a Geometric Shape - Challenge yourself to recreate a geometric shape or object using CAD software's drawing tools. - Start with simple shapes like circles, squares, or triangles, and then progress to more complex forms like polygons or irregular shapes. - Focus on precision and accuracy in your drawings.
- Term end micro project - Making Cad Drawings of the Arch. Design - 1 project at the scale of 1:50

Redraw an Existing Object

- Choose a simple object from your surroundings and redraw it using CAD software. - Focus on capturing the proportions, details, and functionality of the object accurately. - Pay attention to measurements and dimensions to ensure fidelity to the original object.

Assignment

- Create a Simple 2D Floor Plan. - Design a basic floor plan for a small room or apartment - Practice drawing walls, doors, windows, and basic furniture elements using CAD software's 2D drafting tools - Focus on accuracy and proper scaling.

Note :

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

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Computer with specifications such as 8GB RAM, SSD 500GB, LCD Monitor with relevant CAD software. (with the latest configuration)	All
2	Color printer preferably for the output of A-3 size paper	All
3	LCD projector or SMART Interactive display panel	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table) : NOT APPLICABLE

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- The continuous internal assessment for laboratory practicles.

Summative Assessment (Assessment of Learning)

- End semester internal practical exam for laboratory learning..

XI. SUGGESTED COS - POS MATRIX FORM

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

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Frey, David	Auto CAD-2000	BPB Publication, New Delhi, ISBN13: 9788176560801
2	Yasmin, Nighat	Introduction to Auto CAD 2012 for Architectural Assistantship Applications	SDC Publication, 2011 ISBN 978-1-58503-642-4

Sr.No	Author	Title	Publisher with ISBN Number
3	Tickoo, Shyam	Auto CAD 2016: A Problem-Solving Approach, Basic and Intermediate	CADCIM Technologies, 22nd Edition, August 2015 ISBN 13: 9781942689003
4	Leach, James	Auto CAD 2010 Instructor	Tama Mc Graw Hill, New Delhi 2007; ISBN:9780073375410
5	Shumaker, Terence A; Madsen, David P; M; Madsen, David	Auto CAD and its Applications-Basics 2010	Good heart-Willcox Publishers, 2010; ISBN:13:978159070760
6	Bhatt, N. D.	Engineering Drawing	Charotar Publications, Anand, 2016 ISBN:978-93-80358-96
7	Singh, Ajit	Working with Auto CAD 2000	Mcg RAW Hill Publishing New Delhi, 2001; ISBN:978070435964

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.autodesk.in/products/autocad/included-toolsets/autocad-architecture	The Architecture toolset gives students all the tools students need to complete their projects faster and scale project pipeline.
2	https://cad-academy.com/how-to-learn-autocad/#Understanding_AutoCAD_Basics	The tool boosts architectural design and drafting productivity with time-saving features and task automation. This article provides a comprehensive guide to learn AutoCAD step-by-step.
3	https://www.youtube.com/@autocad/featured	Software unlock insights and automations in 2D design workflows. Save time as student collaborate with drawing files using the latest machine learning feature and specialized industry toolsets.
4	https://www.autodesk.in/campaigns/autocad-tutorials?wchannel id=lbxfle7xmq&wmediaid=cf2wf8zv6d	AutoCAD Knowledge webinar is hosted by the Autodesk AutoCAD Product Experts to help users learn AutoCAD and create innovative 2D designs through interactive live webinars or on-demand tutorials.

Note :

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

Programme Name/s	**: Architecture Assistantship/ Automobile Engineering./ Artificial Intelligence/ Agricultural Engineering/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Architecture/ Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Fashion & Clothing Technology/ Dress Designing & Garment Manufacturing/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Food Technology/ Computer Hardware & Maintenance/ Hotel Management & Catering Technology/ Instrumentation & Control/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Instrumentation/ Interior Design & Decoration/ Interior Design/ Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Medical Laboratory Technology/ Medical Electronics/ Production Engineering/ Printing Technology/ Polymer Technology/ Computer Science/ Textile Technology/ Electronics & Computer Engg./ Travel and Tourism/ Textile Manufactures**
Programme Code	**: AA/ AE/ AI/ AL/ AN/ AO/ AT/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DC/ DD/ DE/ DS/ EE/ EJ/ EP/ ET/ EX/ FC/ HA/ HM/ IC/ IE/ IF/ IH/ IS/ IX/ IZ/ LE/ ME/ MK/ ML/ MU/ PG/ PN/ PO/ SE/ TC/ TE/ TR/ TX**
Semester	**: Third**
Course Title	**: ESSENCE OF INDIAN CONSTITUTION**
Course Code	**: 313002**

