

APJ ABDUL KALAM  
TECHNOLOGICAL  
UNIVERSITY

# SEMESTER-5



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART301	LANDSCAPE DESIGN	2-0-1-0	3	2021

**Course Objectives:**

To enable the students to understand the principles of landscape design, construction techniques, site planning etc. and imbibe the importance of integrating landscape design with the built environment.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Demonstrate knowledge of fundamental concepts such as elements and principles of landscape architecture.	Understanding
CO-2	Examine the basic principles of site grading, site drainage, and site layout and their application in the design of outdoor environments.	Analysing, Applying
CO-3	Exhibit knowledge about various landscape construction techniques and plant materials	Understanding
CO-4	Appreciate historic precedents to understand how landscape architects utilize the elements and principles of landscape design to shape outdoor spaces.	Analysing, Applying

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

**Syllabus**

Introduction to Landscape Architecture, Landscape Engineering, Landscape Construction, Study of Plant Materials, Historical perspective of Landscape design.

**Course Plan**

Module	Topic	Course Outcome	No. of Hours
I	<p><b>Introduction to Landscape Architecture:</b></p> <p>Introduction to Landscape Architecture, definition, importance, need and scope, Role of landscape design in architecture.</p> <p>Landscape elements (Major and Minor Elements, Natural and Manmade elements, Tangible, and Intangible elements, Soft and Hard landscape elements).</p> <p>Understanding the visual characteristics (colour, form, texture) and the non-visual characteristics (smell, touch, sound) of these elements and their application in functional, aesthetic and environmental goals.</p> <p>Principles of landscape design (harmony, balance, symmetry, contrast, etc.) Surfacing, Enclosure, Vistas, Visual corridor.</p>	CO1	9
II	<p><b>Landscape Engineering:</b></p> <p>Site Studies and Site Planning - Introduction to grading, Landform modifications; Earth form grading; Basic grading principles, Cut and fill processes, Retaining walls.</p> <p>Surface drainage, vegetation and existing features, etc.</p>	CO2	9
<b>FIRST INTERNAL TEST</b>			
III	<p><b>Landscape Construction:</b></p> <p>Circulation: Vehicular roads and Parking, Pedestrian paths,</p>	CO3	9

	<p>and plazas; Level Change: Wall, steps, and ramps.</p> <p>Planting: Planters, beds, edges, and terraces.</p> <p>Water elements: Pool types and water bodies.</p> <p>Green Practices, energy efficient site planning</p>		
<b>IV</b>	<p><b>Study of Plant Materials:</b></p> <p>Trees, shrubs, ground cover, climbers, Indoor plants.</p> <p>Plant selection criteria - Functional, visual, ecological, and microclimatic aspects.</p> <p>The role of plant material in environmental improvement (e.g., soil conservation, modification of microclimate).</p> <p>Planting for shelter, windbreaks, and shelter belts.</p>	CO3	9
<b>SECOND INTERNAL TEST</b>			
<b>V</b>	<p><b>Climate responsive design for tropical climates</b></p> <p>Changing perceptions of man's relationship with nature till the early 19th century; Ancient Heritage: Mesopotamia, Egypt, Greece, Rome; Western Civilization: Europe; Italy, France, and England</p> <p>The middle east: The Persian tradition and its far-reaching influence Eastern Civilization: China and Japan.</p> <p>Ancient and medieval period in India; Mughal and Rajput Landscapes; Colonial landscape development in India (Lutyens Delhi).</p> <p>Modern and contemporary landscape design.</p>	CO4	9
<b>END SEMESTER EXAMINATION</b>			

### Textbooks

- Lynch, K. Site Planning, Cambridge: The MIT Press. 1962
- Motloch, J. L. Introduction to Landscape Design, US: John Wiley and sons

### Reference books

- Bose, T.K. and Choudhary, K. Tropical Garden Plants in Colour. Horticulture and Allied Publishers. 1991.
- Dee, C. Form and Fabric in Landscape Architecture: A visual introduction, UK: Spon Press.2001
- Laurie, M. An Introduction to Landscape Architecture, NY: American Elsevier Pub.Co Inc.1975
- Simonds, J.O. Landscape Architecture: The Shaping of Man's Natural Environment, NY: McGraw Hill Book Co. Inc. 1961.
- Simonds, J.O. Landscape Architecture: A manual of Site Planning and Design, McGraw Hill, 1961.



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART 303	HISTORY OF ARCHITECTURE AND CULTURE- IV	3-0-0-0	3	2021

### Course Objectives:

The course is intended for the student to understand the technological innovations of mid-19th and early 20<sup>th</sup> century leading to an architectural style called Modernism. It gives a glimpse of the Master works of Modern Architecture and further mentions the evolution of the style, the Utopian concepts that followed and the criticisms about the style. The course also includes the colonial architectural typologies as well as post Independent Modernism influenced architecture that evolved in India during the period corresponding to Modernism in Europe and America.

### Course Outcomes:

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Understanding how Scientific and technological innovations affect cultural movements that influence architecture	Understanding
CO-2	Study of Modernism as a cultural Movement and an architectural movement	Memorising
CO-3	Understanding how society responds and reacts to architecture as it influences lifestyles.	Understanding and applying
CO-4	Learning about the architectural heritage of India as a mix of styles of vernacular and foreign.	Learning

### Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions (5x3= 15 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 7 marks (Total 5x7=35). Part B questions can have subdivisions.

**Syllabus**

Industrial Revolution and Modernism

Modern Architecture and prominent architects

Decline of Modernism- reasons and consequences

Colonial Architecture in India

**Course Plan**

Module	Topic	Course outcome	No. of hours
I	A brief history of Architecture as a profession, till and during 19 <sup>th</sup> century- Practice and Education- Ecole de Beaux Arts- separation of architecture from engineering. Technological advancements of 19 <sup>th</sup> century- Invention of steam engine, formation of factories- Industrial Revolution- New materials - Crystal Palace- Writings of Eugene Viollet le Duc. Eiffel Tower. Movements and counter movements. Arts and Crafts Movement. Modernism as a cultural movement in literature and art- Ulyssus, Cubism. Art Nouveau- Victor Horta. De Stijl, Deutscher Werkbund, Expressionism, Dada Movement. Antonio Gaudi- Sagrada Familia.	CO1	9
II	Breaking away from history- Walter Gropius and Bauhaus. Mies Vander Rohe- Seagram building. Le Corbusier- Villa Savoy. CIAM formation and declarations. Philip Johnson- Glass House, Sony Building. Daniel Burnham- White City, Montauk Building. Chicago School-Skyscrapers- William Le Baron Jenny- Home Insurance Building, Adler and	CO2	9

