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 and Electronics Engineering/ 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/ EK/ 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

- 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.

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

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
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

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

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 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 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

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

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)
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

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

Sr.No	Link / Portal	Description
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

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

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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

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

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
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

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

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

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

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

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

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

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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

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

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
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

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

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

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

Note :

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

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Computer with 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

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

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
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/a utocad-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

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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											
				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	
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.

BUILDING SERVICES **Course Code : 323301**

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
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

BUILDING SERVICES **Course Code : 323301**

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 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
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.

BUILDING SERVICES **Course Code : 323301**

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
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

BUILDING SERVICES **Course Code : 323301**

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

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

BUILDING SERVICES **Course Code : 323301**

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
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
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

BUILDING SERVICES **Course Code : 323301**

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

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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.

THEORY OF STRUCTURE **Course Code : 323302**

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
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

THEORY OF STRUCTURE **Course Code : 323302**

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 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
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

THEORY OF STRUCTURE **Course Code : 323302**

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

THEORY OF STRUCTURE **Course Code : 323302**

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
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

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

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THEORY OF STRUCTURE **Course Code : 323302**

Sr.No	Link / Portal	Description
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

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

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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											
				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	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
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

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.
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
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

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 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

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

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**

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

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
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

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

Sr.No	Link / Portal	Description

Note :

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

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

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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.

BUILDING CONSTRUCTION **Course Code : 323304**

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
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

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.
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
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

BUILDING CONSTRUCTION **Course Code : 323304**

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

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BUILDING CONSTRUCTION **Course Code : 323304**

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

BUILDING CONSTRUCTION **Course Code : 323304**

Sr.No	Author	Title	Publisher with ISBN Number
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-materials	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

ENVIRONMENTAL EDUCATION AND SUSTAINABILITY **Course Code : 314301**

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 and Electronics Engineering/ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Food Technology/ Computer Hardware & Maintenance/ 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/ Surface Coating 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/ EK/ EP/ ET/ EX/ FC/ HA/ IC/ IE/ IF/ IH/ IS/ IX/ IZ/ LE/ ME/ MK/ ML/ MU/ PG/ PN/ PO/ SC/ SE/ TC/ TE/ TR/ TX**
Semester	**: Fourth**
Course Title	**: ENVIRONMENTAL EDUCATION AND SUSTAINABILITY**
Course Code	**: 314301**

I. RATIONALE

The survival of human beings is solely depending upon the nature. Thus, threats to the environment directly impact on existence and health of humans as well as other species. Depletion of natural resources and degradation of ecosystems is accelerated due to the growth in industrial development, population growth, and overall growth in production demand. To address these environmental issues, awareness and participation of individuals as well as society is necessary. Environmental education and sustainability provide an integrated, and interdisciplinary approach to study the environmental systems and sustainability approach to the diploma engineers.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Resolve the relevant environmental issue through sustainable solutions

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 relevant Environmental issues in specified locality.
- CO2 - Provide the green solution to the relevant environmental problems.
- CO3 - Conduct SWOT analysis of biodiversity hotspot
- CO4 - Apply the relevant measures to mitigate the environmental pollution.
- CO5 - Implement the environmental policies under the relevant legal framework.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

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ENVIRONMENTAL EDUCATION AND SUSTAINABILITY **Course Code : 314301**

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	
314301	ENVIRONMENTAL EDUCATION AND SUSTAINABILITY	EES	VEC	3	-	-	1	4	2	1.5	30	70*#	100	40	-	-	-	-	25	10	125

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 need of studying environment and its components. TLO 1.2 Investigate the impact of population growth and industrialization on the relevant environmental issues and suggest remedial solutions TLO 1.3 Explain the Concept of 5 R w.r.t. the given situation TLO 1.4 Elaborate the relevance of Sustainable Development Goals in managing the climate change TLO 1.5 Explain the concept of zero carbon-footprint with carbon credit	**Unit - I Environment and climate change** 1.1 Environment and its components, Types of Environments, Need of environmental studies 1.2 Environmental Issues- Climate change, Global warming, Acid rain, Ozone layer depletion, nuclear accidents. Effect of population growth and industrialization 1.3 Concept of 5R, Individuals' participation in i) 5R policy, ii) segregation of waste, and iii) creating manure from domestic waste 1.4 Impact of Climate change, Factors contributing to climate change, Concept of Sustainable development, Sustainable development Goals (SDGs), Action Plan on Climate Change in Indian perspectives 1.5 Zero Carbon footprint for sustainable development, (IKS-Enviornment conservation in vedic and pre-vedic India)	Lecture Using Chalk-Board Presentations

ENVIRONMENTAL EDUCATION AND SUSTAINABILITY **Course Code : 314301**

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 Justify the importance of natural resources in sustainable development TLO 2.2 Explain the need of optimum use of natural resources to maintain the sustainability TLO 2.3 Differentiate between renewable and non-renewable sources of energy TLO 2.4 Suggest the relevant type of energy source as a green solution to environmental issues	**Unit - II Sustainability and Renewable Resources** 2.1 Natural Resources: Types, importance, Causes and effects of depletion. (Forest Resources, Water Resources, Energy Resources, Land resources, Mineral resources), (IKS- Concepts of Panchmahabhuta) 2.2 Impact of overexploitation of natural resources on the environment, optimum use of natural resources 2.3 Energy forms (Renewable and non-renewable) such as Thermal energy, nuclear energy, Solar energy, Wind energy, Geothermal energy, Biomass energy, Hydropower energy, biofuel 2.4 Green Solutions in the form of New Energy Sources such as Hydrogen energy, Ocean energy & Tidal energy	Lecture Using Chalk-Board Presentations
3	TLO 3.1 Explain the characteristics and functions of ecosystem TLO 3.2 Relate the importance of biodiversity and its loss in the environmental sustainability TLO 3.3 Describe biodiversity assessment initiatives in India TLO 3.4 Conduct the SWOT analysis of the biodiversity hot spot in India TLO 3.5 Explain the need of conservation of biodiversity in the given situation	**Unit - III Ecosystem and Biodiversity** 3.1 Ecosystem - Definition, Aspects of ecosystem, Division of ecosystem, General characteristics of ecosystem, Functions of ecosystem 3.2 Biodiversity - Definitions, Levels, Value, and loss of biodiversity 3.3 Biodiversity Assessment Initiatives in India 3.4 SWOT analysis of biodiversity hot spot in India 3.5 Conservations of biodiversity - objects, and laws for conservation of biodiversity	Lecture Using Chalk-Board Presentations Video Demonstrations
4	TLO 4.1 Classify the pollution based on the given criteria TLO 4.2 Justify the need of preserving soil as a resource along with the preservation techniques TLO 4.3 Maintain the quality of water in the given location using relevant preventive measures TLO 4.4 State the significance of controlling the air pollution to maintain its ambient quality norms TLO 4.5 Compare the noise level from different zones of city with justification TLO 4.6 Describe the roles and responsibilities of central and state pollution control board	**Unit - IV Environmental Pollution** 4.1 Definition of pollution, types- Natural & Artificial (Man- made) 4.2 Soil / Land Pollution – Need of preservation of soil resource, Causes and effects on environment and lives, preventive measures, Soil conservation 4.3 Water Pollution - sources of water pollution, effects on environment and lives, preventive measures, BIS water quality standards for domestic potable water, water conservation 4.4 Air pollution - Causes, effects, prevention, CPCB norms of ambient air quality in residential area 4.5 Noise pollution - Sources, effects, prevention, noise levels at various zones of the city 4.6 Pollution Control Boards at Central and State Government level: Norms, Roles and Responsibilities	Lecture Using Chalk-Board Presentations

ENVIRONMENTAL EDUCATION AND SUSTAINABILITY **Course Code : 314301**

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Explain Constitutional provisions related to environmental protection TLO 5.2 Explain importance of public participation (PPP) in enacting the relevant laws TLO 5.3 Use the relevant green technologies to provide sustainable solutions of an environmental problem TLO 5.4 Explain the role of information technology in environment protection	**Unit - V Enviornmental legislation and sustainable practices** 5.1 Article (48-A) and (51-A (g)) of Indian Constitution regarding environment, Environmental protection and prevention acts 5.2 Public awareness about environment. Need of public awareness and individuals' participation. Role of NGOs 5.3 Green technologies like solar desalination, green architecture, vertical farming and hydroponics, electric vehicles, plant-based packaging 5.4 Role of information technology in environment protection and human health	Lecture Using Chalk-Board Presentations Video Demonstrations

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

•

Suggest the steps to implement (or improve the implementation) of the 5R policy in your home/institute stating your contribution
Draft an article on India's Strategies to progress across the Sustainable Development Goals
Make a chart of Renewable and non-renewable energy sources mentioning the advantages and disadvantages of each source
Conduct the SWOT analysis of biodiversity hotspot in India
Prepare a mind-mapping for the zero carbon footprint process of your field
Prepare a chart showing sources of pollution (air/water/ soil), its effect on human beings, and remedial actions
Any other assignment on relevant topic related to the course suggested by the facilitator

UNICEF Certification(s)

- Students may complete the self-paced course launched by Youth Leadership for climate Exchange under UNICEF program on portal www.mahayouthnet.in . The course encompasses five Modules in the form of Units as given below: -