I. RATIONALE

This course will focus on the basic structure and operative dimensions of Indian Constitution. It will explore various aspects of the Indian political and legal system from a historical perspective highlighting the various events that led to the making of the Indian Constitution. The Constitution of India is the supreme law of India. The document lays down the framework demarcating the fundamental political code, structure, procedures, powers, and sets out fundamental rights, directive principles, and the duties of citizens. The course on constitution of India highlights key features of Indian Constitution that makes the students a responsible citizen. In this online course, we shall make an effort to understand the history of our constitution, the Constituent Assembly, the drafting of the constitution, the preamble of the constitution that defines the destination that we want to reach through our constitution, the fundamental right constitution guarantees through the great rights revolution, the relationship between fundamental rights and fundamental duties, the futurist goals of the constitution as incorporated in directive principles and the relationship between fundamental rights and directive principles.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry /employer expected outcome – Abide by the Constitution in their personal and professional life.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

ESSENCE OF INDIAN CONSTITUTION **Course Code : 313002**

- CO1 - List salient features and characteristics of the constitution of India.
- CO2 - Follow fundamental rights and duties as responsible citizen of the country.
- CO3 - Analyze major constitutional amendments in the constitution.
- CO4 - Follow procedure to cast vote using voter-id.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
313002	ESSENCE OF INDIAN CONSTITUTION	EIC	VEC	1	-	-	1	2	1	-	-	-	-	-	-	-	-	-	50	20	50

Total IKS Hrs for Sem. : 0 Hrs

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

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

Note :

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

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Explain the meaning of preamble of the constitution. TLO 1.2 Explain the doctrine of basic structure of the constitution. TLO 1.3 List the salient features of constitution. TLO 1.4 List the characteristics of constitution.	**Unit - I Constitution and Preamble** 1.1 Meaning of the constitution of India. 1.2 Historical perspectives of the Constitution of India. 1.3 Salient features and characteristics of the Constitution of India. 1.4 Preamble of the Constitution of India.	Presentations Blogs Hand-outs Modules Flipped classrooms Case studies

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 Enlist the fundamental rights. TLO 2.2 . Identify fundamental duties in general and in particular with engineering field. TLO 2.3 Identify situations where directive principles prevail over fundamental rights.	**Unit - II Fundamental Rights and Directive Principles** 2.1 Fundamental Rights under Part-III. 2.2 Fundamental duties and their significance under part-IV-A. 2.3 Relevance of Directive Principles of State Policy under part-IV A.	Presentations Blogs Hand-outs Modules Case Study Flipped Classroom
3	TLO 3.1 Enlist the constitutional amendments. TLO 3.2 Elaborate the elements of Centre-State Relationship TLO 3.3 Analyze the purposes of various amendments.	**Unit - III Governance and Amendments** 3.1 3.1 Amendment procedure of the Constitution and their types - simple and special procedures. 3.2 The Principle of Federalism and its contemporary significance along with special committees that were setup. 3.3 Major Constitutional Amendment procedure - 1st, 7th, 42nd, 44th, 73rd & 74th, 76th, 86th, 52nd & 91st, 102nd	Cases of Federal disputes with relevant Supreme court powers and Judgements Presentations Blogs Hand-outs Problem based learning
4	TLO 4.1 Explain the importance of electoral rights. TLO 4.2 Write the step by step procedure for process of registration TLO 4.3 Explain the significance of Ethical electoral participation TLO 4.4 Explain the steps to motivation and facilitation for electoral participation TLO 4.5 Enlist the features of the voter's guide TLO 4.6 Explain the role of empowered voter TLO 4.7 Write the steps of voting procedure TLO 4.8 Write steps to create voter awareness TLO 4.9 Fill the online voter registration form TLO TLO 4.10 Follow procedure to cast vote using voter-id.	**Unit - IV Electoral Literacy and Voter's Education** 4.1 Electoral rights , Electoral process of registration 4.2 Ethical electoral participation 4.3 Motivation and facilitation for electoral participation 4.4 Voter's guide 4.5 Prospective empowered voter 4.6 Voting procedure 4.7 Voter awareness 4.8 Voter online registration https:/ /www.ceodelhi.gov.in/ELCdetails.aspx	Presentations Hand-outs Modules Blogs Problem based Learning

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES : NOT APPLICABLE.

