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

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

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Draw 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
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

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

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

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
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

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

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

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

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

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

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

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

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

Note : Out of above suggestive LLOs -

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

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

Assignment

- 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

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 l
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

Sr.No	Link / Portal	Description
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

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												Total Marks
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
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.

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

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 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
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

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 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
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

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

DISASTER MANAGEMENT **Course Code : 324303**

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

Programme Code : AA/ AT/ IX/ IZ

Semester : Fourth

Course Title : DISASTER MANAGEMENT

Course Code : 324303

I. RATIONALE

Disaster management plays an integral role in keeping communities safe. It involves coordinating resources, such as risk management control systems, and responsibilities, such as following best practice policies, needed to prevent, prepare for, respond to and recover from emergencies. This course aims to make students aware of various types of disasters, mitigation, rescue, and relief operations.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Apply the principles of disaster management for disaster risk reduction in case of any natural or manmade disaster.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

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

- CO1 - EXPLAIN VARIOUS TYPES OF DISASTERS.
- CO2 - APPLY THE PRINCIPLES OF DISASTER RISK REDUCTION (DRR).
- CO3 - EXPLAIN THE HIERARCHY OF DISASTER MITIGATION AND MANAGEMENT.
- CO4 - EXPLAIN DISASTER RISK MANAGEMENT IN INDIA .
- CO5 - PREPARE A CASE STUDY REPORT ON DISASTER RELATED TOPICS.

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	
324303	DISASTER MANAGEMENT	ELC	DSE	3	-	2	1	6	3	03	30	70	100	40	25	10	25@	10	25	10	175

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 Natural Disaster. TLO 1.2 Describe manmade Disaster.	**Unit - I TYPES OF DISASTERS** 1.1 Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc. – Classification, Causes, Impacts including social, economical, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability – Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Do's and Don‘ts during various types of Disasters. 1.2 Definition: Types of Manmade disasters – Fire, Industry, Terrorist, Crowd hazards, Dos and Don‘ts during various types of Disasters.	Video Demonstrations, Presentations, Collaborative learning, Case Study, Lecture Using Chalk-Board
2	TLO 2.1 Describe Disaster Management cycle – Phases, Culture of safety, prevention, Mitigation. TLO 2.2 Various stake holder or preparedness in disaster.	**Unit - II DISASTER RISK REDUCTION (DRR)** 2.1 Various stages of disaster inter related to each other. 2.2 Preparation for disaster reduction before / during / after.	Case Study, Presentations, Collaborative learning, Video Demonstrations

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 Describe Roles and responsibilities of Urban and Local Bodies of state and national levels. TLO 3.2 Describe Community level and various NGO'S contribution. TLO 3.3 Explain Early Warning System – Advisories from Appropriate Agencies.	**Unit - III HIERARCHY OF DISASTER MITIGATION AND MANAGEMENT** 3.1 Awareness about the various authorities responsible for mitigation in disaster. 3.2 Awareness about the various Community level and various NGO'S contribution in disaster. 3.3 Awareness about Early Warning System – stake-holders-Institutional Processess and Advisories from Appropriate Agencies.	Presentations, Video Demonstrations, Collaborative learning, Lecture Using Chalk-Board
4	TLO 4.1 Describe 'Bhuj' (Gujrat, India) earthquake 2001-highlights and case study. TLO 4.2 Explain Landslides in Uttarakhand (India) 16 June 2013. TLO 4.3 Explain Terrorist attack Mumbai 26th November 2008.	**Unit - IV DISASTER RISK MANAGEMENT IN INDIA** 4.1 Preparedness (before during and after) for disaster risk management 4.2 Collection of Data base of releif and rescue. 4.3 Policy for rehabilitation by various authorities.	Video Demonstrations, Case Study, Presentations, Collaborative learning
5	TLO 5.1 Explain the rehabilitation work done during cyclone in Odissa. TLO 5.2 Describe the rehabilitation work done during earthquake in Gujrat.	**Unit - V APPLICATIONS AND FIELD WORK /CASE STUDIES** 5.1 Interaction with Beneficiaries for effective rehabilitation. 5.2 Roles and responsibilities of authorities during disaster.	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 a report on Natural Disaster. LLO 1.2 Prepare a report Manmade Disaster.	1	*Different Types of Natural and Manmade Disaster.	10	CO1 CO2
LLO 2.1 Tutorial based on various stages inter related to each other. 3R-(Relief, Rescue, Rehabilitation). LLO 2.2 Tutorial based on Learning to be prepared before / during / post Disaster.	2	*Tutorial based on Disaster Risk Reduction (DRR).	15	CO1 CO2