Unit 1: Living with climate change
Unit 2 : Water Management and Climate Action
Unit 3: Energy Management and Climate Action
Unit 4 : Waste Management and Climate Action
Unit 5 : Bio-cultural Diversity and Climate Action
If students complete all the five Units they are not required to undertake any other assignment /Microproject/activities specified in the course. These units will suffice to their evaluations under SLA component

Micro project

•

Technical analysis of nearby commercial RO plant.
Comparative study of different filters used in Household water filtration unit
Evaluate any nearby biogas plant / vermicomposting plant or any such composting unit on the basis of sustainabilityand cost-benefit
IKS-Study and prepare a note on Vedic and Pre-Vedic techniques of environmental conversion

Visit a local polluted water source and make a report mentioning causes of pollution
Any other activity / relevant topic related to the course suggested by the facilitator

Activities

•

Prepare a report on the working and functions of the PUC Center machines and its relavance in pollution control.
Prepare and analyse a case study on any polluted city of India
Prepare a note based on the field visit to the solid waste management department of the municipal corporation / local authority
Record the biodiversity of your institute/garden in your city mentioning types of vegetation and their numbers
Visit any functional hall/cultural hall /community hall to study the disposal techniques of kitchen waste and prepare a report suggesting sustainable waste management tool
Watch a video related to air pollution in India and present the summary
Any other assignment on relevant topic related to the course suggested by the facilitator

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	Nil	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	Environment and climate change	CO1	8	4	4	4	12
2	II	Sustainability and Renewable Resources	CO2	10	4	4	8	16
3	III	Ecosystem and Biodiversity	CO3	8	4	4	4	12
4	IV	Environmental Pollution	CO4	12	4	8	6	18
5	V	Enviornmental legislation and sustainable practices	CO5	7	4	4	4	12
Grand Total				**45**	**20**	**24**	**26**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two-unit tests (MCQs) of 30 marks will be conducted and average of two-unit tests considered. Formative assessment of self learning of 25 marks should be assessed based on self learning activity such as UNICEF Certification(s)/Microproject/assignment/activities. (60 % weightage to process and 40 % to product)

Summative Assessment (Assessment of Learning)

- Online MCQ type 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	-	1	-	-	3	2	3			
CO2	-	2	2	-	3	2	3			
CO3	-	-	-	-	3	1	2			
CO4	1	-	-	-	3	2	2			
CO5	1	-	2	-	3	2	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	Y. K. Singh	Environmental Science	New Age International Publishers, 2006, ISBN: 81-224-2330-2
2	Erach Bharucha	Environmental Studies	University Grants Commission, New Delhi
3	Rajagopalan R.	Environmental Studies: From Crisis to Cure.	Oxford University Press, USA, ISBN: 9780199459759, 0199459754
4	Shashi Chawla	A text book of Environmental Science	Tata Mc Graw-Hill New Delhi
5	Arvind Kumar	A Text Book of Enviornmental science	APH Publishing New Delhi (ISBN 978-8176485906)

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://sdgs.un.org/goals	United Nation’s website mentioning Sustainability goals
2	http://www.greenbeltmovement.org/news-and-events/blog	Green Belt Movement Blogs on various climatic changes and other issues
3	http://www.greenbeltmovement.org/what-we-do/tree-planting-fo r-watersheds	Green Belt Movement's work on tree plantation, soil conservation and watershed management techniques
4	https://www.youtube.com/@ierekcompany/videos	International Experts For Research Enrichment and Knowledge Exchange – IEREK's platform to exchange the knowledge in fields such as architecture, urban planning, sustainability
5	www.mahayouthnet.in	UNICEF Intiative for youth leadership for climate action

ENVIRONMENTAL EDUCATION AND SUSTAINABILITY **Course Code : 314301**

Sr.No	Link / Portal	Description
6	https://eepmoefcc.nic.in/index1.aspx?lsid=297&lev=2&lid=1180&langid=1	GOI Website for public awareness on enviornmetal issues
7	https://egyankosh.ac.in/handle/123456789/61136	IGNOU's Intiative for online study material on Enviornmental studies
8	https://egyankosh.ac.in/handle/123456789/50898	IGNOU's Intiative for online study material on sustainability
9	https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf	Final list of proposed Sustainable Development Goal indicators
10	https://sustainabledevelopment.un.org/memberstates/india	India’s Strategies to progress across the SDGs.
11	https://www.un.org/en/development/desa/financial-crisis/sustainable-development.html	Challenges to Sustainable Development
12	https://nptel.ac.in/courses/109105190	NPTEL course on sustainable development
13	https://onlinecourses.swayam2.ac.in/cec19_bt03/preview	Swayam Course on Enviornmetal studies (Natural Resources, Biodiversity and other topics)
14	https://onlinecourses.nptel.ac.in/noc23_hs155/preview	NPTEL course on enviornmental studies which encomopasses SDGs, Pollution, Cliamate issues, Energy, Policies and legal framework
15	https://www.cbd.int/development/meetings/egmbped/SWOT-analysis-en.pdf	SWOT analysis of Biodiversity
16	https://www.sanskrit.nic.in/SVimarsha/V2/c17.pdf	Central sanskrkit university publication on Vedic and pre vedic enviornmetal conservation

Note :

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

MSBTE Approval Dt. 21/11/2024 **Semester - 4, K Scheme**

07-01-2025 11:27:47 AM

ARCHITECTURAL DESIGN - II **Course Code : 324001**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Fourth**
Course Title	**: ARCHITECTURAL DESIGN - II**
Course Code	**: 324001**

I. RATIONALE

This course is designed so that students will learn ergonomic and anthropometry approaches towards space design and area statement formations for commercial space design. This course will focus on small commercial Institutional building design up to 2000 sqm. to 5000 sqm. plot size. covering maximum G+3 building structure. Interior Design course can focus designing a commercial Retail store / Spa / Restaurant/ Office / Bank / Experience center of 500 sqm. To 700 sqm.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Undertake surveys of various types of commercial / Institutional spaces to plan and design it as per the need of society.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Explain the importance of typologies for commercial / institutional spaces.
- CO2 - Apply all theoretical learning about the predesign concepts in the final design conventional methods of architectural design / Interior spaces project.
- CO3 - Prepare design for space envelope architecture / interior design space.
- CO4 - Design technical and sustainable approach towards the designed project.
- CO5 - Demonstrate skills to represent the ideas in 3D model.

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	
324001	ARCHITECTURAL DESIGN - II	ADE	DSC	2	-	4	2	8	4	-	-	-	-	-	50	20	50@	20	25	10	125

ARCHITECTURAL DESIGN - II **Course Code : 324001**

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 List various types of commercial space in chart form with its requirements of area and document / explain anthropometry data TLO 1.2 Develop & prepare mind maps to understand predesign and conceptual requirements. TLO 1.3 Prepare case studies (one shall be online and one bookcase). TLO 1.4 Develop a concept / theme of design for the space exploration.	**Unit - I Pre-design concept in context with anthropometry and ergonomics.** 1.1 Human scaling with basic anthropometry data assembling for commercial / institutional architecture / interior spaces. 1.2 Predesign concept, check lists and list of space requirements. 1.3 Case studies in context of the project 1.4 Concept discussions for its correctness of the designated project	Demonstration, Hands-on, Cooperative Learning, Lecture Using Chalk-Board, Presentations, Video Demonstrations, Case Study
2	TLO 2.1 Prepare site plan, bubble diagram & zoning TLO 2.2 Prepare site drawing as per scales provided TLO 2.3 Provide alternative layouts to explore design possibilities TLO 2.4 Produce schematic layout and working model with material board	**Unit - II Zoning, planning and area statements** 2.1 Predesign area statements for zoning & planning. 2.2 Site documentation with site plan / measurement plans. 2.3 Planning & preparing alternatives plans for understanding of best possible layout / planning. 2.4 Schematic layout & working Models with material board.	Demonstration, Presentations, Lecture Using Chalk-Board, Video Demonstrations, Model Demonstration, Collaborative learning
3	TLO 3.1 Draw layout plans as designed to the scale. TLO 3.2 Draw sections as designed to the scale. TLO 3.3 Prepare Proposed Civil Layout (AA/AT) / Existing & Proposed civil Layout (IX/IZ) TLO 3.4 Develop 3D views & sketches & perspective drawings.	**Unit - III Planning & designing & 3D modelling.** 3.1 Scaled layout and sections to understand and demonstrate design 3.2 Sections with all structural indications and levels 3.3 3D sketches and views, concepts and design related drawing and their solutions 3.4 Revision & discussions with mentors in regards of designed project for its corrective measures.	Model Demonstration, Demonstration, Video Demonstrations, Lecture Using Chalk-Board, Hands-on, Collaborative learning, Presentations