	Sullivan- Wainwright Building, Frank Lloyd Wright- Prairie style, Robie House, Queen Anne Style, Taliesin School.		
<b>FIRST INTERNAL TEST</b>			
<b>III</b>	International Style definition and characteristics. Alvar Aalto- Villa Mairea, Saynatsalo Townhall, Louis Kahn- Salk Institute, Kimbell Art Museum.  Second World War and its influences. Chancellor housing. Modern Utopian concepts- Archigram- Peter Cook- Plugin City. Le Corbusier's City of 3 million inhabitants. Team X and Brutalism. Metabolists of Japan- Kisho Kurokawa. Criticism of Modernism, intellectual, economic and social reasons that led to the bombing of Pruitt Igoe.	CO3	6
<b>IV</b>	Colonial Architecture and Indo Saracenic Architecture in India. New Delhi- Edwin Lutyens, India Gate, Rashtrapati Bhavan. Calcutta- Victoria Memorial Hall. Bombay- Indo-Deco style. CST Terminus, Gateway of India. Character study of Pondicherry French and Tamil Towns- and Goa- Indo Portuguese style. Chennai- Rippon Building. Kochi- St Francis Church, Hill Palace Museum. The Architecture of the Princely States of Jaipur, Bikaner and Mysore. Evolution and definition of typologies of Hill stations, Colonial Bungalows, Cantonments, clock towers, railway stations, public offices, assembly halls, water systems etc.	CO4	12
<b>SECOND INTERNAL TEST</b>			
<b>V</b>	Post-colonial, Nehruvian nation building initiatives; Planning Commission and public sector led industrialisation; Building of new industrial towns (e.g. Bhilai, Durgapur, Rourkela etc.), New capital cities (e.g. Bhubaneswar, Chandigarh and Gandhinagar); Works of Corbusier and Louis Kahn in India and their influences on Indian architects; Millowners Building, IIM Ahmedabad. Works of public nature- Legislative assembly, High Court and Secretariat, Chandigarh.	CO4	9
<b>END SEMESTER EXAMINATION</b>			



**Text Books:**

1. A Global History of Architecture/ Francis. D. K. Ching, Mark Jarzombek, Vikramaditya Prakash. Published by John Wiley and sons, Third edition 2017
2. A History of Architecture: Settings and Rituals/ Spiro Kostoff. Revisions by Greg Castilo. Published by Oxford University Press, 1985, 1995
3. Sir Banister Fletcher, "A History of Architecture", CBS Publications (Indian Edition), 1999.
4. Chopra P.M., 2000. Monuments of the Raj. Arya Book Depot.
5. Desai Madhavi, Lang Jon, 1997. The Search for identity-India 1880-1980 Architecture and Independence. Oxford Univ. Press
6. Frampton, Kenneth 1994. Modern Architecture: A Critical History. Thames & Hudson, London
7. Pevsner, Nikolaus, 1960 Pioneers of Modern Design, Penguin Books
8. Bhatt, V. & Scriver, P., 1990. After the Masters: Contemporary Indian Architecture. Mapin Publishing

**Course materials, Guidance and Evaluation methods**

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Faculty to act as facilitator and guide rather than one way lecturing.
- Book Reviews are to be part of assignments.
- Students are to be encouraged to watch movies and documentaries which give information about culture and architecture and prepare reviews/ reports and have discussions in class.
- As far as possible the students are to be encouraged to visit the architectural monuments in their vicinity and prepare reports and sketches, regardless of whether they are part of the syllabus.
- At the end of the course, each student has to prepare a short video on any of the topics in the syllabus.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET 301	THEORY OF STRUCTURES- V	2-1-0-0	3	2021

**Course Objectives:**

This course provides fundamental concept of steel and timber structures and their design. It enables the students to design and detail steel structural elements such as tension members, compression members, and flexural members along with connection design. In addition, an introduction to the design of timber structures is given, which enable the students to design a timber beam and a column. The course also trains the students to use the code of practice of steel design, IS 800: 2007.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Comprehend the design philosophies of Limit state method and working stress method.	Understanding
CO - 2	Recall the structural behaviour of elements subjected to tension, compression, and flexure.	Remembering
CO - 3	Design proper bolted or welded connections for steel structures subjected to given set of loading	Creating
CO - 4	Apply the principles of limit state method to design the steel elements such as tension members, compression members, and flexural members subjected to dead and live loads following IS 800: 2007	Creating
CO - 5	Apply the principles of working stress method to design the timber elements such as beams and columns	Creating

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carries 8 marks.

**Standards Permitted in the exam hall:**

IS 800: 2007 Indian Standard, General construction in steel – Code of Practice, Bureau of Indian Standards.

SP: 6(1) -1964, Hand book for structural engineers - 1, Structural steel sections, Bureau of Indian Standards

IS 883: 1994 Indian Standard, Design of structural timber in building – Code of Practice, Bureau of Indian Standards.

**Syllabus**

Introduction to steel and steel structures- Limit state design concept - Analysis and design of bolted and welded connections - Analysis and design of different structural members such as tension members, compression members, column bases and flexural members - Working stress method of design - Timber structures - Design of timber beams and columns - Flitched timber beams

**Course Plan**

Module	Topic	Course Outcome	No. of hours
I	Introduction to steel and steel structures, Properties of steel; Structural steel sections Limit state design concept Types of Connection, Analysis and Design of Bolted and Welded Connection (Moment Connection not required).	CO1 CO3	9
II	Tension members – Types of sections – net area -Design of tension members – Plate and single angled member	CO1 CO2 CO3	9
<b>FIRST INTERNAL TEST</b>			
III	Compression Members-Design of Struts - normal sections, single angled section. Solid and Built –up Columns for axial load Battens and lacing (Only theory is required) Column Bases-Design of slab bases only	CO1 CO2 CO4	9
IV	Flexural members – laterally restrained and laterally unrestrained beams – Simple and compound beams (Concept only) - Design of laterally restrained beam	CO1 CO2 CO4	9
<b>SECOND INTERNAL TEST</b>			

V	Introduction to Working stress method of design Timber structures, Types of timber – Classification, allowable stresses Design of timber beams - flexure, shear, bearing and deflection considerations Flitched timber beam- Types of Flitched Beam-Design of flitched timber beam Design of timber column	CO1 CO2 CO5	9
<b>END SEMESTER EXAMINATION</b>			