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 3.1 Prepare and present a report on various authorities responsible for mitigation in disaster. LLO 3.2 Prepare and present a report on awareness about the various community level and various NGO's contribution in disaster. LLO 3.3 Prepare and present a report on awareness about early warning system, stake holders, Institutional processes and advisories from appropriate agencies.	3	Report writing and presentation.	15	CO1 CO2 CO3
LLO 4.1 Prepare and present a report and a case study on disaster risk management in India case example.	4	*Presentation of case study report.	15	CO1
LLO 5.1 Prepare and present a report on applications and field work/case studies (NDRF).	5	Presentation of case study.	15	CO1

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

- First aid treatment and rescue methods in Disaster.
- Training Workshop By NDRF

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 Disaster rescue equipment's with Disaster management cell in campus. (Rope, Wheel chair, helmet, Oxygen mask, Ropes, bandages, First-aid Kit.	2

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	TYPES OF DISASTERS	CO1,CO2	5	4	2	4	10
2	II	DISASTER RISK REDUCTION (DRR)	CO1,CO2,CO3	10	6	3	6	15
3	III	HIERARCHY OF DISASTER MITIGATION AND MANAGEMENT	CO1,CO2,CO3	10	6	3	6	15
4	IV	DISASTER RISK MANAGEMENT IN INDIA	CO1,CO2,CO3	10	6	3	6	15
5	V	APPLICATIONS AND FIELD WORK /CASE STUDIES	CO1,CO2	10	6	3	6	15
Grand Total				**45**	**28**	**14**	**28**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Tutorials based on CO2 (30 MARKS)

Summative Assessment (Assessment of Learning)

- End semester examination 3 hours (70 marks)

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	0	0	1	0	3			
CO2	3	0	0	2	0	3	3			
CO3	3	0	0	0	2	0	3			
CO4	0	2	2	0	0	3	3			
CO5	0	2	0	0	3	3	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	Singhal J.P.	Disaster Management, Laxmi Publications, 2010	ISBN-10: 9380386427 ISBN-13: 978-9380386423
2	Tushar Bhattacharya	Disaster Science and Management, McGraw Hill India Education Pvt. Ltd., 2012.	. ISBN-10: 1259007367, ISBN-13: 978-1259007361

Sr.No	Author	Title	Publisher with ISBN Number
3	IIT Kanpur	Earthqauke tips IIT Kanpur	9788190613071
4	Dr. Manish Shrikhande	Earthquake Resistance Design of Structures	978-8120328921
5	Dr. Manish Shrikhande	Proceedings of 17th Symposium on Earthquake Engineering	978-9819916078

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.unccd.int/cbm/free-course-disaster-risk-reductio n-and-management	Free Course in Disaster Risk Reduction and Management
2	https://iisdt.in/product/diploma-in-disaster-management/	An ISO Certified Govt. Registered Skill Development Training and Vocational Education Autonomous Organization
3	https://nptel.ac.in/	Natural disasters and their phenomenon

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 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/ 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

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme							Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH	Credits	Paper Duration	Theory			Based on LL & TL Practical				Based on SL		Total Marks
				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	**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	Lecture Using Chalk-Board Presentations

	Sustainable Development Goals in managing the climate change TLO 1.5 Explain the concept of zero carbon-footprint with carbon credit	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)	
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	**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	Lecture Using Chalk-Board Presentations Video

	analysis of the biodiversity hot spot in India TLO 3.5 Explain the need of conservation of biodiversity in the given situation	3.4 SWOT analysis of biodiversity hot spot in India 3.5 Conservations of biodiversity - objects, and laws for conservation of biodiversity	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
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	**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.	Lecture Using Chalk-Board Presentations

	technologies to provide sustainable solutions of an environmental problem TLO 5.4 Explain the role of information technology in environment protection	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	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
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

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												Total Marks
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
324301	ESTIMATING & COSTING	EST	VEC	3	1	2	-	6	3	03	30	70	100	40	25	10	-	-	-	-	125

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

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 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
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

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

ESTIMATING & COSTING **Course Code : 324301**

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

Note :