ARCHITECTURAL DESIGN - II **Course Code : 324001**

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 Draw structural elements for designed project(AA/AT) TLO 4.2 Develop center line drawings for designed project (AA/AT) TLO 4.3 Organize site visits for services (AA/AT/IX/IZ) TLO 4.4 Draw structural layouts electrical, Plumbing, Rainwater Harvesting and Fire fighting layouts. (AA/AT) TLO 4.5 Draft all services drawing as per layout like flooring, reflected ceiling, Electrical with lighting, HVAC and networking layouts. (IX / IZ) TLO 4.6 Draw coordination layout showing all overlapping services (IX / IZ)	**Unit - IV Structural design development / Service Layouts & Technical drawings** 4.1 Study model and understand structural requirements. (AA/AT). 4.2 Structural issues and solving the problems (AA/AT). 4.3 Services its important points to be noted while designing(AA/AT/IX/IZ). 4.4 Structural & service drawings for electrical, Plumbing, Rainwater Harvesting and Fire fighting layouts. (AA/AT). 4.5 Flooring, reflected ceiling, Electrical with lighting, HVAC and networking layouts.(IX / IZ). 4.6 Overlay drawings / coordination layout to understand all services to be provided within space. (IX / IZ).	Demonstration, Video Demonstrations, Presentations, Collaborative learning, Hands-on, Site/Industry Visit, Model Demonstration
5	TLO 5.1 Transfer the manual designed drawings in computer software TLO 5.2 Prepare different layouts & sections TLO 5.3 Produce & Print portfolio on A3 size drawing sheets to evaluate TLO 5.4 Conduct Internal / cross jury for given project TLO 5.5 Assess Final portfolio	**Unit - V Project development - Computer skill based.** 5.1 Transfer prepared manual drawings to software driven outcomes 5.2 Print drawings and presentation methodologies 5.3 Prefinal portfolio printing 5.4 Prefinal drawings prepared and suggestions 5.5 Final portfolio submission of the given project	Flipped Classroom, Demonstration, Video Demonstrations, Presentations, Collaborative learning

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 report on anthropometry data for commercial space designed, sketch to the scale drawings on A1 tracing / Cartridge sheet	1	*Preparation of anthropometry data.	4	CO1
LLO 2.1 List all predesign requirements and preparing a mind map and concept sheet on A1 sheet & client brief	2	Preparation of Mind map and concept drawings.	4	CO1
LLO 3.1 Prepare one online & one book case study to be given on specified topic on A1 sheet with comparative analysis	3	Preparation of Case Study and Zoning Layout	4	CO1
LLO 4.1 Prepare zoning layouts with area statements on tracing sheets – Zoning layouts (minimum 3/5 alternatives)	4	Preparation of Bubble Diagram & zoning Layout	6	CO2

ARCHITECTURAL DESIGN - II **Course Code : 324001**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 5.1 Develop site documents with all site conditions mentioned on layout with contours specifications on 1:100 or 1:200 (AA/AT) / measurement layouts with bear section with all specifications (IKS)	5	Preparation of Site Documentation and Alternative Layouts	4	CO2
LLO 6.1 Prepare alternative options with schematic layouts.	6	Preparation of final site drawings / Measurement Layout.	4	CO2
LLO 7.1 Draft one final alternative to be scaled up as final layouts and sections to understand elevations, Final space plan layout on 1:100 or 1:200 (AA/AT)/ Furniture layout on one A1 sheet on 1:50 scale	7	Preparation of alternative Layouts.	3	CO3
LLO 8.1 Prepare 3D schematic sketches for the design finalized sketches as based scheme finalised. Students shall do the market survey and prepare material chart on A1 sheet for the finalized material board	8	Preparation of 3D Views & Sketches	3	CO3
LLO 9.1 Develop structural layouts & – civil, electrical & plumbing, Firefighting (AA/AT) Final Services L – Flooring, electrical & lighting, Reflected ceiling layouts, HVAC, Networking Layouts (IX / IZ)	9	*Preparation of Services Layouts – Civil Layout / Civil Changes Pre/Post layout/s Services Layouts – Electrical Layout with Lighting Services Layouts – Plumbing Layout Services Layouts – Fire Fighting Layout Services Layouts – Reflected Ceiling Layout (IX / IZ) Services Layouts – HVAC Layout (IX / IZ) Services Layouts – Networking Layout (IX / IZ)	4	CO4
LLO 10.1 Prepare a set of final Drawings with all suggested corrections	10	Preparation of revised Service Drawing	2	CO4
LLO 11.1 Prepare drawings of the given project using Auto cad software.	11	*Preparation of drawings using Auto cad software.	2	CO5
LLO 12.1 Develop 3D model by using cad software's	12	*Preparation of drawings by using autocad software – 3D / Exploded views	4	CO5
LLO 13.1 Draw all service layouts on A1 sheet as specified per schemes	13	Preparation of service drawings	4	CO5
LLO 14.1 Prepare portfolio for prefinal internal assessment and a cross jury	14	Preparation of architectural,technical drawing and model for Internal cross jury	6	CO5
LLO 15.1 Prepare final A1 portfolio signed, stamped & Certified by mentors	15	Preparation of architectural, technical drawings and model for final portfolio submission	6	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 /

ARCHITECTURAL DESIGN - II **Course Code : 324001**

SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Develop a technically sound and sustainable built project with the help of online courses
- Software learning and preparing drawings, Mind maps and flow charts
- Case study data analysis & Mapping
- Material market survey & rate analysis

Assignment

- Conduct visits for (Electrical, Plumbing, HVAC, Fire Fighting, etc.) collect technical information and student shall submit site reports

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	LCD projector & white screen for projection,	All
2	A1 drafting board and all drafting tools, tracing paper, A1 size drawing sheets, A3 Sketchbook, etc.	All
3	Computer loaded with required software's – Auto CAD, Sketchup, Corel Draw, Photoshop, etc..	All
4	A1 plotter or printer facility for students.	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	Pre-design concept in context with anthropometry and ergonomics.	CO1	6	0	0	0	0
2	II	Zoning, planning and area statements	CO2	6	0	0	0	0
3	III	Planning & designing & 3D modelling.	CO3	6	0	0	0	0
4	IV	Structural design development / Service Layouts & Technical drawings	CO4	6	0	0	0	0
5	V	Project development - Computer skill based.	CO5	6	0	0	0	0
Grand Total				**30**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Continuous assessment based on work done through out the semester.

Summative Assessment (Assessment of Learning)

- End Semester Examination, Lab Performance, Viva-voce

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	3	3	0	3	3	3			
CO2	3	3	3	1	3	1	3			
CO3	3	3	2	1	1	1	3			
CO4	3	3	2	3	1	3	3			
CO5	3	3	3	3	2	3	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	Ernst Neufert, Peter Neufert	Neufert Architects' Data	Oxford Brooks University; ISBN 10: 1405192534 ISBN 13: 9781405192538
2	Kate Nesbitt (org)	Theorizing a New Agenda for Architecture: An Anthology of Architectural Theory 1965 - 1995	Princeton Architectural Press, 1996; ISBN 10: 156898054XISBN 13: 9781568980546
3	Francis D. K. Ching	Architecture: Form, Space and Order	Published by Van Nostrand Reinhold, 1979; ISBN 10: 0442215355 / ISBN 13: 9780442215354
4	Frank Lloyd Wright	The Future Of Architecture	Published by Random House Value Publishing, 1988; ISBN 10: 0517030896 / ISBN 13: 9780517030899
5	Karlen Mark	Space planning Basics	Van Nostrand Reinhold, New York, 1992; ISBN 10: 0442009704ISBN 13: 9780442009700
6	Joseph D Chiara, Julius Panero, & Martin Zelnick,	Time Saver standards for Interior Design & space planning	2nd edition, Mc-Graw Hill professional, 2001, ISBN 10: 0070162999ISBN 13: 9780070162990
7	Francis.D. Ching & Corky Bingelli	Interior Design Illustrated	Published by Wiley, 2004 ISBN 10: 0471473766ISBN 13: 9780471473763
8	Julius Panero & Martin Zelnick	Human Dimension & Interior Space : A source book of Design Reference standards	Published by Watson-Guptill, 1979 ISBN 10: 0823072711ISBN 13: 9780823072712
9	Karlen Mark, Kate Ruggeri & Peter Hahn	Space Planning Basics	Published by Van Nostrand Reinhold, 1992 ISBN 10: 0442009704ISBN 13: 9780442009700

ARCHITECTURAL DESIGN - II **Course Code : 324001**

Sr.No	Author	Title	Publisher with ISBN Number
10	Maureen Mitton	Interior Design Visual Presentation: A Guide to Graphics, Models, and Presentation Techniques	Published by Wiley, 1999 ISBN 10: 0471292591ISBN 13: 9780471292593
11	Robert Rengel,	Shaping Interior Space	Published by Fairchild Books, 2003 ISBN 10: 1563672219ISBN 13: 9781563672217

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.open.edu/openlearn/free-courses/full-catalogue	Design thinking
2	https://www.open.edu/openlearn/free-courses/full-catalogue	People-centred designing
3	https://www3.nhk.or.jp/nhkworld/en/tv/designtalksplus/	DESIGN TALKS plus

Note :

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

MSBTE Approval Dt. 21/11/2024 **Semester - 4, K Scheme**

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COMPUTER AIDED DRAWING-II **Course Code : 324002**

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

Programme Code : **AA/ AT/ IX/ IZ**

Semester : **Fourth**

Course Title : **COMPUTER AIDED DRAWING-II**

Course Code : **324002**

I. RATIONALE

This subject aims to help students understand the significance of 3D modelling in creating realistic perspectives. The utilization of 3D modelling software not only saves time by minimizing the necessity for model rework but also enhances productivity. Additionally, it fosters the development of proficient presentation skills through the use of various presentation software.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Create 3D objects and models of designed spaces precisely and produce photorealistic rendered images using various rendering 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 the basics of 3D modelling software.
- CO2 - Execute the diverse commands within 3D modeling software.
- CO3 - Draw 3-dimensional objects & models using 3D modelling software.
- CO4 - Produce the photorealistic rendered images, walkthrough & presentations.