**Reference Books/ Standards:**

- S. Ramachandra, Design of Steel Structures - Standard Book House, Delhi, 1984
- N. Subramanian, Design of Steel Structures, Oxford Publications
- S.K Duggal, Limit State Design of Steel Structures, Mc Graw Hill Publications
- SP 6 – Part 1: 1964 (Reaffirmed 2003), Handbook for structural engineers - 1. Structural steel sections
- A.S. Arya, Structural Design in Steel, Masonry and Timber, Nemchand and Bros, Roorkee, 1971.
- Dayaratnam P., Design of Steel Structures, Oxford and IBH Publishing Co.
- Gurucharan Singh, Design of Steel Structures, Standard Publishers, New Delhi, 1982
- L.S. Negi, Design of Steel Structures – Tata McGraw Hill Publishing Company Ltd. New Delhi, 1997
- IS 883: 2016 – Code of Practice for Design of Structural Timber in Buildings, Bureau of Indian Standards, New Delhi
- IS 3629: 1986: Specification for structural Timber in building, Bureau of Indian Standards, New Delhi
- IS 800 – Code of Practice for use of Structural Steel in General Building Construction, Bureau of Indian Standards, New Delhi
- National Building Code of India, 1983, Part VI, Structural Design, Bureau of Indian Standards, New Delhi



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET 303	<b>BUILDING SERVICES III- (HVAC, FIRE FIGHTING AND SAFETY)</b>	<b>2-0-1-0</b>	<b>3</b>	<b>2021</b>

**Course objectives:**

To understand the fundamentals and principles of mechanical ventilation systems.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To learn the fundamentals of Refrigeration, HVAC	Understanding
CO2	To understand principles of Air-Conditioning and required components and equipment.	Understanding
CO3	To understand factors that affect human comfort	Understanding, Applying, Analyzing
CO4	To learn about the techniques and methods of air conditioning, distribution of conditioned air and representing them in drawings using symbols and legends	Understanding, Applying, Analyzing, Evaluating
CO5	To understand the fundamentals of fire safety To understand the requirements of buildings and preparedness of occupants in detecting and fighting fire Representing the components of fire fighting systems in drawings using symbols and legends	Understanding, Applying, Analyzing, Evaluating

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

**Syllabus**

Fundamentals of Refrigeration, HVAC systems, Concepts on Human Comfort and Air Conditioning, Air Conditioning and Distribution Systems, Fundamentals of Fire Safety, Detection and Fighting

**Course plan**

Module	Contents	Course outcome	No. of Hours
I	<p><b>Fundamentals of Refrigeration</b></p> <p>Modes of heat transfer. Basic laws of Conduction, convection and radiation. Heat transfer through Composite wall, composite cylinders, thermal resistance, overall heat transfer coefficient and its importance. Simple numerical examples, Insulation material used in air-conditioned building. Vapour compression refrigeration Cycle- pressure enthalpy diagram. COP.</p>	CO1	6
II	<p><b>HVAC Systems</b></p> <p>Components of vapour compression refrigeration system, compressors, reciprocating compressors, rotary compressors, scroll compressors, hermetically sealed compressors, their relative merits and demerits, type of evaporators, condensers - air cooled, water cooled , evaporative type , their application and selection, expansion devises, capillary tube, automatic expansion valve.</p> <p>Refrigerants, properties, ODP, GWP, environment friendly refrigerants and their comparison and application.</p>	CO2	9
<b>FIRST INTERNAL EXAMINATION</b>			

III	<p><b>Concepts on Human Comfort and Air Conditioning</b></p> <p>Psychometric chart, psychometric processes, DBT, WET, dew point temperature, Absolute Humidity, Relative Humidity, Specific Humidity, specific volume, Humidity measurements, human comfort, effective temperature, comfort chart, Simple numerical examples</p> <p>Air conditioning - Capacity of an air condition machine, TONS, EER, ISEER, star rating, cooling load calculation, factors effecting cooling load calculation, sensible and latent heat load, room sensible heat factor. Grand sensible heat factor. heat load due to mixing of outdoor air, numbers of air changes per hour, need of mixing outdoor air, factors to consider percentage of outdoor air mixing and their methods. Cooling load calculations, Simple numerical examples</p>	CO2 CO3	9
IV	<p><b>Air Conditioning and Distribution Systems</b></p> <p>Type of air conditioning machines, split , cassette system, window, central air conditioning, direct expansion, chilled water system of air conditioning, fan coil unit, double duct system, reheat system , Zonal system, air – water system , relative merits and demerits. Selection criteria of different models.</p> <p>Air distribution systems- supply duct, return duct, location of return duct opening, throw, AHU, Duct lay out pattern, wall duct system, ceiling duct system, Types of diffusers. Air filters, HEPA filters, Symbols and legends used in building HVAC layout.</p> <p>Case Study or Simple drawings of central air conditioning system for an auditorium, for a seminar hall, for an office</p>	CO4	9
<b>SECOND INTERNAL EXAMINATION</b>			
V	<p><b>Fundamentals of Fire Safety, Detection and Fighting</b></p> <p>Fire sources, spreading, and growth decay curve, Principles of fire behavior, Fire safety design principles _ NBC Planning considerations in buildings – non-combustible materials, egress systems, Exit Access – Distance between exits, exterior corridors – Maximum travel distance, Doors, Smoke proof enclosures</p> <p>General guidelines for egress design for Auditoriums, concert halls, theatres, other building types, window egress, accessibility for disabled. NBC guidelines – lifts lobbies, stairways, ramp design, fire escapes and A/C, electrical systems.</p> <p>Heat smoke detectors – sprinkler systems, Firefighting pump and water requirements, storage – wet risers, Dry rises</p>	CO5	12

	Fire extinguishers & cabinets, Fire protection system – CO2 & Halon system, Fire alarm system, snorkel ladder Configuring, sizing and space requirements for firefighting equipment. Case study or Simple drawings of fire detection and fighting for a medium/ high rise building		
<b>END SEMESTER EXAMINATION</b>			