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

HOUSING **Course Code : 324304**

Programme Name/s	**: Architecture Assistantship/ Architecture/ Interior Design & Decoration/ Interior Design/**
Programme Code	**: AA/ AT/ IX/ IZ**
Semester	**: Fourth**
Course Title	**: HOUSING**
Course Code	**: 324304**

I. RATIONALE

This course aims to equip the students with the knowledge and skills of Housing, covers various aspects such as urban housing challenges, housing policy, affordability issues, sustainable housing solutions and the impact of socio-economic factors on housing. This course aims to equip the students with the knowledge and skills of housing. The course covers various aspects of housing such as urban housing challenges, housing policy, affordability issues, sustainable housing solutions and the impact of socio-economic factors on housing.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Plan and execute housing work as per the needs 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 - Identify different characteristics of housing areas.
- CO2 - Apply principles & elements for housing design.
- CO3 - Implement relevant policies for a housing typology.
- CO4 - Plan various aspects of neighborhood.
- CO5 - Select different construction materials & techniques of housing construction.

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	
324304	HOUSING	ELC	DSE	3	-	2	1	6	3	03	30	70	100	40	25	10	25@	10	25	10	175

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 Describe various housing patterns in India. TLO 1.2 Explain Socio-cultural aspects influencing a housing design. TLO 1.3 Explain roles of housing design based on needs, environmental impact and sustainability.	**Unit - I Introduction of Housing.** 1.1 Introduction and overview of Housing. 1.2 Definition and scope of housing. 1.3 Significances & characteristics of housing design.	Presentations, Lecture Using Chalk-Board, Collaborative learning
2	TLO 2.1 Prepare a report on own house on various principles of housing. TLO 2.2 Explain Importance of elements such as accessibility to site, orientation of site, contours, setbacks, wind flow, drainage, soil condition, Existing flora fauna and building bye laws. TLO 2.3 Prepare one live case study report and one book case study on various typologies on individual bases.	**Unit - II Principles and Elements of housing.** 2.1 Principles – aspects, prospect, privacy, grouping, roominess, furniture requirement, sanitation, flexibility and practical considerations. 2.2 Importance of elements Accessibity to site, orientation of site, contours, setbacks, wind flow, drainage, soil condition & existing flora fauna. 2.3 Theory based examples on Principles and elements.	Presentations, Lecture Using Chalk-Board, Site/Industry Visit

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Prepare list of low cost materials used in building construction TLO 3.2 Prepare a report on different important aspects of housing based on guidelines TLO 3.3 Differentiate housing schemes and categories on the basis of Income groups. TLO 3.4 Prepare a report on different settlement patterns.	**Unit - III Typologies and Policies of housing.** 3.1 Single-family dwellings, Multi-family housing, Affordable housing, Specialized housing (detached, semi-detached, courtyard/patio, Row house, core house & apartment house) 3.2 Definition, Importance & classification of zoning with examples 3.3 Housing schemes for LIG, MIG, EWS, Agencies for housing schemes – MHAHA, HUDCO, CIDCO, PMAY, etc 3.4 Settlement planning pattern, associated forms, typical Vedic village, towns (Dandaka, Nandyavartha etc.), typology of Shelters and civic buildings of ancient architecture in reference to following civilization: Indus Valley, Aryan / Vedic Civilization, Buddhist Architecture, Indo Aryan & Dravidian Architecture.(IKS).	Lecture Using Chalk-Board, Presentations, Collaborative learning
4	TLO 4.1 Prepare layout of ideal Neighbourhood on A3 sheet. TLO 4.2 Prepare report on different concepts of Neighbourhoods.	**Unit - IV Neighbourhood.** 4.1 An ideal Neighbourhood. 4.2 Modern concepts of town planning 4.3 Neighbourhood models of Clarence stein and Clarence A Perry, N.L.Engelhard & Jose Sert.	Presentations, Lecture Using Chalk-Board, Presentations
5	TLO 5.1 Prepare a list of low cost materials used in affordable construction. TLO 5.2 Prepare a report on different aspects of Housing based on guidelines. TLO 5.3 Prepare a case study on urban poor housing, trends and future.	**Unit - V Low cost construction materials and techniques of housing.** 5.1 Introduction and Overview, History of World Affordable Housing. 5.2 Design of affordable Housing, Materials and different Techniques in construction. 5.3 Urban Poor Housing, Trends and Future.	Lecture Using Chalk-Board, 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 types of Housing	1	*Preparation of report on types of Housing as per historical timeline.	2	CO1
LLO 2.1 Prepare a report on scope of Housing in India.	2	*Scope of Housing	2	CO1
LLO 3.1 Prepare a report on different characteristics & significance of housing design.	3	*Characteristics of housing	2	CO1
LLO 4.1 Prepare a report/A3 sheet layout or Draw sketches with notes explaining principles of housing	4	Application of principles of Housing	2	CO2