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	
324002	COMPUTER AIDED DRAWING-II	CAD	SEC	2	-	2	-	4	2	-	-	-	-	-	25	10	25@	10	-	-	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.

COMPUTER AIDED DRAWING-II **Course Code : 324002**

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 State the types of 3D modelling software. TLO 1.2 Describe the necessity of 3D modelling software in architectural/ Interior practice. TLO 1.3 Modify the 2D drawings for 3D modelling.	**Unit - I Basics of 3D modelling software.** 1.1 Overview of 3D modelling computer aided software. 1.2 Introduction to types of 3D modelling software. 1.3 File formats of 2D drawings for 3D modeling.	Demonstration, Presentations, Hands-on, Flipped Classroom
2	TLO 2.1 Describe the setting up template & layouts in 3D modelling software. TLO 2.2 Elaborate the tools & 3D-Navigation techniques of 3D modelling software. TLO 2.3 Describe the different types of tool bars along with tools. TLO 2.4 Create a 3D model of a given object/ Project.	**Unit - II Setting-up 3D Interface, modelling & drafting techniques.** 2.1 Introduction to setting up the template & understanding the layout. 2.2 Interface of 3D modelling software, navigating in 3D. 2.3 Tools description & types of tool bars. Creation of basic shapes, objects & models. 2.4 Creation of 3-D models using a software.	Flipped Classroom, Presentations, Hands-on, Demonstration
3	TLO 3.1 Elaborate the concept of surfaces & modelling techniques. TLO 3.2 Describe the material applications, modifications & grouping in 3D modelling software. TLO 3.3 Define the concept of 3D warehouse & integration of objects and models. TLO 3.4 Discuss the concepts & importance of plugins in 3D modelling software.	**Unit - III Surfaces, materials, 3D Warehouse & Plugins.** 3.1 Concept of surfaces & surface modelling techniques. 3.2 Material applications to objects & models in 3D modelling software. 3.3 Introduction of 3D Warehouse & their integration with 3D models. 3.4 Concepts & applications of plugins in 3D modelling software.	Flipped Classroom, Presentations, Video Demonstrations, Hands-on
4	TLO 4.1 Describe concept & principles of rendering in 3D modelling software. TLO 4.2 Discuss the rendering set up in V-Ray & Lumion. TLO 4.3 Define plugins in rendering techniques for 3D modelling. TLO 4.4 Create a walkthrough of a chosen project in computer aided 3D modelling software. TLO 4.5 Create a presentation of given project using computer aided tools.	**Unit - IV Computer aided rendering, presentation & walkthrough.** 4.1 Introduction to rendering & rendering principals. 4.2 Overview of rendering set up, optimization techniques in software's like V-Ray & Lumion. 4.3 Real-time rendering technologies & rendering plugins. 4.4 Presentation & walkthrough creation in computer aided 3D modelling software.	Flipped Classroom, Presentations, Video Demonstrations, Hands-on

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

COMPUTER AIDED DRAWING-II **Course Code : 324002**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Select suitable 2D drawing for given 3D model. LLO 1.2 Modify the given 2D drawing for 3D model drafting. LLO 1.3 Set up the 2D drawing format in appropriate version for 3D modelling.	1	* Modifications of 2D drawings for 3D modelling.*	2	CO1 CO2
LLO 2.1 Explain types of templates & suitable template as per 2D drawing. LLO 2.2 Prepare a standard sheet template using layout tool in 3D modelling software like Sketch Up. LLO 2.3 Export the layout sheet into pdf format for printing.	2	* Creation of templates and Layouts.	2	CO1 CO2
LLO 3.1 Prepare a sheet of tools for 3D modelling sketch-up software. LLO 3.2 Prepare a sheet for types of toolbars in sketch-up 3D modelling software.	3	* Application of tools and toolbars.	2	CO2
LLO 4.1 Explain the interface of sketch up 3D modelling software. LLO 4.2 Demonstrate the navigating techniques in sketch-up 3D modelling software. LLO 4.3 Prepare a sheet on Interface and navigation tools of sketch-up 3D modelling software.	4	* Interface of 3D modelling and navigation techniques.	2	CO2 CO3
LLO 5.1 Draw the basic shapes in 3D modelling software. (8-10 shapes) LLO 5.2 Prepare a sheet of basic shapes (minimum 6 shapes) in sketch-up 3D modelling software.	5	Creation of basic shapes like Rectangle, Circle, Square, Triangle.	2	CO2 CO3
LLO 6.1 Demonstrate the object creation like door, window & furniture elements in sketch-up 3D modelling software. LLO 6.2 Prepare a sheet of basic objects (minimum 3 objects) in sketch-up 3D modelling software.	6	* Creation of objects like door, window, furniture elements.	2	CO2 CO3
LLO 7.1 Demonstrate the model creation of basic chosen project like residential unit/commercial building/ space formation in interiors. LLO 7.2 Draft a 3D model of a chosen project like residential unit/commercial building/ space formation in interiors. LLO 7.3 Prepare a sheet of a drafted model in sketch-up 3D modelling software using layout tool.	7	* Development of 3D model for a project.	2	CO2 CO3
LLO 8.1 Explain surface modelling techniques. Elaborate wireframe models, surface models, and solid models. LLO 8.2 Draft an object and apply surface modelling techniques to a given object. (Minimum 3 objects) LLO 8.3 Prepare a sheet of given objects in sketch-up 3D modelling software by using layout tool.	8	Application of surface modelling techniques.	2	CO2 CO3

COMPUTER AIDED DRAWING-II **Course Code : 324002**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 9.1 Match the suitable material to given model in sketch-up 3D modelling software. LLO 9.2 Demonstrate the Edit material option and create a new material option in sketch-up 3D modelling software. LLO 9.3 Prepare the sheet for material application of drafted model in sketch-up 3D modelling software by using layout tool.	9	* Application of materials to objects and models.	2	CO2 CO3
LLO 10.1 Demonstrate the 3D warehouse of sketch-up 3D modelling software. LLO 10.2 Select the suitable objects/ materials for a drafted model in sketch-up 3D modelling software. LLO 10.3 Prepare the sheet for integration of 3D warehouse models using in sketch-up 3D modelling software by using layout tool.	10	* 3D warehouse and object integration in 3D modelling.	2	CO2 CO3
LLO 11.1 Setup the plugins in 3D modelling software. LLO 11.2 Select the suitable plugin for 3D drafting in sketch-up 3D modelling software. LLO 11.3 Prepare a sheet of plugins used in sketch-up 3D modelling software by using layout tool.	11	* Operations of plugins in 3D modelling software.	2	CO2 CO3
LLO 12.1 Select the suitable rendering software for given 3D model to render. (V-Ray, Lumion) LLO 12.2 Demonstrate the tools and techniques in rendering software. LLO 12.3 Render a drafted model using rendering software. LLO 12.4 Prepare a sheet for tools of rendering software in sketch-up 3D modelling software by using layout tool.	12	* Rendering software and applications of rendering tools.	2	CO4
LLO 13.1 Setup the rendering software plugins in 3D modelling software. LLO 13.2 Select the suitable plugin for rendering the chosen model. LLO 13.3 Prepare a sheet of plugins used for rendering in rendering software.	13	Operations of plugins in rendering software.	2	CO4
LLO 14.1 Create a realistic rendered images of a chosen project in rendering software. LLO 14.2 Prepare a sheet of rendered images using computer aided presentation tools.	14	* Creation of realistic 3D rendered images of 3D model.	2	CO4
LLO 15.1 Setup the presentation of a given project using computer aided presentation tools. LLO 15.2 Prepare a presentation of a given project (Plan, Sections, 3D's, Rendered Images).	15	* Presentation with the aid of 3D modeling software.	2	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

- Interior Design Concepts: Experiment with interior layouts, furniture placement, and color schemes. SketchUp allows you to visualize how different elements will fit together in a room. Try designing a cozy living room, a functional kitchen, or a stylish bedroom.
- Model Creation: Create 3D model in SketchUp. Define the geometry, add textures, materials, and components. Pay attention to details like lighting fixtures, furniture, and other elements that will enhance the realism of chosen scene.
- Camera Placement: Position your camera within the model. Think about the best angles to showcase your design. Adjust the field of view, focal length, and perspective to achieve the desired composition.
- Materials and Textures: Apply appropriate materials and textures to surfaces. Use high-resolution images for realistic results. Consider reflective surfaces, roughness, and transparency.
- Render Settings: Choose a rendering engine or plugin (such as V-Ray, Enscape, or Twilight Render). Adjust settings like resolution, quality, and rendering time. Set up global illumination, ambient occlusion, and other effects.
- Render Output: Click the render button. The software will process selected scene and generate a high-quality image. Save the output in a suitable format (JPEG, PNG, etc.).