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

Assignment

- Outline the procedure to submit application for Voter-id
- Assignments are to be provided by the course teacher in line with the targeted COs.

A1. Prepare an essay on Constitution of India .
A2 Prepare a comparative chart of Unique features of Indian Constitution of India and Constitution of USA

- Assignments are to be provided by the course teacher in line with the targeted COs. A1. Prepare an essay on Constitution of India . A2 Prepare a comparative chart of Unique features of Indian Constitution of India and Constitution of USA A3. Self-learning topics: Parts of the constitution and a brief discussion of each part Right to education and girl enrollment in schools. GER of Girls and Boys. Right to equality. Social Democracy. Women Representation in Parliament and State Assemblies. LGBTQIA+

Micro project

- 1. Organize a workshop-cum discussions for spreading awareness regarding Fundamental Rights of the citizen of the country

2. Prepare elaborations where directive principle of State policy has prevailed over Fundamental rights with relevant Supreme Court Judgements.
3. Organize a debate on 42nd, 97th and 103rd Constitutional Amendment Acts of Constitution of India.

Seminar

- 1 Differences in the ideals of Social democracy and Political democracy.

2 Democracy and Women's Political Participation in India.
3 Khap Panchayat - an unconstitutional institution infringing upon Constitutional ethos.
4 Situations where directive principles prevail over fundamental rights.

Group discussions on current print articles.

-
- Art 356 and its working in Post-Independent India.
- Women's Resrvation in Panchayat leading to Pati Panchayats - Problems and Solutions.
- Adoption of Article 365 in India.
- Need of Amendments in the constitution.
- Is India moving towards a Unitary State Model ?

Activity

- Arrange Mock Parliament debates.

Prepare collage/posters on current constitutional issues.
i. National (Art 352) & State Emergencies (Art 356) declared in India.
ii. Seven fundamental rights.
iii. Land Reforms and its effectiveness - Case study of West-Bengal and Kerala.

Cases: Suggestive cases for usage in teaching:

- A.K. Gopalan Case (1950) :SC contented that there was no violation of Fundamental Rights enshrined in Articles 13, 19, 21 and 22 under the provisions of the Preventive Detention Act, if the detention was as per the procedure established by law. Here, the SC took a narrow view of Article 21.

Shankari Prasad Case (1951) : This case dealt with the amendability of Fundamental Rights (the First Amendment's validity was challenged). The SC contended that the Parliament's power to amend under Article 368 also includes the power to amend the Fundamental Rights guaranteed in Part III of the Constitution.
Minerva Mills case (1980) :This case again strengthens the Basic Structure doctrine. The judgement struck down 2 changes made to the Constitution by the 42nd Amendment Act 1976, declaring them to violate the basic structure. The judgement makes it clear that the Constitution, and not the Parliament is supreme.
Maneka Gandhi case (1978) :A main issue in this case was whether the right to go abroad is a part of the Right to Personal Liberty under Article 21. The SC held that it is included in the Right to Personal Liberty. The SC also ruled that the mere existence of an enabling law was not enough to restrain personal liberty. Such a law must also be "just, fair and reasonable."
Other cases:
1. Kesavananda Bharati Case (1973) : In this case the Hon. SC laid down a new doctrine of the 'basic structure' (or 'basic features') of the Constitution. It ruled that the constituent power of Parliament under Article 368 does not enable it to alter the 'basic structure' of the Constitution. This means that the Parliament cannot abridge or take away a Fundamental Right that forms a part of the 'basic structure' of the Constitution.
2. Mathura Rape Case(1979) : A tribal woman Mathura (aged 14 to 16 years) was raped in Police Custody. The case raised the questions on the idea of 'Modesty of Woman' and here it was was a tribal woman who succumbs to multiple pattiarchies. Custodial rape was made an offence and was culpable with the detainment of 7 years or more under Section 376 of Indian Penal Code. The weight of proofing the allegations moved from the victim to the offender, once sexual intercourse is established. The publication of the victim's identity was banned and it was also held that rape trials should be conducted under the cameras.
3. Puttswamy vs Union of India (2017) : In this landmark case which was finally pronounced by a 9-judge bench of the Supreme Court on 24th August 2017, upholding the fundamental right to privacy emanating from Article 21. The court stated that Right to Privacy is an inherent and integral part of Part III of the Constitution that guarantees fundamental rights. The conflict in this area mainly arises between an individual's right to privacy and the legitimate aim of the government to implement its policies and a balance needs to be maintained while doing the same.
4. Navtej Singh Johar & Ors. v. Union of India (2018) : Hon. SC Decriminalised all consensual sex among adults, including homosexual sex by scrapping down section 377 of the Indian penal code (IPC). The court ruled that LGBTQ community are equal citizens and underlined that there cannot be discrimination in law based on sexual orientation and gender.
5. Anuradha Bhasin Judgement (2020) : The Supreme Court of India ruled that an indefinite suspension of internet services would be illegal under Indian law and that orders for internet shutdown must satisfy the tests of necessity and proportionality. The Court reiterated that freedom of expression online enjoyed Constitutional protection, but could be restricted in the name of national security. The Court held that though the Government was empowered to impose a complete internet shutdown, any order(s) imposing such restrictions had to be made public and was subject to judicial review.