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 5.1 Draw to suitable scale on A2 size tracing /cartridge sheet, showing various layers of site depicting different elements of housing.	5	Importance of elements of Housing.	2	CO2
LLO 6.1 Prepare presentation on awardee architects housing projects explaining principles and elements of design.	6	Preparation of housing projects of renowned awardees Architects.	2	CO2
LLO 7.1 Prepare a live case study report on Housing project, explaining the principles and elements of design.	7	Preparation of case study of Housing principles and elements.	2	CO2
LLO 8.1 Prepare drawing of own House layout on suitable scale on A2 tracing / cartridge sheet	8	*Preparation of different typology of Housing.	2	CO3
LLO 9.1 Prepare a report on classification of Zoning & its importance.	9	*Classification of zoning.	2	CO3
LLO 10.1 Prepare a report on different typologies (LIG, MIG, HIG & EWS) of housing depending on socio-economic aspects.	10	Categorization of Housings	2	CO3
LLO 11.1 Prepare layout of Ideal Neighborhood using google earth on suitable scale with various requirements of Neighborhood.	11	Ideal Neighborhood planning & their requirements on different scales.	2	CO4
LLO 12.1 Prepare sketches on different concepts of town planning.	12	*Modern concepts of town planning.	2	CO4
LLO 13.1 Prepare a report on Neighborhood models of Clarence Stein, Clarence A Perry, N.L Engelhard & Jose Sert	13	Neighborhood model development.	2	CO4
LLO 14.1 Prepare a report on low cost affordable housing in India.	14	Preparation of comprehensive report on affordable housing	2	CO5
LLO 15.1 Prepare a report on different techniques of construction for low cost housing.	15	Construction techniques of low cost housing.	2	CO5

Note : Out of above suggestive LLOs -

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

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

Micro project

- Prepare a report on neighborhood planning by visiting different sites of a housing schemes.
- Prepare a report on different typologies of housing by visiting different sites of a housing schemes.
- Compare different housing schemes on basis of principles and elements of housing. Visit related departments offering the housing schemes. Prepare a report and present in the class.
- Prepare a physical model of a house based on Vernacular Architectural studies for various climatic zones in India.

Assignment

- Prepare a layout plan showing percentage of land use by visiting a near by housing scheme.

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	Sketch book, computer desktop, Microsoft office, sketching & drafting tools, LCD Projector, drafting board, Plotter or Printer .	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 of Housing.	CO1	5	3	3	4	10
2	II	Principles and Elements of housing.	CO2	10	4	5	6	15
3	III	Typologies and Policies of housing.	CO3	5	3	3	4	10
4	IV	Neighbourhood.	CO4	10	3	5	7	15
5	V	Low cost construction materials and techniques of housing.	CO5	15	5	5	10	20
Grand Total				**45**	**18**	**21**	**31**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Team work, assignment, Micro project (60% weightage to process & 40% weightage to product).

Summative Assessment (Assessment of Learning)

- Pen and paper test (written test), Practical exam, oral exam.

XI. SUGGESTED COS - POS MATRIX FORM

HOUSING **Course Code : 324304**

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	1	0	1	0	2			
CO2	2	2	1	1	2	1	3			
CO3	2	1	2	1	1	1	3			
CO4	2	2	2	2	2	2	2			
CO5	2	3	2	3	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	C.S. Rangwala	Town Planning	Charotar Publishing House Pvt. 8185594813, 9788185594811
2	Brooks. R. G	Site Planning: Environment, Process and development. Michigan	Pearson, 1998 - ISBN 10: 0558421938 ISBN 13: 9780558421939
3	Abir Bandyopadhyay	Town Planning	Books and allied P. Ltd ISBN-13: 978-8187134657 ISBN-10: 8187134658.
4	G.K Hiraskar	Fundamentals of Town Planning	Publisher. Dhanpat Rai Publication ISBN-10. 8189928899; ISBN-13. 978-8189928896