Micro project

- DIY Home Renovation Projects - Use SketchUp to plan and visualize your home improvement projects. Whether it's remodeling a room, designing custom furniture, or creating built-in storage solutions.
- Watch the basic tutorial videos on YouTube to explore the tools & commands of sketch up. https://www.youtube.com/watch?v=qgt2s9RzvKM

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	Color printer preferably for the output of A-3 size paper.	2,3,4,5,6,7,8,9,10,11,12,13,14,15
2	LCD projector/ Smart Interactive Display Panel of latest configuration.	2,3,4,5,6,7,8,9,10,11,12,13,14,15
3	Latest software subscriptions of AUTO CAD, SKETCH-UP, LUMION, V-RAY, ENSCAPE and PHOTOSHOP software.	All
4	Computer Specifications: Processor (CPU): A multi-core processor (Intel Core i7 or AMD Ryzen) with high clock speed is ideal. Memory (RAM): At least 16 GB RAM for smooth modeling and rendering. Graphics Card (GPU): A dedicated GPU with good OpenGL support. Storage: SSD for faster loading times. Operating System: Windows 10 or macOS.	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 3D modelling software.	CO1	7	0	0	0	0
2	II	Setting-up 3D Interface, modelling & drafting techniques.	CO2,CO3	8	0	0	0	0
3	III	Surfaces, materials, 3D Warehouse & Plugins.	CO2,CO3	7	0	0	0	0

COMPUTER AIDED DRAWING-II **Course Code : 324002**

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
4	IV	Computer aided rendering, presentation & walkthrough.	CO4	8	0	0	0	0
Grand Total				**30**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- The continuous internal assesement for laboratory practical.

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	1	2	2	1	2	2			
CO2	3	2	2	3	1	2	2			
CO3	3	2	2	3	1	2	2			
CO4	3	2	2	2	1	2	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	Aidan Chopra, Laura Town, Chris Pichereau	Introduction to Google SketchUp, 2nd edition	Publisher: Wiley ISBN: 1118214382
2	Aidan Chopra	Google SketchUp 8 For Dummies	Publisher: For Dummies ISBN: 0470916826
3	Chris Grover	Google SketchUp: The Missing Manual	Publisher: O'Reilly Media, Inc. ISBN: 9780596521462
4	Hujun Bao and Wei Hua	Real-Time Graphics Rendering Engine	Publisher: Springer Publishing Company, Incorporated ISBN: 978-3-642-18342-3
5	Bhatt, N.D.	Engineering Drawing	Charotar Publications, Anand, 2016 ISBN: 978-93-80358-96

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description

COMPUTER AIDED DRAWING-II **Course Code : 324002**

Sr.No	Link / Portal	Description
1	https://www.sketchupschool.com/	SketchUp School is an online platform dedicated to teaching individuals how to master SketchUp, a powerful 3D modelling software widely used in various industries including architecture, interior design, construction and more.
2	https://www.thesketchupessentials.com/sketchup-tutorials/	The SketchUp Essentials provides comprehensive tutorials covering a wide array of topics. From fundamental concepts like navigation and basic modelling techniques to more advanced topics such as rendering, animation, and plugin integration.
3	https://learn.sketchup.com/	The learning portal serves as a valuable resource for beginners. It offers an ever-growing library of learning tracks designed to help students become an active SketchUp user.
4	https://www.sketchupclub.com/2024/01/10-online-tutorials-for -sketchup.html	Sketchup Club is a platform that caters to students, artists and enthusiasts. Sketchup Club explores various extensions and plugins that enhance the SketchUp experience. Sketchup Club features a post on V-Ray for SketchUp, a 3D rendering software that seamlessly integrates with SketchUp. It allows students to create photorealistic visualizations.
5	https://slidesgo.com/interior-design	Slides go offers a collection of Interior Design Google Slides & PPT Templates that cater to both designers and amateur decorators. Whether students are passionate about tidiness, attuned to visual aesthetics, or simply create home decorating, these templates are designed to inspire and enhance interior design presentations.

Note :

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

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WORKING DRAWING **Course Code : 324003**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Fourth**
Course Title	**: WORKING DRAWING**
Course Code	**: 324003**

I. RATIONALE

The aim of this course is to introduce working drawings and their significance in the construction of buildings, furniture designs & interior design and decoration. Students will learn the essential components of working drawings like technical indications, annotation systems, styles and drawing standards. Student will be able to develop and convert the intent of an architectural design, interior space design into a set of drawings and documents that are technically correct and complete for work execution on site.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Prepare the working drawings & documents so as to explain properly the architectural, interior space design decisions to the executing agencies.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Identify different components of working drawings, information denoting styles in graphical & annotative manner.
- CO2 - Apply the design & technical information on plans & layouts to be sent on site for execution.
- CO3 - Apply the design & technical information on sections & elevations to be sent on site for execution.
- CO4 - Use the knowledge & technical information about building services and incorporate it in the service layout drawings for execution.
- CO5 - Explain the various working details on execution drawings

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	
324003	WORKING DRAWING	WDR	DSC	2	-	2	2	6	3	-	-	-	-	-	50	20	50@	20	25	10	125

WORKING DRAWING **Course Code : 324003**

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 purpose of Working drawings, their importance in execution of any design. Get acquainted with different stages and components of working drawing set to be issued to site. TLO 1.2 Collect and study any actual working drawing set of any live / already built project from any site or practicing architect.	**Unit - I Introduction to Working Drawing** 1.1 Components of working drawing set, drawing names, their specific purpose on site, the information given in the drawings, universal indications and annotations to be used in working drawings. 1.2 Working drawing sets copy issued on site by architects showing different styles and methods used to convey the architectural information.	Lecture Using Chalk-Board/ White board, Presentations & class discussions, Display of actual GFC drawings, Collaborative learning, Drawing collection from live site / Practicing Architect and discussion on it in the class
2	TLO 2.1 Draw building envelope using diagonal and coordinate Method TLO 2.2 Identify vertical structural members of the structure and their exact positioning in the drawing. TLO 2.3 Draw the floor plans showing important building elements & annotating the spaces. TLO 2.4 Locate existing structural elements on site & proposed changes in any of them as per design approved by client. TLO 2.5 Prepare interior design layouts (Plans) of the project with proper indications and annotations.	**Unit - II Working Drawings (Plans & Layouts)** 2.1 Building outline (setting out plan) properly annotated with respect to Site Boundary 2.2 Center line plan of the project with reference to the setting out plan 2.3 Floor Plan Drawing with important building elements like walls, columns, doors, windows, projections, weather protections, claddings. 2.4 Existing floor plan & proposed changes in any of them as per design. 2.5 Interior Furniture layouts, False ceiling layout & electrical layout.	White board / Chalk-board explainations, Video Demonstrations, Studio discussions,

WORKING DRAWING **Course Code : 324003**

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 purpose and significance of sectional drawings & the information given through them on site. TLO 3.2 Incorporate the different information through the drawings of whole and part detail sections of the given project. TLO 3.3 Explain the purpose & information denoted in the building elevations. TLO 3.4 Prepare the schedule of openings and finishes.	**Unit - III Working Drawings (Sections & Elevations)** 3.1 Sections through important areas of the project with required information and annotations. 3.2 Full sections and Part detail sections of the building showing civil elements, finishes and annotations. 3.3 All sides building elevations with proper annotations, levels & finishes indications. 3.4 Door & windows schedule with sizes, levels, types, finishes etc.	Lecture Using Chalk-Board, Presentations, Collaborative learning
4	TLO 4.1 Explain water supply and sewer systems at Site Level & Building Level. TLO 4.2 Prepare the drawings of toilet details showing water supply & drainage systems, sanitary fixtures details etc. TLO 4.3 Explain electrical & lighting systems at Site Level & Building Level TLO 4.4 Explain HVAC systems at Site Level & Building Level TLO 4.5 Explain Fire fighting systems at Site Level & Building Level	**Unit - IV Building Services Details** 4.1 Water supply and Drainage layouts at Site Level & Building Level. 4.2 Water supply and drainage layouts of toilets and sanitary fixing details. 4.3 Electrical & Lighting layouts at Site Level & Building Level. 4.4 HVAC Layouts at Site Level & Building Level 4.5 Fire fignting Layouts at Site Level & Building Level	Video Demonstrations, Case Study, Lecture Using Chalk-Board, Collaborative learning
5	TLO 5.1 Explain the standard details of various architectural components like window framings, kitchen platforms, staircase finishes, railings and other fixtures. TLO 5.2 Explore various flooring materials (such as natural stones, tiles, hardwood, vinyl, etc.), their technical specifications & characteristics like durability, slip resistance, and maintenance. TLO 5.3 Explain how to represent wall finishes, dado (lower wall cladding), and decorative elements. TLO 5.4 Explain the importance of sectional/elevational details & external/ Internal fenestration details.	**Unit - V Building Component Details** 5.1 Drawing set of details of various architectural components like window framings, kitchen platforms, staircase finishes, railings and other fixtures. 5.2 Flooring layouts showing different laying patterns (e.g., herringbone, diagonal, straight) for aesthetic and functional purposes. 5.3 Wall finishes drawings and sectional details showing different finishes, dado, cladding, and decorative elements. 5.4 external & Internal fenestration sections & sectional & elevational details at bigger scales. 5.5 Elevation drawings mentioning finishes, color codes etc.	Classroom Lecture, Presentations, Collaborative learning