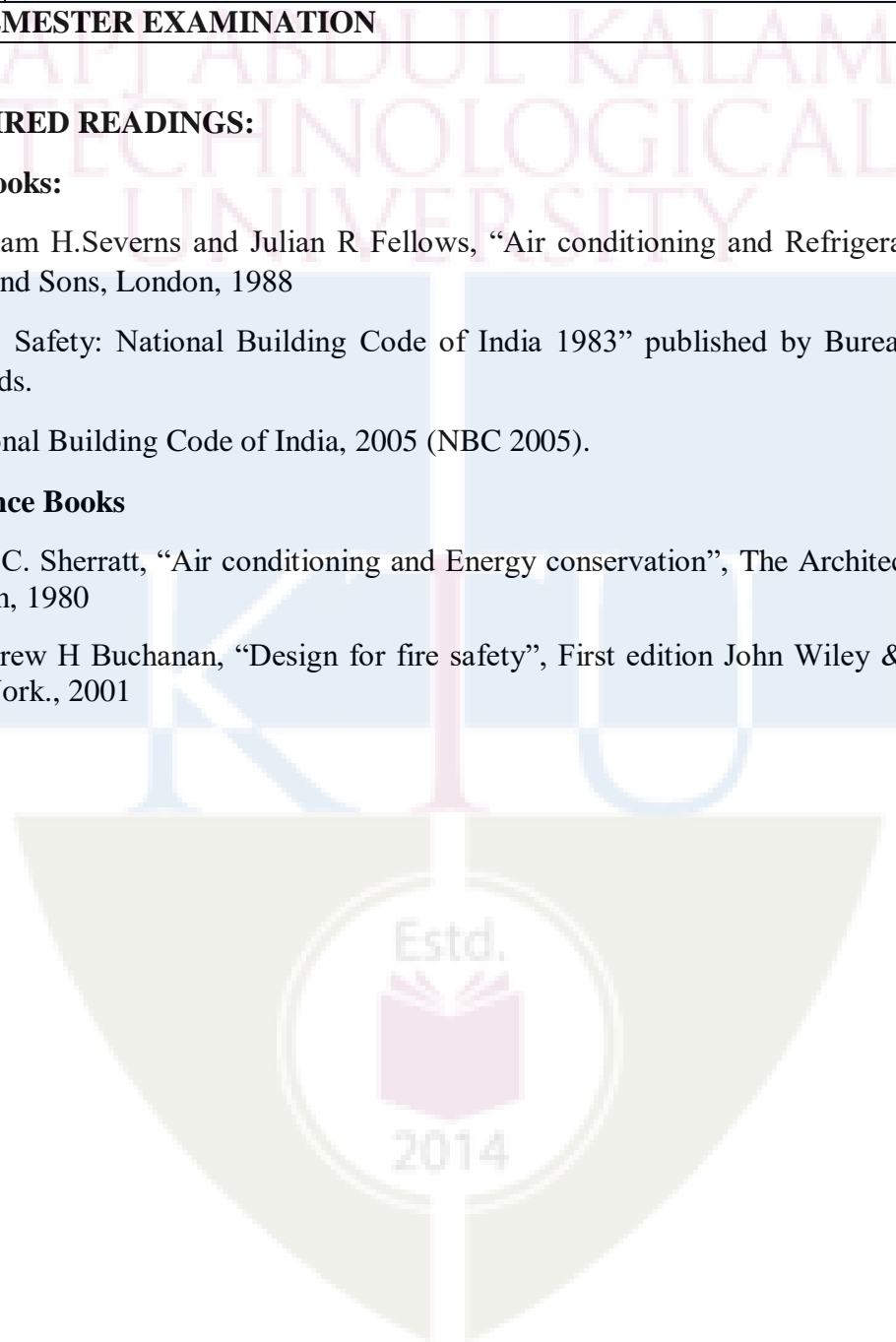
**REQUIRED READINGS:**

**Text Books:**

1. William H. Severns and Julian R. Fellows, "Air conditioning and Refrigeration", John Wiley and Sons, London, 1988
2. "Fire Safety: National Building Code of India 1983" published by Bureau of Indian Standards.
3. National Building Code of India, 2005 (NBC 2005).

**Reference Books**

1. A.F.C. Sherratt, "Air conditioning and Energy conservation", The Architectural Press, London, 1980
2. Andrew H. Buchanan, "Design for fire safety", First edition John Wiley & Sons Ltd., New York., 2001





Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT301 (1)	VERNACULAR ARCHITECTURE	3-0-0-0	3	2021

**Course objectives:**

To inculcate an appreciation of vernacular architecture; as an expression of local identity and indigenous traditions of the culture.

To understand the process of creation of vernacular architecture specific to a region, to create an understanding about the social and physical environment, climate of the place, materials and methods of construction

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Learning from Vernacular architecture and its relevance.	Understanding
CO-2	Different approaches and concepts to study of vernacular architecture	Understanding
CO-3	Vernacular Architecture as a process – explore the concepts of culture and civilization and their impact on these architectural products	Analysing
CO-4	Studies of Vernacular settlements of the various parts of the world	Analysing
CO-5	Survey and study of vernacular architecture Physical experience of buildings in order to appreciate the complexity of the physical and metaphysical influences bearing on architecture.	Applying

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

**Syllabus**

A brief overview of the process of creation of vernacular architecture, its cultural and contextual responsiveness, its determinants, role of social, cultural, political, economic, symbolic, climatic, technological contest in creation of form, different approaches and concepts to study of vernacular architecture, and the specific vernacular architectural forms in the northern and southern parts of India.

**Course plan**

Module	Contents	Course outcome	No. of Hours
I	<p><b>Introduction to Vernacular architecture</b> Definitions and classifications of Vernacular architecture.</p> <p>Determinants of vernacular architecture: Role determinants in the creation of vernacular architecture of a region.</p> <p>Cultural and contextual responsiveness of vernacular architecture</p> <p>Learning from Vernacular architecture and its relevance.</p>	CO1	6
II	<p><b>Approaches and concepts</b> Different approaches and concepts to study of vernacular architecture: Aesthetic, Architectural and anthropological studies in detail.</p> <p>Survey and study of vernacular architecture: The process of recording, categorizing and dissemination of knowledge about vernacular architecture.</p>	CO2	9
<b>FIRST INTERNAL EXAMINATION</b>			