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.academia.edu/31873937/rural development policy and planning lecture notes	Rural development policy and planning lecture
2	https://www.classcentral.com/report/swayam-moocs-course-list /	Courses
3	https://www.homify.sg/ideabooks/2000070/12-cheap-building-materials-for-a-low-costhome	Low Cost building materials
4	https://nptel.ac.in/courses/124106009	Introduction to History of Architecture in India.
5	https://youtu.be/t2bUAfmHG6s?feature=shared	Vernacular Architecture &Traditional Constructional practices

HOUSING **Course Code : 324304**

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

LANDSCAPE DESIGN **Course Code : 324305**

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

Programme Code : AA/ AT/ IX/ IZ

Semester : Fourth

Course Title : LANDSCAPE DESIGN

Course Code : 324305

I. RATIONALE

This course is the art of creating, designing, and planning indoor and outdoor spaces. It aims to equip the students with concepts and principles of landscaping, different landscape styles, plant study, and elements of landscape. It will allow students to embrace landscape design in a manicured and predictable way. Landscape design promotes the improvement of environment.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Apply elements and principles of landscape design, the planning process, ergonomics and anthropometry. The students will be able to appreciate the importance of landscape design and acquire knowledge effectively in the landscape design field.

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 scope and need of landscaping using elements and principles in the given situation.
- CO2 - Suggest various landscape styles for indoor and outdoor spaces.
- CO3 - Identify various types of softscapes.
- CO4 - Suggest various types of hardscapes.
- CO5 - Select the appropriate tools and equipments required for landscaping.

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	
324305	LANDSCAPE DESIGN	ELC	DSE	3	-	2	1	6	3	03	30	70	100	40	25	10	25@	10	25	10	175

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 Describe Landscape design. TLO 1.2 Explain scope of landscape design. TLO 1.3 Explain the need of landscape design. TLO 1.4 Describe different landscape principles. TLO 1.5 Explain different landscape Elements.	**Unit - I Introduction To Landscape Design** 1.1 Introduction to Landscape design. 1.2 Scope of Landscape : Indoor landscape , Outdoor landscape. 1.3 Need of Landscape : Need and necessity,Aesthetics and environment. 1.4 Landscape Principles : Balance , Harmony , Rhythm , Scale , Proportion ,Emphasis etc. 1.5 Elements of Landscape : Color , Texture , Line of sight , form etc.	Video Demonstrations, Lecture Using Chalk-Board, Presentations, Case Study
2	TLO 2.1 Explain different types of feature of English garden style. TLO 2.2 Explain different characteristics of Mughal gardens. TLO 2.3 Explain various elements and principles of Spanish gardens. TLO 2.4 Explain different types and features of Japanese landscape style. TLO 2.5 Explain various characteristics of Chinese Landscape style.	**Unit - II Landscape Styles** 2.1 English Gardens: Introduction, Characteristics, Elements and case studies. 2.2 Mughal Gardens: Introduction, Characteristics, Elements and case studies. 2.3 Spanish Gardens: Introduction, Characteristics, Elements and case studies. 2.4 Japanese Gardens: Introduction, Characteristics, Elements and case studies. 2.5 Chinese Gardens: Introduction, Characteristics, Elements and case studies.	Case Study, Presentations, Video Demonstrations, Lecture Using Chalk-Board, Site/Industry Visit