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

WORKING DRAWING **Course Code : 324003**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Analyze the working drawings collected from the industry and reproduce showing different elements.	1	Analysis of different working drawings collected from the Industry.	2	CO1
LLO 2.1 Prepare the Site plan with building outline of the given project with proper origin point, all required measurements & annotations.	2	Site plan preparation of a given project.	2	CO2
LLO 3.1 Prepare the Center line plan of the given project showing all vertical structural members, all required measurements & annotations.	3	*Center line plan preparation of a given project.	2	CO2
LLO 4.1 Prepare the working floor plan of the given project showing all civil components, all required measurements & annotations.	4	*Working floor plans preparation of the given project.	2	CO2
LLO 5.1 Prepare the furniture layout plan of the given project showing all proposed furniture units, all required measurements & annotations.	5	Furniture layout plans preparation of the given project.	2	CO2
LLO 6.1 Prepare the false ceiling layout plan of the given project showing all proposed false ceilings, all required measurements, annotations & construction details.	6	False ceiling layout plans preparation of the given project.	2	CO2
LLO 7.1 Prepare the electrical layout plan of the given project showing all electrical fitting components, all required measurements, annotations & fixing details.	7	*Electrical layout plans preparation of the given project.	2	CO2
LLO 8.1 Prepare minimum 2 cross sections of the given project, showing important details, all required measurements, annotations.	8	*Cross sections preparation of the given project.	2	CO3
LLO 9.1 Prepare Elevations of the given project, showing important levels, all required measurements and annotations.	9	*Elevations of the given project.	2	CO3
LLO 10.1 Prepare water supply and Drainage layouts at site Level & building Level, all required measurements, annotations & details.	10	Water supply and drainage layout preparation of the given project.	2	CO4
LLO 11.1 Prepare Electrical & lighting layouts at site Level & building Level, all required measurements, annotations & details.	11	Electrical & lighting layout preparation of the given project.	2	CO4
LLO 12.1 Prepare flooring layouts showing start tile, all required measurements, annotations & details.	12	Flooring layout preparation of the given project.	2	CO5
LLO 13.1 Prepare Toilet details with all sanitary fittings, fixtures, tiling layouts, dado, all required measurements, annotations & details.	13	*Toilet detail drawings preparation of the given project.	2	CO5
LLO 14.1 Prepare Kitchen platform details with all materials, fixing details, dado, all required measurements, annotations & details.	14	Kitchen platform details preparation of the given project.	2	CO5
LLO 15.1 Prepare 'wardrobe' working details with all materials, hardware, fixing details, finishes, all required measurements & annotations.	15	Furniture unit 'Wardrobe' working details preparation of the given project.	2	CO5

WORKING DRAWING **Course Code : 324003**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 16.1 Prepare 'TV unit with paneling' working details with all materials, hardware, fixing details, finishes, all required measurements & annotations.	16	Furniture unit 'TV unit with paneling' working details preparation of the given project.	2	CO5
LLO 17.1 Prepare 'Bed with side tables' working details with all materials, hardware, fixing details, finishes, all required measurements & annotations.	17	Furniture unit 'Bed with side tables' working details preparation of the given project.	2	CO5
LLO 18.1 Furniture unit 'Sofa' working details preparation of the given project.	18	Prepare 'Sofa' working details with all materials, hardware, fixing details, finishes, all required measurements & annotations.	2	CO5

Note : Out of above suggestive LLOs -

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

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

Assignment

- Study of Fire fighting systems: Visiting site to understand services & collecting a service drawing set (Fire fighting) of existing / on going project prepared by industry expert / practicing professional. Understanding the technical and practical aspects of those drawings and creating a report including photos, sketches, drawings and information brochures.
- Study of HVAC systems: Visiting site to understand services & collecting a service drawing set (HVAC) of existing / on going project prepared by industry expert / practicing professional. Understanding the technical and practical aspects of those drawings and creating a report including photos, sketches, drawings, information brochures.
- Case study: Case study of an existing project to understand working details, materials, finishes and fixing techniques.
- Documentation of Building facade details: Visiting, understanding & analyzing an existing building facade with materials, finishes, characteristics, fixing details etc. Preparation of report with detail sketches, site photos and relevant technical information.

Micro project

- Market survey: Visiting various vendors, suppliers and shops for study of various building materials to understand their technical specifications and requirements.
- Market survey 2: Visiting various vendors, suppliers and shops for study of various Interior finishing materials to understand their technical specifications and requirements.

WORKING DRAWING **Course Code : 324003**

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	LCD projector & white screen for projection, CPU connected to Projector system/ smart board. 2. A1 drafting board and all drafting tools. 3.Computer loaded with required drafting & modelling softwares eg. Auto CAD, Sketchup. 4. A1 plotter or printer facility for student.	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	Introduction to Working Drawing	CO1	2	0	0	0	0
2	II	Working Drawings (Plans & Layouts)	CO2	8	0	0	0	0
3	III	Working Drawings (Sections & Elevations)	CO3	8	0	0	0	0
4	IV	Building Services Details	CO4	6	0	0	0	0
5	V	Building Component Details	CO5	6	0	0	0	0
Grand Total				**30**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Continuous assessment based on Drawing assignment submissions, Site visit reports & Teamwork presentations done throughout the semester..

Summative Assessment (Assessment of Learning)

- Internal Viva on the Drawing set Portfolio prepared during the semester.

XI. SUGGESTED COS - POS MATRIX FORM

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WORKING DRAWING **Course Code : 324003**

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	1	-	-	2	2			
CO2	3	3	1	1	-	2	2			
CO3	3	3	1	1	-	2	2			
CO4	3	3	1	1	-	2	2			
CO5	3	3	1	1	-	2	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	Keith Styles	Working Drawings Handbook	978-0851397122
2	Ralph W. Liebing	Architecture Working Drawings	John Wiley & Sons 978-0471348764
3	Fred Stitt	Working Drawing Manual	978-0070615540

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.behance.net/search/projects/working%20drawings	Drawings for execution, estimating costing, shop drawings for specialized jobs, information related to sizes of structural members, material representation drawing discipline for coordination sets of drawing .
2	https://quifstudio.com/2022/11/14/episode-2-site-plan-working-drawings/	Architecture working drawing , Standard symbol and annotations in working drawing,
3	https://design40.com/blog/2022/08/10/interior-design-drawing/	Working drawings are also called as GFC - Good For Construction drawings as they are basically approval drawings which are break down in details for execution.

Note :

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

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ESTIMATING & COSTING **Course Code : 324301**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Fourth**
Course Title	**: ESTIMATING & COSTING**
Course Code	**: 324301**

I. RATIONALE

This course aims to equip the students to apply the knowledge and skills for calculating the quantities, cost of materials, labour and tools required for Architectural / Interior design project. It is often required to use local material for which the rates are varying in greater extent across the country. The rate analysis justifies the rates to be finalized for various items of works based on local market survey for budget provision. Additionally, it incorporates the use of various software tools for precise and efficient quantity determination.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Calculate the Quantities and Estimated Project Cost for an Architecture / Interior Design Project.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - Apply the principles of estimating & costing for different specifications relevant to the Architectural / Interior Design Project.
- CO2 - Calculate quantities and cost for items of works relevant to the Architectural / Interior Design Project.
- CO3 - Calculate rates for an item of work using the rate analysis process relevant to the Architectural / Interior Design Project.
- CO4 - Select appropriate type of tenders, contracts relevant to the Architectural / Interior Design Project.
- CO5 - Use relevant software for estimating the quantities and cost of items of works relevant to the Architectural / Interior Design Project.

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	
324301	ESTIMATING & COSTING	EST	VEC	3	1	2	-	6	3	03	30	70	100	40	25	10	-	-	-	-	125

ESTIMATING & COSTING **Course Code : 324301**

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 principles of estimation and mode of measurement. TLO 1.2 Classify the estimate as relevant to the Architectural / Interior design project. TLO 1.3 Select the rates provided in SSR for appropriate items of work as relevant to the Architectural / Interior design project. TLO 1.4 Interpret the given drawing / information to prepare estimate.	**Unit - I Estimating, Costing and Specification** 1.1 Introduction to estimation, costing and mode of measurement specific to an Architectural / Interior design project. 1.2 Types of estimate, Use guidelines of IS 1200 for estimation. 1.3 Introduction to State Scheduled of Rates (SSR) for the cost estimation. 1.4 Drawing /information required for preparation of estimates.	Demonstration, Video Demonstrations, Presentations, Lecture Using Chalk-Board
2	TLO 2.1 Explain the items of work as they relate to the architectural / interior design project. TLO 2.2 Describe the measurement sheet. TLO 2.3 Explain various methods for calculations of quantities for an item of work. TLO 2.4 Calculate the quantities for the Civil / Interior work as they relate to the Architectural / Interior design project.	**Unit - II Estimation of Civil / Interior Work** 2.1 Items of works specific to an Architectural / Interior design project. 2.2 Introduction to measurement sheet. 2.3 Methods for calculations of quantities. 2.4 Estimation of quantities for the Civil / Interior work.	Demonstration, Video Demonstrations, Presentations, Lecture Using Chalk-Board
3	TLO 3.1 Explain the rate analysis. TLO 3.2 Apply the process of rate analysis for an item of work. TLO 3.3 Describe the types of work, task work and wages for different types of labour. TLO 3.4 Calculate rates for an item of work as they relate to the Architectural / Interior design project.	**Unit - III Rate Analysis** 3.1 Terminologies, purpose and factors affecting analysis of rates. 3.2 Procedure of rate analysis. 3.3 Types of labours, task work, wages for labourers as per SSR. 3.4 Rate analysis for important items of work specific to an Architectural / Interior Design Project.	Demonstration, Video Demonstrations, Presentations, Lecture Using Chalk-Board