III	<p><b>Vernacular architecture as a process</b> Vernacular architecture as a continuous process, dynamic process and participatory process. Study of examples from various regions of the world.</p> <p>Urban vernacular architecture. Vernacular architecture examples of urban settlements.</p> <p>Vernacular architecture as an indicator of changes in social, cultural, economic, climatic, political, symbolic and technological aspects.</p>	CO3	12
IV	<p><b>Vernacular Settlements</b> Studies of Vernacular settlements of the various parts of the world based on location and topographical conditions, regions influenced by social and economic factors, the result of the local population's livelihoods etc.</p> <p>Examples from Egypt , Indonesia , Iceland , China etc</p>	CO4	9
<b>SECOND INTERNAL EXAMINATION</b>			
V	<p><b>Regional variations in the vernacular architecture in India</b> Understanding how various factors impact Vernacular Architecture. Study based on the vernacular architecture of the following regions: Bohra houses of Gujarat, wooden houses of Himachal Pradesh, Bangla houses (village huts) of Bengal, Toda Houses Tamil Nadu, Bhunga Houses of Gujarat, Naga Houses of North East India, Tribal houses of Kerala.</p>	CO5	9
<b>END SEMESTER EXAMINATION</b>			

### Reference Books

- Paul Oliver, Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997.
- Amos Rapoport, House, Form & Culture, Prentice Hall Inc 1969.
- Vellinga Marcel, Oliver Paul & Bridge Alexander , Atlas of Vernacular Architecture of the World , Taylor & Francis Ltd , 2008
- Carmen Kagal, VISTARA—The Architecture of India, Pub: The Festival of India, 1986.
- Cooper, I. Traditional buildings of India. Thames and Hudson Ltd, London, 1998
- Desai Madhavi Traditional Architecture: House Form of Bohras in Gujarat, National Institute of Advanced Studies in Architecture (NIASA), 2007

- John May Handmade Houses and Other Buildings the World of Vernacular Architecture, Thames &Hudson2010
- R W Brunskill: Illustrated Handbook on Vernacular Architecture,1987.
- R.W. Brunskill, 4th ed 2000 Faber and Faber, Vernacular Architecture: An Illustrated Handbook
- S. Muthiah and others: The Chettiar Heritage; Chettiar Heritage 2000
- Tejinder S. Randhawa ,Vernacular Architecture of India: Traditional Residential Styles and Spaces, INTACH 2022
- Willi Weber and Simos Yannas, Lessons from Vernacular Architecture: Achieving Climatic Buildings by Studying the Past , Routledge,2013
- Reimar Schefold , Gaudenz Domenig and Peter J. M. Nas, Indonesian Houses: Tradition and Transformtion in Vernacular Architecture, Koninklyk Instituut Voor Taal Land,2003
- Ronald G. Knapp China's Vernacular Architecture: House Form and Culture, University of Hawaii 1989
- G.H.R. Tillotsum – The tradition of Indian Architecture Continuity, Controversy – Change since 1850, Oxford University Press, Delhi, 1989.



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT301 (2)	APPRECIATION OF ART IN ARCHITECTURE	3-0-0-0	3	2021

**Course objectives:**

- To explore visual art forms and their cultural connections across historical periods
- To understand and analyze any piece of artwork by means of elements and principles of design
- To acquire basic knowledge about various art mediums and develop skills in using the various mediums as effective and versatile presentation tools.
- To understand the relationship among art, art appreciation and architecture
- To help students Critically interpret, evaluate, and contextualize works of art.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To understand and differentiate art works as expressions of values across varied cultural and historical contexts.	Understanding
CO2	To analyze and summarize the elements of art and the principles of design through creative works in various mediums and materials.	Applying, Analyzing,
CO3	Identify and describe a body of art works, understand the art elements of artists.	Understanding, Creating
CO4	To understand and gain a fundamental knowledge of art expressions, design- its elements and principles and demonstrate using techniques.	Applying, Analyzing, Evaluating, Creating
CO5	To learn about individual artists and their role in society.	Understanding

**Mark distribution:**

<b>Total marks</b>	<b>Continuous internal evaluation marks</b>	<b>End semester examination marks</b>	<b>End semester examination duration</b>
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question carries 8 marks. One or two questions can have subdivisions. Some questions can be framed in such a manner to assess the student's capacity for analyzing the topics and linking it with other courses.

**Syllabus**

Introduction and Fundamentals – Art understanding – Indian art – Tools and techniques in print making, photography and plastic arts – works of International artists

**Course plan**

<b>Module</b>	<b>Contents</b>	<b>Course outcome</b>	<b>No. of Hours</b>
<b>I</b>	<p><b>Fundamentals of Art</b></p> <p>Introduction to Art- definition and Interpretation.</p> <p>Introduction to History of Art, Artistic Tradition and Theories. Examples from Greek, Roman, Gothic, Renaissance, Art Deco, Modern , Post Modern, Futuristic</p> <p>Art in space perception- Contemporary approaches vs. traditional approach</p> <p>Contemporary Art Issues Recent Art Movements</p>	CO1	6

<b>II</b>	<b>Understanding Art</b> Form and content in art Elements & design principles that create artistic form a) line, shape, light, colour, texture, pattern, space, motion b) unity, variety, focal points, emphasis, balance, symmetry, rhythm, scale, proportion Iconography in art	CO1 CO2	6
<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	<b>Indian Art</b> Introduction to aesthetics of Indian Art, Sculpture & Painting Art in Prehistoric, Islamic, Medieval, Colonial times Works of Indian artists	CO1 CO2 CO3	9
<b>IV</b>	<b>Imaging and sculpting</b> Printmaking: techniques and tools. Digital art Architectural Photography: time, emotion, abstract, construction, environment setting through the lens; technological developments and methods. Plastic arts: sculpture, modeling, installation: artists and techniques.	CO2 CO4	12
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	<b>Artists works</b> Art and approach to art of famous artists- <ul style="list-style-type: none"> <li>• Picaso, Michelangelo, Van Gogh, Salvador Dali,</li> <li>• Yayoyi Kusama, Kurt Schwitters, Jason Rhoades , Kara Walker, Doris Salcedo</li> <li>• Jeanette Hägglund, Hufton and Crow, Cristóbal Palma Auguste Rodin, Boccioni, Jeff Koons, Anish Kapoor</li> </ul>	CO1 CO3 CO5	12
<b>END SEMESTER EXAMINATION</b>			

**Text Books:**

1. Fichner-Rathus, Lois. Understanding Art. 11th edition
2. Pamela Sachant, Peggy Blood, Introduction to Art: Design, Context, and Meaning 2016
3. Dennis J.Sporre, Perceiving the arts. 11<sup>th</sup> edition 2015

### Reference Books

1. Charles Wallschlaeger & Synthia Basic Snyder, Basic Visual Concepts & Principles for artists, architects & designers, McGraw hill, USA, 1992.
2. Francis D.K Ching, 'Drawing, Space, Form, Expression'.
3. J.H.Bustano, by 'Principles of Colour and Colour Mixing'.
4. Luis Slobodkin, 'Sculpture-Principle and Practice'.
5. Roy C. Craven, 'Indian Art'.
6. Suzanne Huntington, 'Art of Ancient India'.

### Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Representing art works through drawing, painting, photography, sculpting, printing etc. can be given as class exercises
- The students can be encouraged to attend workshops and visit art related exhibitions, events and sites.
- Each student should be encouraged to have a sketchbook with notes, graphical interpretations, sketches of all the topics covered.



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT301 (3)	ARCHITECTURAL DESIGN WITH STEEL AND GLASS	3-0-0-0	3	2021

#### Course Objectives:

- To provide a basic knowledge on Glass and Steel as an architectural building materials.
- To provide the students with the latest & recent trends in architecture and to understand the selection and usage of glass for appropriate purposes and for improving the building performance using glass.
- To introduce the design potential of steel as an important material in modern construction and familiarize the students with the structural merits and limitations of steel.
- To understand the sustainability of steel in construction field.

#### Course Outcomes:

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify the importance of glass and steel in architecture and its types.	Remembering
CO2	Identify appropriate glass and steel for construction and its applications	Understanding
CO3	Introduce the sustainability of steel and identify the technical aspect of combining steel and glass	Applying
CO4	Case study of green building designed predominantly with energy efficient materials.	Applying

#### Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

**Syllabus**

Glass as a building material: Evolution and importance of glass. Types of glass:

Glass and green architecture: Building physics, Day lighting in buildings, Achieving energy efficient using glass, Case study of green buildings: Steel as a building material – structural properties of steel, advantages of steel in construction - Sustainability of steel: Recycled, reuse and adaptive reuse of steel. Various steel and glass envelope systems

**Course plan**

Module	Contents	Course outcome	No. of Hours
I	<p><b>Glass As Building Material</b></p> <p>Evolution &amp; importance of glass in modern architecture. Applications of glass in buildings (façade/ interior applications). Understanding the production &amp; properties of glass.</p> <p>Types of Glass- mirror, lacquered, fire resistant. Modern glass with different applications. Glass for hospitals, green homes, airports, offices, other buildings. Role of glass in acoustics.</p>	CO1,CO2, CO3,CO4	6
II	<p><b>Glass And Green Architecture</b></p> <p>Building Physics. Theory of electromagnetic radiation. Understanding of internal and external reflections. Day-lighting in Buildings - introduction and basic concepts (VLT). Solar Control and thermal insulation (SF, UV, SHGC). Need for green Buildings. Energy efficient buildings. Achieving energy efficiency using glass. Factors of energy efficient material selection.,</p>	CO1,CO2, CO3,CO4	6

	Case study of green building designed predominantly with energy efficient materials.		
<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	<p><b>Introduction to Steel as Building Material</b></p> <p>Materiality of steel, structural properties of steel, advantages of steel in construction. History of metal in construction – Iron to Steel.</p> <p>Steel and tension. Industrialization and mass fabrication of steel.</p> <p>Casting of steel in historic and contemporary examples. Invention of hollow structural sections. Hot rolled steel shapes, various hollow structural sections.</p>	CO1,CO2, CO3,CO4	9
<b>IV</b>	<p><b>Sustainability of Steel</b></p> <p>Introduction to steel as a sustainable material. Recycled, reuse and adaptive reuse of steel.</p> <p>Steel and glazing systems, support systems for glazing. Technical aspects of combining steel with glass.</p> <p>Various steel and glass envelope systems - curtain wall system, wind braced support systems.</p>	CO1,CO2, CO3,CO4	12
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	<p><b>Fabrications, Erection and Implications on Design</b></p> <p>Study on transformation of architectural design into fabricated elements.</p> <p>Steel in temporary/ exhibit buildings. Need for corrosion and fire protection. Various finishes and coating systems of steel.</p> <p>Detailed study on corrosion protection and fire protection systems. Transportation, site issues and erection on site. Erection of beams and columns. Effects of climate and weather on erections. Other issues relating to practical implication of design on site.</p>	CO1,CO2, CO3,CO4	12
<b>END SEMESTER EXAMINATION</b>			

**Text Books:**

1. Christian Schittich, 'Glass Construction Manual', Birkhauser Basel, 2007.
2. 'Architectural Glass Guide', Federation of Safety Glass, 2013.
3. Terrimeyer Buake, 'Architectural Design in Steel', SPON, 2004.
4. Peter Silver et al, 'Structural Engineering for Architects', Laurence King, 2013.

**Reference Books**

1. 'LEED 2011 For India - Green Building Rating System', Indian Green Building Council, 2011
2. 'Energy Conservation Building Code. User Guide', Bureau of Energy Efficiency, 2009
3. Training Manuals & E- Learning, Glass Academy.
4. Victoria Ballard Bell & Patrick J Rand; 'Materials for Architectural Design', Lawrence King, 2006.
5. Ettinger J. Van et all(Editor), 'Modern Steel Construction in Europe', Elsevier,1963.
6. Leonardo Benevolo, 'History of Modern Architecture Vol 1 & 2', Reprint, MIT Press, 1977.
7. 'Handbook of Steel Construction', Canadian Institute of Steel Construction, 2010.
8. INSDAG Publications and Brochures.



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT301 (4)	GRAPHIC AND PRODUCT DESIGN	3-0-0-0	3	2021

**Course objectives:**

To understand the role of visualization in design and to learn how to externalize the visualizations through various illustrations.

To understand the stages and processes involved in product design.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To create geometric forms using light and shadows.	Understanding, Analyzing
CO2	To identify the relevance of proportioning systems.	Understanding, Analyzing
CO3	To articulate the design process.	Understanding, Analyzing, Evaluating
CO4	To evaluate the space dimension factors.	Understanding, Analyzing, Evaluating
CO5	To identify various occupational hazards.	Understanding, Analyzing

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

**Syllabus**

Introduction to form and proportion – Introduction to product sketching – Introduction to product design - Human physical dimension concern and ergonomics - Percentile and measurements and occupational safety.