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Describe Annual, biennials and herbaceous perennials. TLO 3.2 Select various types of Shrubs. TLO 3.3 Differentiate Trees on the basis of their classification. TLO 3.4 Identify the climbers and creepers. TLO 3.5 Identify the cactus and succulents. TLO 3.6 Distinguish between Indoor and Outdoor plants. TLO 3.7 Suggest ornamental plants and bulbous plants for given spaces.	**Unit - III Introduction to Softscape** 3.1 Annual, Biennials and Herbaceous perennials. 3.2 Shrubs: Evergreen Shrubs, Deciduous Shrubs, Flowering Shrubs, Fruit-Bearing Shrubs etc. 3.3 Trees: Flowering, fall foliage, fast growing, evergreen, dwarf trees, etc. 3.4 Climbers and Creepers. 3.5 Cactus and Succulents. 3.6 Indoor and Outdoor plants. 3.7 Ornamental Plants and Bulbous plants.	Lecture Using Chalk-Board Site/Industry Visit Presentations Video Demonstrations
4	TLO 4.1 Describe the hard elements of landscape. TLO 4.2 Suggest the material used for Hardscape.	**Unit - IV Introduction to Hardscape** 4.1 Hard elements of landscape :Paths, Driveways, Fencing, Decking, Patios, Steps, Walls, Sculptures, Gates etc. 4.2 Hardscape Materials: Brick, Gravel, Rock, Concrete, Asphalt, Timber, Metals,Glass etc .	Lecture Using Chalk-Board Presentations Site/Industry Visit
5	TLO 5.1 List the hand tools used by landscaper. TLO 5.2 Suggest the equipments used for outdoor landscaping. TLO 5.3 Demonstrate the Planting tools used in landscaping.	**Unit - V Landscape Tools and Equipments** 5.1 Hand tools: Shovel, Rakes, Pruning Shears, Lawn Mower, Grass Trimmer, Leaf Blower, Hedge Trimmer, Lawn Aerator, etc. 5.2 Equipments used in landscaping: Excavators, Backhoe Loaders, Scrapers, Crawler Loaders, Bulldozers, Trenchers, Motor G raders, etc. 5.3 Planting tools: Digging tools, Watering tools, Cutting tools, Planting tools etc.	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 Compose photo collage of Indoor landscape Spaces. LLO 1.2 Compose Photo collage of outdoor landscape spaces.	1	*Preparation of Landscape collage for Indoor and Outdoor spaces.	2	CO1
LLO 2.1 Prepare presentation report on Various principles of landscape design.	2	* Applications of Principles of landscape design .	2	CO1
LLO 3.1 Sketch various landscape elements. LLO 3.2 Identify Various elements of landscape design.	3	*Applications of Elements of landscape design.	2	CO1
LLO 4.1 Prepare a report on historical development of various landscape.(IKS)	4	*Presentation on Landscape Styles as per Indian knowledge system.	4	CO1 CO2

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 5.1 Prepare graphical presentation on various landscape styles.	5	*Presentation on Landscape Styles.	4	CO2
LLO 6.1 Suggest appropriate plant species for indoor and outdoor spaces. LLO 6.2 Collect plant samples and prepare herbarium sheets.	6	*Preparation of Herbarium Sheets.	4	CO3
LLO 7.1 Compose sample charts on classification of trees. LLO 7.2 Prepare a graphical representation on trees and Shrubs.	7	*Compositions of Trees and Shrubs.	2	CO3
LLO 8.1 Compare between Biennial Plants, Perennial Plants and Annual Plants. LLO 8.2 Identify Biennial Plants, Perennial Plants and Annual Plants.	8	*Composition of types of Plants: Biennial Plants,Perennial Plants,Annual Plants.	2	CO3
LLO 9.1 Identify appropriate materials used for hardscape. LLO 9.2 Suggest hardscaping and softscaping for given Spaces and situations.	9	*Exploration of Hardscape Materials.	2	CO3 CO4
LLO 10.1 Draw Various tools used for landscape design. LLO 10.2 Sketch various hardscape elements.	10	*Exploration of Hardscape Elements.	2	CO4
LLO 11.1 Draw Various hand tools used for landscaping. LLO 11.2 Select appropriate hand tools for landscaping.	11	* Applications of Essential Hand Tools of landscaping.	2	CO5
LLO 12.1 Select appropriate planting tools for landscaping. LLO 12.2 Draw various types of planting tools.	12	*Applications of Planting Tools of landscaping.	2	CO5
LLO 13.1 Identify various equipments used in Landscaping.	13	Applications of Equipment in landscape design.	2	CO5
LLO 14.1 Prepare report of machinery used in Landscape design.	14	Application of Machinery in landscape design.	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

- Analyze a nearby landscape spaces, focusing on the application of fundamental principles and elements, and present findings report.
- Visit a local nursery to observe various plant species, their care requirements, and nursery operations, then summarize findings in a concise report highlighting key observations and insights.
- Analyze the historical significance and architectural features of a selected Traditional Gardens through a graphical presentation highlighting its layout
- Create a Zen gardening mood board by selecting serene images of gravel, rocks, and bonsai trees, showcasing simplicity and tranquility through minimalist design elements.
- Create a digital illustration showcasing the water element in the landscape design, emphasizing its flow and interaction with surrounding features.