Note :

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

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED : NOT

ESSENCE OF INDIAN CONSTITUTION **Course Code : 313002**

APPLICABLE

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

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Constitution and Preamble	CO1	4	0	0	0	0
2	II	Fundamental Rights and Directive Principles	CO2	4	0	0	0	0
3	III	Governance and Amendments	CO3	4	0	0	0	0
4	IV	Electoral Literacy and Voter's Education	CO4	3	0	0	0	0
Grand Total				**15**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Assignment, Self-learning and Terms work Seminar/Presentation

Summative Assessment (Assessment of Learning)

XI. SUGGESTED COS - POS MATRIX FORM

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

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	P.M.Bakshi	The Constitution of India	Universal Law Publishing, New Delhi 15th edition, 2018, ISBN: 9386515105 (Check the new edition)

ESSENCE OF INDIAN CONSTITUTION **Course Code : 313002**

Sr.No	Author	Title	Publisher with ISBN Number
2	D.D.Basu	Introduction to Indian Constitution	Lexis Nexis Publisher, New Delhi, 2015, ISBN:935143446X
3	B. K. Sharma	Introduction to Constitution of India	PHI, New Delhi, 6thedition, 2011, ISBN:8120344197
4	MORE READS :	Oxford Short Introductions - The Indian Constitution by Madhav Khosla. The Indian Constitution: Cornerstone of a Nation by Granville Austin. Working a Democratic Constitution: A History by Garnville Austin Founding Mothers of the Indian Republic: Gender Politics of the Framing of the Constitution by Achyut Chetan. Our Parliament by Subhash C. Kashyap. Our Political System by Subhash C. Kashyap. Our Constitution by Subhash C. Kashyap. Indian Constitutional Law by Rumi Pal.	Extra Read
5	B.L. Fadia	The Constitution of India	Sahitya Bhawan,Agra, 2017, ISBN:8193413768

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	http://www.legislative.gov.in/constitution-of-india	Constitution overview
2	https://en.wikipedia.org/wiki/Constitution_of_India	Parts of constitution
3	https://www.india.gov.in/my-government/constitution-india	Constitution overview
4	https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/	Fundamental rights and duties
5	https://main.sci.gov.in/constitution	Directive principles
6	https://legalaffairs.gov.in/sites/default/files/chapter%203.pdf	Parts of constitution
7	https://www.concourt.am/armenian/legal_resources/world_constitutions/constit/india/india-e.htm	Parts of constitution
8	https://constitutionnet.org/vl/item/basic-structure-indian-constitution	Parts of constitution

Note :

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

THEORY OF STRUCTURE **Course Code : 323302**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Third**
Course Title	**: THEORY OF STRUCTURE**
Course Code	**: 323302**

I. RATIONALE

In our day-to-day professional activities, we encounter various structures designed for diverse purposes and functions. The analysis of stresses during the design phase is a crucial and prerequisite step. A precise analysis can be done only comprehensive understanding of the types and effects of forces acting on the structure. This course is design to offer an in-depth exploration of fundamental concepts within the laws of mechanics and their practical application to various structural problems.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Use principles of Theory of Structure to solve broad-based structural related problems.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Determine unknown forces of different system by applying the basics of mechanics.
- CO2 - Check the stability of various force system.
- CO3 - Find Center of Gravity and Moment of Inertia of various components in system.
- CO4 - Determine the forces in truss and frame member.
- CO5 - Draw S.F.D. & B.M.D. of a given beam section
- CO6 - Identify the column and loading on column.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
323302	THEORY OF STRUCTURE	TOS	DSC	3	2	-	1	6	3	3	30	70	100	40	25	10	-	-	25	10	150