**Course plan**

Module	Contents	Course outcome	No. of Hours
I	<b>Introduction to form and proportion.</b> Simple geometric forms and composition, principles of perspective, effect of light and shadows on surface composition, understanding the basics of proportions and application of scales in drawing.	CO1, CO2	6
II	<b>Introduction to product sketching.</b> Natural forms sketching, the human body and its parts, human proportions and proportioning systems. Man-made form sketching, introduction to product sketching, understanding the proportions and material properties, importance of line weights in representation.	CO2	9
<b>FIRST INTERNAL EXAMINATION</b>			
III	<b>Introduction to product design.</b> Research, Concept Development, Production, Launch. Various types of design process: Linear model, Double diamond, total design, waterfall design, Christmas tree. Importance of human centred design.	CO3	9

<b>IV</b>	<b>Human physical dimension concern and ergonomics.</b>	CO2 CO4	12
	Behavioural space dimension factors, Behavioural zones, Value of ergonomics in spaces, Principles of optimal spaces in workspace. Proper posture and proper optimisation of work component.		
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	<b>Percentile and measurements and occupational safety.</b>	CO1 CO3 CO5	12
	Percentile selection for design use, general working postures and workstation design. Various occupational safety and stress caused in the workspace and remedial measures		
<b>END SEMESTER EXAMINATION</b>			

### Reference Books

- Edwards Betty; New drawing on the right side of the brain. Publisher: Tarcher 2002
- D.K Francis; Design Drawing, John Wiley and Sons, 1998
- T C Wang; pencil sketching, John Wiley & sons, 1997
- Dalley Terence Ed; the complete guide to illustration & design, Phaidon, Oxford 1980
- Morris, Richard. *The fundamentals of product design*. Bloomsbury Publishing, 2016.
- Chakrabarti Debkumar, Indian Anthropometric Dimensions for Ergonomic Design Practice 1997.

### Course materials, Guidance and Evaluation methods

- Design process and methodologies need to be emphasised in module 3 with the help of case studies.
- For Module 4 and 5 real time scenarios can be adopted as examples for a better understanding.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARD301	ARCHITECTURAL DESIGN - IV	0-0-10-0	10	2021

**Course Objectives:**

- To learn the procedure of documenting and preparing measured drawing of buildings.
- To understand socio-economic, cultural patterns and environmental characteristics of a settlement.
- Students will be introduced to the site and context as the primary generators of design decisions through design exercises, taking into account site conditions, ecological aspects, activities, services, and building methods, as well as social use phenomena in the design development process.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Documentation of a heritage building / settlement study to understand the building materials, construction technology & the various determinants of design of the built form like the context /environment , livelihoods, socio- economic and cultural aspects, climate, rituals, customs etc.	Understanding
CO-2	To increase one's understanding of site planning techniques, barrier-free design principles, and construction techniques in order to develop design programmes that consider context and functional requirements through data analysis, inference from data collection, and case studies of projects related to the design project.	Developing
CO-3	Applying site planning techniques to initiate the architectural design process, with the site and context serving as the primary generators of design decisions	Applying
CO-4	To design through conscious consideration of Site, context, and principles of barrier-free design	Creating



**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester Jury examination marks	End semester Jury examination duration
100	50	50	2-3 days

**Continuous internal evaluation pattern:**

Attendance : 5 Marks  
 Design Assignments/Reviews/Tests/CAD Assignments : 45 Marks

**Syllabus:**

Documentation of a heritage building / settlement study. Study complex projects like Polyclinics, Convention Centre, Education institutions like Architecture schools, Dental college etc. emphasizing ecologically responsible site planning techniques and principles of Barrier- free design.

**Course Plan:**

Module	Topic	Course outcome	No. of hours
I	Preparation of measured drawing of a heritage building to understand the building materials, construction technology & the various determinants of built form.  Or Documentation on housing settlements of a small community, with focus on the integration of socio-economic, cultural patterns and environmental characteristics and context as generators of architectural space and forms.	CO-1	20
II	Study of ecologically responsible site planning methods and barrier-free design concepts with a focus on how the built and natural environments interact. The location, the context, and how they relate to the built environment will be the main points of emphasis.  Site characteristics, ecological factors, activities, services, construction techniques, and social utilisation are all taken into account during the design creation process.	CO-2	40
<b>FIRST INTERNAL TEST</b>			
III	Introduction to the project – Projects may be on Polyclinics, Convention Centers, Education institutions etc. Emphasis on	CO-2, CO-3	30

	<p>the site planning techniques with respect to the ecological aspects of the site, zoning regulations/land uses, and barrier-free considerations.</p> <p>Study Space Standards and building codes, basic design parameters, such as the user group, zoning laws and regulations, the site context, and barrier-free considerations, etc for the selected project typology.</p> <p>Data Collection, Case studies, Site studies, Analysis, and Inferences</p>		
<b>IV</b>	<p>Concept development, Design development/ Form Development.</p> <p>Understand how site and context as prime generators of design decisions and the significance of landscape, open spaces, circulation networks, and utility infrastructure. Elements of Barrier-free design have to be included to make the design inclusive.</p>	CO-3	30
<b>SECOND INTERNAL TEST</b>			
<b>V</b>	<p>Detailed Site Layout landscape, open spaces, circulation networks, utility infrastructure, etc.</p> <p>Detailed drawings of the proposed design with details of architectural features.</p>	CO-4	30
<b>END SEMESTER EXAMINATION/ JURY</b>			

### Reference Books

- Francis D. K. Ching, 'Architecture: Form, Space, and Order', John Wiley & Sons, 2007.
- Christopher Alexander et al, The Oregon Experiment, New York: Oxford UP, 1975
- Edward T White, Site Analysis: Diagramming Information for Architectural Design, Architectural Media Ltd. 1983
- Simon Unwin, 'Analysing Architecture, Routledge, 2003
- Neuferts' Architect's Data
- Time-Saver Standards for Architectural Design Data Time-Saver Standards for Architectural Design Data.
- Rudolf, A 'The dynamics of architectural form', Berkeley and Los Angeles: University of California Press, 1977.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS 301	<b>BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES-V</b>	1-0-0-2	3	2021

**Course objectives :**

The goal of this course is to expose the students to elementary building materials and their applications. It aims to familiarize students to contemporary as well as vernacular and traditional building materials. It will also introduce students to prevailing & relevant BIS specifications. After this course, the students will be able to recognize materials in the market and use them in their design visualization.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify the relevant BIS specifications.	Remembering
CO2	Identify appropriate foundations for various construction needs.	Understanding
CO3	Work with various building materials in the construction yard and understand their behaviour.	Applying
CO4	Use the various building materials in their design processes appropriately	Applying

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 5 Marks
Continuous assessment tests (2 nos.)	:15 Marks
Portfolio presentation (15) / drawings(15)	: 30 Marks

**End semester examination pattern:**

There will be three parts; Part A, B and C. Part A will contain 5 questions with 1 question

from each module, having 3 marks for each question. Students should answer all the questions. Part B will contain 2 questions from each module, of which the student should answer any one. Each question carries 4 marks. Part C will have one essay question which can have subdivisions, to assess the student's capacity for analysing the topics and linking it with other subjects studied. The question carries 15 marks.