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 : Multi core 64-bit processor, 8 GB Boot Drive, 8 GB RAM minimum 200 GB Hard Disk. OR Latest specification at time of procurement.	All
2	Projector : Type of display Poly-silicon TFT active matrix Resolution Brightlink 480i: 1024 × 768 pixels (XGA)Brightlink 475Wi / 485Wi:1280 × 800 pixels (WXGA)Lens F= 1.80, Focal length: 3.71 mmColour reproduction: Full colour, 16.77 million colours, Focus adjustment-Manual, Zoom adjustment-Digital, Zoom ratio-1:1.35 OR Latest specification at time of procurement.	All
3	Projector Screen: 116" Diagonal viewing screen, Manual pull down Screen for both ceiling and wall usage OR Latest specification at time of procurement.	All
4	B/W Printer: Print speed black (normal, A4) Up to 14 ppm print speed. Duty cycle (monthly, A4) Up to 5000 pages recommended, monthly page volume 250 to 2000 OR Latest specification at time of procurement.	All
5	Camera : Type - 22.3 mm x 14.9 mm CMOSEffective Pixels -Approx. 24.10 megapixelsTotal Pixels-Approx. 25.80 megapixelsAspect Ratio- 3:2Low-Pass Filter - Built-in/FixedSensor Cleaning - EOS integrated cleaning system.	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

LANDSCAPE DESIGN **Course Code : 324305**

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Introduction To Landscape Design	CO1	8	6	4	2	12
2	II	Landscape Styles	CO2	12	10	6	0	16
3	III	Introduction to Softscape	CO3	12	10	4	2	16
4	IV	Introduction to Hardscape	CO4	8	6	4	4	14
5	V	Landscape Tools and Equipments	CO5	5	4	4	4	12
Grand Total				**45**	**36**	**22**	**12**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Studio Performance, Assignments, Self-learning.

Summative Assessment (Assessment of Learning)

- Pen and paper illustration ,Oral Examination to be conducted by faculty.

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	-	3			
CO2	3	1	2	-	2	1	2			
CO3	3	2	1	-	1	1	2			
CO4	3	2	1	-	1	1	2			
CO5	2	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	Geoffrey Jellicoe (Author), Susan Jellicoe (Author).	The Landscape of Man: Shaping the Environment from Prehistory to the Present Day.	Thames & Hudson Ltd, ISBN-13 978-0500278192
2	Grant W Reid.	Landscape Graphics.	Watson-Guptill Publications Inc.,U.S, ISBN-13 978-0823073337

Sr.No	Author	Title	Publisher with ISBN Number
3	Tropical Garden Plants in Colour.	T. K. Bose (Author), B. Chowdhury.	South Asia Books,ISBN-13 978-8190017107
4	Mohammad Shaheer ,Geeta Wahi Dua, Adi Pal.	Landscape Architecture In India.	LA,Journal of Landscape Architecture,ISBN-13 978-8192625409
5	K C Sahni.	The Book of Indian Trees.	Oxford,ISBN-13 978-0195645897

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.re-thinkingthefuture.com/landscape-architecture/a2441-the-evolution-of-landscape-architecture/	The Evolution of Landscape Architecture
2	https://www.britannica.com/art/garden-and-landscape-design/Japanese	Historical development of landscape design
3	https://www.ambius.com/resources/blog/plant-profile/the-ultimate-guide-to-indoor-plants#:~:text=Indoor%20plants%20that%20need%20little,is%20adaptable%20to%20various%20environments	Indoor Plants
4	https://goldbio.com/articles/article/indoorplantguide	Indoor Plants
5	https://www.indiaplants.com/	Plants
6	https://plantsinformation.com/plants/hibiscus/	Outdoor Plants
7	https://whereisthenorth.com/7-hardscape-components-of-landscaping-in-architecture/	Hardscape
8	https://www.homesandgardens.com/advice/how-to-plan-a-dry-garden	Hardscape

Note :

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

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												Total Marks
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
324003	WORKING DRAWING	WDR	DSC	2	-	2	2	6	3	-	-	-	-	-	50	20	50@	20	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 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

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 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,
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

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 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
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

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 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
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.

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)

WORKING DRAWING **Course Code : 324003**

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

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