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

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

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Use the relevant units of various quantities in a given situations. TLO 1.2 Explain effect of a force on the given object TLO 1.3 Calculate the resultant of the given force system analytically. TLO 1.4 Find the resultant of the given force system using law of triangle and law of parallelogram	**Unit - I Mechanics and Forces** 1.1 Significance and relevance: Mechanics, Applied Mechanics, Statics, Dynamics. 1.2 Force: Unit, Representation of vector and by Bow's Notation, characteristics and effect of a force, principle of transmissibility of force, force system and its classification 1.3 Resolution of a force- orthogonal and nonorthogonal component of a force, moment of a force, Varignon's theorem, 1.4 Composition of forces- Resultant, Analytical Method of Determination of resultant of concurrent, non-concurrent and parallel coplanar system, law of triangle, law of parallelogram and polygon of forces.	Lecture Using Chalk-Board Demonstration Presentations
2	TLO 2.1 Draw the free body diagram for the given system. TLO 2.2 Determine unknown force in the given situation using Lami's theorem. TLO 2.3 Identify the types of beam required for the given situation. TLO 2.4 Determine the reactions in the given type of beam Analytically	**Unit - II Equilibrium of Force System** 2.1 Equilibrium and Equilibrant, free body and free body diagram, analytical and graphical condition of equilibrium 2.2 Equilibrium of force systems by analytically 2.3 Lami's Theorem 2.4 Types of beam, support (simple, hinged, roller and fixed) and loads acting on beam (vertical point load and UD load) 2.5 Beam reaction for simply supported beam with or without overhang, cantilever- subject to combination of point load and UD load	Lecture Using Chalk-Board Video Demonstrations Presentations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Explain the concept of C.G and M.I. TLO 3.2 Explain Parallel Axis Theorem and Radius of Gyration of the given system.	**Unit - III Centre of Gravity and Moment of Inertia** 3.1 Concept of C.G and M.I. 3.2 Formula only of C.G and M.I for rectangular, Triangular, Circular and Semi Circular Shapes. 3.3 Parallel Axis Theorem and Radius of Gyration, Formula for Radius of Gyration of a Rectangular Shape	Lecture Using Chalk-Board Model Demonstration Presentations
4	TLO 4.1 Describe the concept of truss and frame. TLO 4.2 Explain the concept of different geometry of truss. TLO 4.3 Identify the concept of frames and truss. TLO 4.4 Determine the forces in a member of given frames and truss.	**Unit - IV Frame and Truss** 4.1 Introduction to plane lattice construction, application of frames and truss with building construction terminology of Rafters, Purlins. 4.2 Different geometry of trusses up to 15 m. span. 4.3 Perfect frames, imperfect frames, redundant and deficient frames 4.4 Assumptions in the solution of frames: effect of horizontal and vertical forces on frames	Lecture Using Chalk-Board Video Demonstrations Collaborative learning
5	TLO 5.1 Explain basic terminology of a SFD and BMD. TLO 5.2 Explain the concept of Point of Zero Shear, S.F max and B.M max and their relationship TLO 5.3 Draw of S.F.D. and B.M.D. of a given beam.	**Unit - V Shear Force and Bending Moment** 5.1 Definitions of Shear Force and Shear Force diagram, Bending Moment and Bending Moment diagram 5.2 Point of Zero Shear, S.F max and B.M max, relationship between S.F.D and B.M.D 5.3 S.F.D and B.M.D of Simple Supported Beam with full U.D.L, Simple Supported Beam with Central Point Load, Simple Supported Beam with Eccentric point Load.	Lecture Using Chalk-Board Presentations
6	TLO 6.1 Identify the column based on loading condition. TLO 6.2 Explain middle third rule and core or kernel of rectangular section TLO 6.3 Explain Euler's theory, assumption and end condition of column, Rankine's Theory	**Unit - VI Analysis of Column** 6.1 Compression Members Subjected to eccentricity of loading about one and both axis, Middle third Rule for eccentricity about one axis 6.2 Concept of Core or Kernel of a column for eccentricity about both axes. Applying the Middle Third Rule to Brick Pier Foundation. 6.3 Euler’s Theory, Assumptions, Euler’s Formula and its Limitations leading to Rankine’s Theory. Long and Short Columns for different Materials: Various End Conditions and their Effective Lengths.	Lecture Using Chalk-Board Presentations