ESTIMATING & COSTING **Course Code : 324301**

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 Explain the process of tendering. TLO 4.2 Classify the tenders TLO 4.3 Prepare the tender documents TLO 4.4 Describe the process of E-tendering TLO 4.5 Describe the types of contracts	**Unit - IV Tenders and Contracts** 4.1 Terminologies, purpose and process of tendering 4.2 Types of tenders 4.3 Contents of tender document 4.4 E-tendering process 4.5 Types of contracts	Demonstration, Video Demonstrations, Lecture Using Chalk-Board, Presentations
5	TLO 5.1 Use the relevant software for preparing the detailed estimate for a given work. TLO 5.2 Introduction to BIM (Building Information Modeling) for quantity, estimation and costing for given project.	**Unit - V Estimation using E-Tools** 5.1 Use the computer / softwares / programmers for detailed estimate preparation of works. 5.2 Use the softwares for detailed estimate preparation of works.	Demonstration, 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 Prepare the check list of items to be executed with units for detailed estimate of the given structure from the given drawing.	1	Preparation of check list of items to be executed	2	CO1
LLO 2.1 Determine a report on market rates for given material, labour wages, hire charges of tools & equipment required to construct the given structure.	2	Preparation of report on market Survey	2	CO1
LLO 3.1 Prepare the detailed specification for the given items using DSR (for any ten items)	3	Elaborate specification for the given items*	2	CO1
LLO 4.1 Enlist the information required / types of drawings to be prepared for the process of estimating and costing.	4	Analyze the drawings to be prepared / information to be collected for the estimation*	4	CO1
LLO 5.1 Enlist items of work required for an Architectural / Interior design project.	5	Analyze items of works.	4	CO2
LLO 6.1 Prepare a measurement sheet for an Architectural / Interior design project.	6	Outline measurement sheet*	2	CO2
LLO 7.1 Prepare a report on methods of estimation for an Architectural / Interior design project.	7	Preparation of report on methods of estimation.	2	CO2
LLO 8.1 Prepare detailed estimates for an Architectural / Interior design project.	8	Calculation of quantities of items of work*	4	CO2
LLO 9.1 Perform rate analysis for a given architectural / interior design project.	9	Describes the analysis of rates*	4	CO3
LLO 10.1 Prepare a report on types of labour required for an Architectural / Interior design project.	10	Report on types of labour required for a given project.	2	CO3
LLO 11.1 Determine the labourers required for an Architectural / Interior design project.	11	Task work of different types of labour	2	CO3
LLO 12.1 Prepare a report on market rates for different types of labour required for an Architectural / Interior design project	12	Report on market rate for different types of labour required for a given project	2	CO3
LLO 13.1 Analyze rates of items of work for an Architectural / Interior design project.	13	Calculation of rates of important items of work for a given project*	4	CO3
LLO 14.1 Classify the different type of tender for an Architectural / Interior design project.	14	Types of tender*	2	CO4
LLO 15.1 Classify the different type of contract for an Architectural / Interior design project.	15	Types of contract.	2	CO4

ESTIMATING & COSTING **Course Code : 324301**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 16.1 Identify different E-tools of Estimation required for an Architectural / Interior design project.	16	E-tools of Estimation	2	CO5
LLO 17.1 Operate and practice E-tool software of estimation for given Architectural / Interior design project.	17	Operation of E-tool of Estimation.	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

- Assignment on rate analysis.

Micro project

- Prepare bill of quantities using software.
- Prepare detailed Estimate of an Architectural /Interior work.
- Prepare rate analysis of an Architectural /Interior work.

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	MS Excel, PRISM, Rebarman – Reinforcement Bar Management Software, BIM tool etc.	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	Estimating, Costing and Specification	CO1	8	2	4	8	14
2	II	Estimation of Civil / Interior Work	CO2	12	4	4	10	18
3	III	Rate Analysis	CO3	12	2	6	10	18
4	IV	Tenders and Contracts	CO4	9	2	6	6	14

ESTIMATING & COSTING **Course Code : 324301**

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
5	V	Estimation using E-Tools	CO5	4	2	2	2	6
Grand Total				**45**	**12**	**22**	**36**	**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)

- Nil

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	-	-	-	-	3			
CO2	3	3	3	3	3	3	3			
CO3	3	3	3	3	3	3	3			
CO4	3	3	1	3	3	3	2			
CO5	3	2	2	3	3	3	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	Datta B. N.	Estimating and Costing	UBS Publishers Distributors Pvt. Ltd. New Delhi ISBN:978817476725
2	Peurifoy, Rebort l., Oberlender, Garold	Estimating and Construction Cost (Fifth Edition)	Mcgraw Hill Educaion, New Delhi. ISBN-13:9780073398013
3	Birdie G. S.	Estimating and Costing	Dhanpat Rai Publishing Company Ltd. New Delhi ISBN:9789384378134
4	Patil B. S.	Civil Engineering Contracts and Estimates	Orient Longman Mumbai ISBN: 97881737715594
5	Chakraborti M.	Estimating and Costing, Specification and Valuation in Civil Engineering	Monojit Chakraborti, Kolkata ISBN:9788185304366

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	http://www.ensoftindia.com/	Required Software's are available
2	https://newtonindia.com/	Providing Innovative Software Solutions
3	https:\mahatenders.gov.in, www.mahapwd.com	Tender Related Information

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ESTIMATING & COSTING **Course Code : 324301**

Sr.No	Link / Portal	Description

Note :

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

MSBTE Approval Dt. 21/11/2024 **Semester - 4, K Scheme**

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BUILDING CONSTRUCTION & TECHNOLOGY **Course Code : 324302**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Fourth**
Course Title	**: BUILDING CONSTRUCTION & TECHNOLOGY**
Course Code	**: 324302**

I. RATIONALE

In the Building Construction & Technology course, students will acquire understanding of material properties and behaviors, along with their testing methods. They will explore various construction techniques, applying both time-honored and innovative scientific methods to diverse building types. This knowledge base will pave way for mastering advanced technologies and construction methods, enabling them to skillfully manage field construction, maintenance, and repair work. With these skills, students will be equipped to oversee construction projects, ensuring they meet high-quality standards. The Advanced Construction Technology segment further enhances their proficiency, focusing on the operation and effectiveness of cutting-edge construction equipment, fostering their ability to select the appropriate tools and methods for efficient construction processes.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Apply modern construction techniques and practices 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 different components of retaining wall, types of foundation, different waterproofing treatments and finishes for single basement structure.
- CO2 - Explain building assembly with Stanchion, Beams, Metal Deck Flooring, various structural steel members and connections for multi-Storey buildings.
- CO3 - Identify components of different types of steel trusses for a given building structure.
- CO4 - Explain different types of wall cladding and glazing for a given building structure.
- CO5 - Use different types of plants, advanced tools and machineries in building construction Industry.
- CO6 - Apply different steps involved in maintenance and demolition work of a building.

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	
324302	BUILDING CONSTRUCTION & TECHNOLOGY	BTE	DSC	2	-	4	-	6	3	4	30	70	100	40	25	10	25@	10	-	-	150

BUILDING CONSTRUCTION & TECHNOLOGY **Course Code : 324302**

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 Evaluate the engineering principles that govern the stability and durability of single basements and retaining walls. TLO 1.2 Apply design knowledge to create effective single basement spaces and retaining walls, considering factors like soil pressure, water table, and load distribution. TLO 1.3 Identify and choose appropriate materials for construction that ensure longevity and resistance to environmental stresses. TLO 1.4 Master the construction methods specific to basements and retaining walls, including waterproofing, drainage systems, and reinforcement strategies. TLO 1.5 Explain the safety protocols and maintenance requirements to preserve the structural health of basements and retaining walls over time.	**Unit - I Single basement structure** 1.1 Engineering principles that ensure the stability and durability of underground structures. Study real-world case studies to understand the challenges. 1.2 Sngle basements and retaining walls by considering soil mechanics, hydrostatic pressure, and load distribution. Use simulation software to model different scenarios and their impact on design efficacy. 1.3 Properties of construction materials suitable for subterranean use and their long-term performance. Compare traditional and modern materials through hands-on laboratory testing. 1.4 Latest construction methods for basements and retaining walls. Implement waterproofing, install drainage systems, and apply reinforcement strategies in a controlled environment. 1.5 Regular maintenance and the safety protocols necessary to ensure the longevity of structures. Participate in workshops focused on inspection techniques and preventive measures for basements and retaining walls.	Case Study, Presentations

BUILDING CONSTRUCTION & TECHNOLOGY **Course Code : 324302**

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 design criteria, including the Allowable Stress Design (ASD) and Load and Resistance Factor Design (LRFD) philosophy for structural steel. TLO 2.2 Explain the structural properties of steel and its designation according to Indian Standards. TLO 2.3 Design various structural steel members and connections for multi-Storey buildings	**Unit - II Steel Structures** 2.1 Tension members, compression members (columns), built-up sections, beams (flexural members), and plate girders. 2.2 Various types of bolted and welded connections for structural steel components. 2.3 single and double angle section struts and I-section compression members. 2.4 Types of trusses, their components, and usability. 2.5 Connection between purlins and roof covering in truss systems. 2.6 Principles, procedures, and codal requirements to analyze and design tension members, compression members, bases, beams, and connections. 2.7 Latest developments in steel structures, including considerations for sustainability and environmental impact.	Video Demonstrations, Case Study, Presentations
3	TLO 3.1 Explain the purpose of building cladding and its role in protecting structures from external elements. TLO 3.2 Apply design principles to select appropriate cladding materials based on factors like aesthetics, durability, insulation, and maintenance. TLO 3.3 Explain proper installation techniques for cladding materials, including weatherproofing, fastening, and joint detailing.	**Unit - III Building Cladding and Glazing** 3.1 Types of cladding materials (such as metal, stone, glass, or composite panels) and their properties. Analyze the advantages and disadvantages of various cladding systems. 3.2 Impact of cladding on energy efficiency, thermal performance, and overall building sustainability. Evaluate the compatibility of cladding systems with the architectural design and structural requirements. 3.3 Maintenance requirements for cladding and glazing systems to ensure long-term functionality and aesthetics. Address common challenges related to water infiltration, condensation, and material degradation. 3.4 Stick systems involved in assembling the curtain wall frame (mullions) and glass or opaque panels piece by piece on-site. 3.5 Importance of proper installation techniques for achieving a weather-tight and structurally sound curtain wall. advantages and disadvantages of both interior and exterior glazed curtain wall systems. 3.6 Structural behaviour of curtain wall. 3.7 Role of curtain walls in shaping building aesthetics, energy efficiency, and occupant comfort.	Site/Industry Visit, Case Study, Video Demonstrations

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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 State all advanced machinery used in construction industry. TLO 4.2 State all advanced plants and equipments used in construction. TLO 4.3 Differentiate between the Earth moving and hauling equipments TLO 4.4 Explain with sketch all advanced plants and equipments used in construction.	**Unit - IV Advanced Machinery, Plants and Equipments.** 4.1 Earth moving machineries, Handling, Hoisting, Conveying, Pumping, Compacting, Pile driving, Drilling equipments, Plants for Grouting, Guniting and Hot Mix Plant, Concrete Mix Plant, Ready Mix Plant, etc. 4.2 List factors affecting the selection of equipments depending on the various parameters. 4.3 Equipments for excavation like Power Shovel, drag line, Calm Shell, Scoop, Trenching equipments, Wheel mounted belt loaders. Equipments for Earth moving equipments like Tractors, Boulders, Graders, Scrapers, Rippers, etc 4.4 Conveying equipments like Belt conveyors, Buckets, Chutes 4.5 Pumping equipments like Water pumps and concrete pumps. 4.6 Vibrators for concrete consolidation like Internal, Surface, Platform and form vibrators.	Case Study, Site/Industry Visit
5	TLO 5.1 Choose the flooring material for the given type of building with justification. TLO 5.2 Explain the procedure for laying and construction of given type of door. TLO 5.3 Describe the procedure of Plastering and pointing for Use given type of construction. TLO 5.4 Select the relevant type of paint material(s) to be used for the given type of building surface proofing and damp proofing or the given type of building construction. TLO 5.5 Describe safe practices to be used during the construction of the given type of building.	**Unit - V Building Maintainance** 5.1 Cracks : Causes and Types of Cracks. Identification and Repair of Cracks. Grouting and Guniting. 5.2 Settlement of Foundation: Types, Causes and Remedial measures. 5.3 Demolition: Necessity, Method of Demolition-Hand Demolition, Machine Demolition, Controlled Blasting. Demolition Implosion, Precautions During Demolition 5.4 Water Proofing: Necessity and importance. Material used for Water Proofing, Non conventional method of water proofing- Introduction of crystalline water proofing, cement base polymer' coatings. conventional water proofing methods-brick bat coba waterproofing, Box type water Proofing, Injection/grouting. Plinth Protection necessity and material used, Damp Proof Course.	Case Study, Presentations, 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 drawing of a retaining wall for a single basement structure to a suitable scale indicating the details of a retaining wall for a given building structure.	1	*Preparation of drawing of a retaining wall for a basement.	4	CO1
LLO 2.1 Prepare detail drawing indicating drainage system of a basement to a suitable scale for a given building structure.	2	Preparation of drawing of a drainage system of a single basement structure.	4	CO1

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 3.1 Prepare a drawing of a retaining wall for a single basement structure to a suitable scale indicating the details of a retaining wall for a given building structure.	3	preparation of drawing of a retaining wall for a basement.	2	CO1
LLO 4.1 Prepare detail drawing indicating drainage system of a basement to a suitable scale for a given building structure.	4	*Preparation of drawing of a drainage system of a single basement structure.	2	CO1
LLO 5.1 Prepare a report on different waterproofing treatments and materials for a given basement structure	5	Preparation of report on a waterproofing of a basement.	4	CO1
LLO 6.1 Prepare a report on safety protocols and maintainance requirements to preserve the structural health of a basement and retaining walls over time.	6	*Preparation of report on safety protocol of a single basement structure.	4	CO1
LLO 7.1 Prepare sketches of different types of steel trusses used in building construction	7	Preparation of sketches of different types of steel trusses.	2	CO2 CO3
LLO 8.1 Prepare a drawing of North light truss indicating its components and joinery details.	8	Preparation of a drawing of a North Light Truss.	2	CO2 CO3
LLO 9.1 Prepare sketch of multistorey steel frame building assembly with stanchion, beams and metal deck	9	Preparation of sketches for a multistorey steel building.	2	CO2 CO3
LLO 10.1 Prepare a report on different wall cladding materials available in market for a given building structure.	10	Preparation of report on wall cladding material of a building.	2	CO4
LLO 11.1 Prepare a report on different wall cladding adhesives available in market	11	Preparation of report on wall cladding adhesives of a building	2	CO4
LLO 12.1 Prepare a report on different wall curtain material available in market for a given building structure.	12	Preparation of report of structural glazing of a building	2	CO4
LLO 13.1 Prepare a report on advanced tools used in building construction industry.	13	Preparation of report on advanced tools in building construction.	2	CO5
LLO 14.1 Prepare a report on advanced plants and machineries used in building construction industry.	14	Preparation of report on advanced plants and machineries in building construction.	2	CO5
LLO 15.1 Prepare a report on water pumps and concrete pumps used in building construction industry.	15	Preparation of reports of water pumps used in construction.	2	CO5
LLO 16.1 Prepare a report on different steps involved in maintenance and demolition of a given building structure.	16	Preparation of report on steps involved in a maintenance and demolition work of a given building structure.	2	CO6
LLO 17.1 Prepare the sketches of different tools and equipments used in demolition work for a given building structure.	17	Preparation of report on demolition of a given building structure.	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)

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Assignment

- Site visit to building typologies included in curriculum and preparation of report along with presentation.

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	Measuring Tape, Drawing Board, Drafting Tolls, Microsoft Office,	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	Single basement structure	CO1	6	3	6	6	15
2	II	Steel Structures	CO2,CO3	8	4	5	6	15
3	III	Building Cladding and Glazing	CO4	4	4	4	6	14
4	IV	Advanced Machinery, Plants and Equipments.	CO5	6	4	3	6	13
5	V	Building Maintainance	CO6	6	3	4	6	13
Grand Total				**30**	**18**	**22**	**30**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Term work (Lab Manual and drawing sheet), Question and Answers in class room as well as at the time of Practical. Note: Each practical will be assessed considering 60% weightage to process related and 40 % weightage to product related.

Summative Assessment (Assessment of Learning)

- Laboratory Performance, Unit Tests , Midterm Exam, Self-learning, Term Work, Seminar/Presentations.

XI. SUGGESTED COS - POS MATRIX FORM

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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	3	2	2	2	3	3			
CO2	2	2	2	2	2	2	3			
CO3	2	2	2	2	2	2	3			
CO4	2	2	3	2	3	2	2			
CO5	2	1	2	3	1	3	2			
CO6	2	3	2	2	2	2	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	S.P. Arora and Bindra	Building Construction	Dhanpat Rai Publication, Delhi Edition 2013.ISBN: 9788189928803
2	Francis D.K. Ching.	Building construction iIlustrated	Wiley India,USA, 2014,ISBN: 978-1- 118- 45834-1
3	S.C.Rangawala	Building Construction	Chariotar Publication,Dist-Anand ISBN-13 : ? 978-9385039041
4	B. C.Punmia and A.K Jain	Building Construction	Frewall Media, 2005 ISBN 9788170080534
5	S.S.Bhavikatti	Building Construction	Vikas Publication House Pvt. Ltd., New Delhi (ISBN: 978-93259-6079-4 1
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://youtu.be/J6qNbQ2h4Xk	MCQs of Building Construction
2	https://www.buildofy.com/home-design	Independent media firm that broadcast architecture films and eBooks of amazing houses in India.
3	https://www.gujaratguardianglass.com/in/en/our-glass/modigua rd	MODIGUARD® brings to your innovative interior glass solutions that add character to your design project with enamouring reflections and flawless colour neutrality.
4	https://www.saint-gobain.co.in	The worldwide leader for Habitat, mainly for new residential construction and renovation

Note :

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