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

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Calculate resultant of the given force system analytically	1	* Resolution of a force	2	CO1
LLO 2.1 Find resultant of the given force system using law of triangle and law of parallelogram	2	Composition of forces	2	CO1

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 3.1 Draw free body diagram for the given beam system.	3	* Free body and free body diagram, analytical and graphical condition of equilibrium	2	CO2
LLO 4.1 Determine unknown force in the given condition using Lami's theorem	4	Equilibrium of force systems by analytically	2	CO2
LLO 5.1 Identify the types of beam.	5	Types of beam, support	2	CO2
LLO 6.1 Determine reactions in the given type of beam analytically	6	Beam reaction for different types of loading	2	CO2
LLO 7.1 Explain of C.G and M.I.	7	* Formula only of C.G and M.I for different types of section	2	CO3
LLO 8.1 Explain Parallel Axis Theorem and Radius of Gyration of the given system.	8	Parallel Axis Theorem and Radius of Gyration	2	CO3
LLO 9.1 Explain the concept of different geometry of truss	9	Different geometry of trusses up to 15 m. span	2	CO4
LLO 10.1 Explain the concept of frames	10	Perfect frames, imperfect frames, redundant and deficient frames	2	CO4
LLO 11.1 Describe the concept of Point of Zero Shear, S.F max and B.M max and relationship	11	Point of Zero Shear, S.F max and B.M max, relationship between S.F.D and B.M.D	2	CO5
LLO 12.1 Draw of S.F.D and B.M.D of a Simple supported beam with full UDL	12	Draw S.F.D and B.M.D of Simple Supported Beam with full U.D.L	2	CO5
LLO 13.1 Draw of S.F.D and B.M.D of a Simple supported beam with central point load	13	* Draw S.F.D. and B.M.D. of Simple Supported Beam with Central Point Load, Simple Supported Beam with Eccentric point Load.	2	CO5
LLO 14.1 Explain the middle third rule and core or kernel of rectangular section	14	Concept of Core or Kernel of a column for eccentricity about both axes	2	CO6
LLO 15.1 Explain the Euler's theory, assumption and end condition of column, Rankine's Theory	15	Euler’s Theory, Rankine’s Theory, Long and Short Columns, Various End Conditions	2	CO6

Note : Out of above suggestive LLOs -

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

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

Assignment

- Question on each Unit

Note :

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

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Demonstration on Respective models	All

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

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Mechanics and Forces	CO1	8	2	4	5	11
2	II	Equilibrium of Force System	CO2	8	2	2	8	12
3	III	Centre of Gravity and Moment of Inertia	CO3	8	2	2	8	12
4	IV	Frame and Truss	CO4	7	2	4	6	12
5	V	Shear Force and Bending Moment	CO5	7	2	4	6	12
6	VI	Analysis of Column	CO6	7	2	5	4	11
Grand Total				**45**	**12**	**21**	**37**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Formative assessment (assessment for learning) assignments on each units, Self Learning (Assignment)

Summative Assessment (Assessment of Learning)

XI. SUGGESTED COS - POS MATRIX FORM

THEORY OF STRUCTURE **Course Code : 323302**

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	2	1	-	-	-	2			
CO2	3	3	-	-	-	-	1			
CO3	3	3	2	-	-	-	1			
CO4	3	3	2	2	-	-	2			
CO5	3	3	2	2	-	-	2			
CO6	3	1	1	1	-	-	2			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Khurmi R. S.	Applied Mechanics	S. Chand & Co. New Delhi 2014, ISBN : 9788121916431
2	Ramamrutham S.	Engineering Mechanics	S. Chand & Co. New Delhi 2008, ISBN : 9788187433514
3	Ram H. D., Chauhan A. K.	Foundations and Applications of Applied Mechanics	Cambridge University Press, Thomson Press India Ltd., New Delhi, 2015, ISBN:9781107499836
4	Meriam J. L., Kraige L. G.	Engineering Mechanics, Vol. I	Wiley Publication, New Delhi, ISBN:978-81-265-4396

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://structville.com	Theory of structures is a field of knowledge that is concerned with the determination of the effect of loads (actions) on structures
2	www.youtube.com	Videos regarding Theory of Structures
3	www.nptel.ac.in	Online courses and Study Material for Theory of Structure
4	https://onlinelibrary.wiley.com/doi/book/10.1002/9783433602638	online source of material for theory of strucutre

Note :

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

THEORY OF STRUCTURE **Course Code : 323302**

MSBTE Approval Dt. 02/07/2024 **Semester - 3, K Scheme**