## Syllabus

Vertical transportation systems; Ramps and Stairs-Planning, Design parameters-Stairs; Standards-types of stairs- construction details- Elevators and Escalators; Planning and design parameters- Different types- Construction details- Wood substitutes: Different types wood substitutes available – Properties- Market forms- Plastics: Plastics as a building materials- Damp proofing and Termite proofing: Causes of damp proofing- Materials used for Damp proofing- Anti termite treatments.

## Course plan

Module	Topic	Course outcome	No. of hours
I	<p><b>VERTICAL TRANSPORTATION SYSTEMS: RAMPS AND STAIRS</b></p> <p>Planning of vertical transportation systems – design parameters.</p> <p>Ramps: Planning of ramps, slope, finishes, safety precautions.</p> <p>Stairs: Planning staircases - Standards, rules and regulations.</p> <p>Components of stairs, Support conditions like inclined slab, cranked slab, cantilever. Stair plans, stairs with straight, circular and curved flights.</p> <p>Construction details of Wood stair, fire escape stairs, Concrete stair, Steel stair and Composite stair</p> <p><i>Drawings: Wooden stair, RCC stair, Steel Stair, Composite stair.</i></p>	CO1, CO2 CO3 CO4	9
II	<p><b>ELEVATORS AND ESCALATORS</b></p> <p>Elevators: Planning and grouping of elevators. Elevator design parameters.</p> <p>Different types of elevators – passenger elevators, observation elevators, hospital elevators and freight elevators. Construction details – lift shaft, lift pit, machine room etc.</p> <p>Escalators: Planning and details of escalators and travelators</p> <p><i>Drawings: Passenger lift, Capsule lift, Escalator.</i></p>	CO1, CO2 CO3 CO4	9

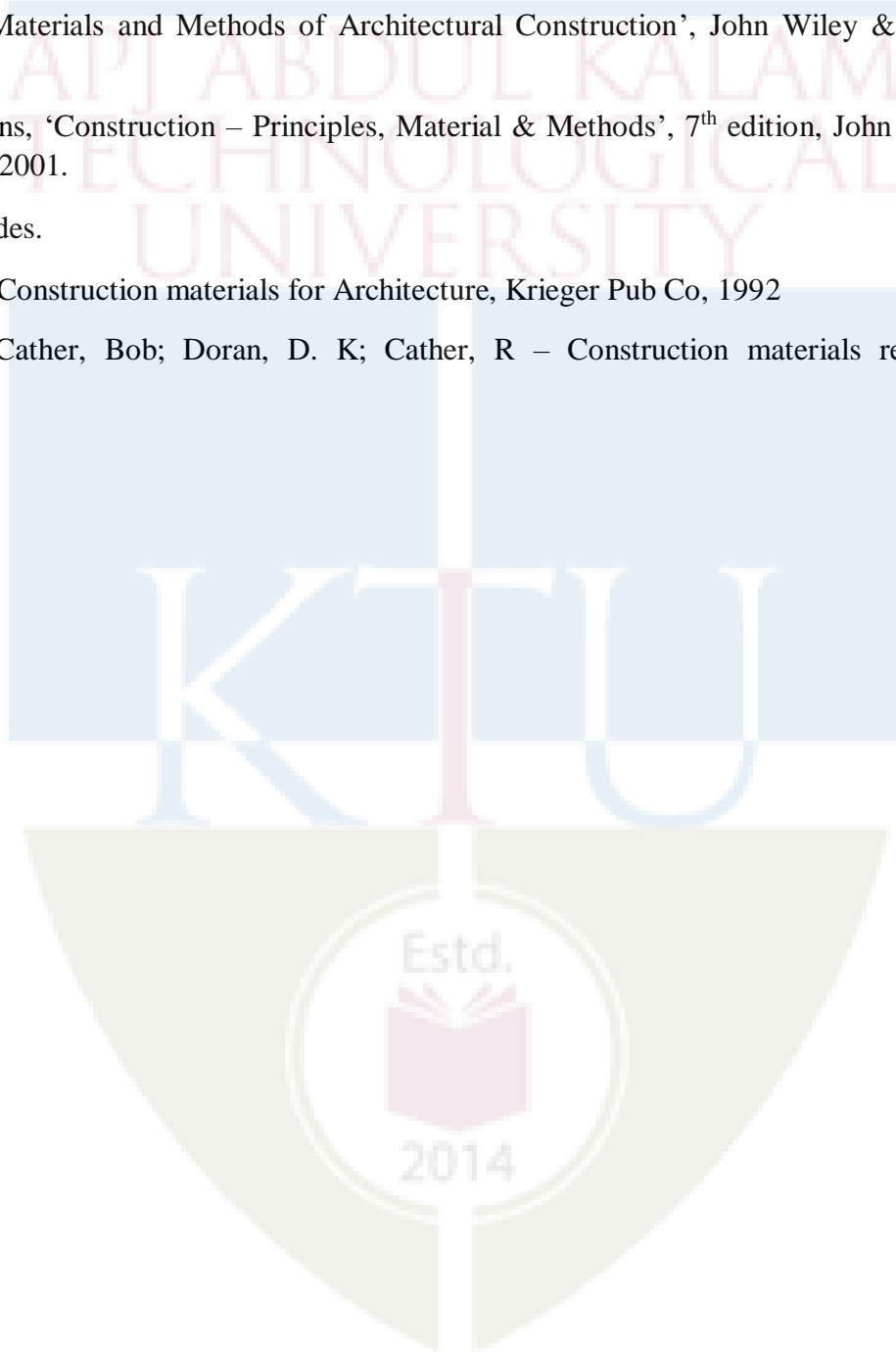
<b>FIRST INTERNAL TEST</b>			
<b>III</b>	<p><b>WOOD SUBSTITUTES</b></p> <p>Industrial products as substitutes for natural hard wood. Characteristics, physical properties, areas of application, available forms and sizes of: Veneers and veneer ply woods, particle board, hard board, fibre board, block board, lamina-boards, glulam, laminates, cement particle board, e-board, bamboo ply, etc.</p> <p><i>Market study: wood substitutes.</i></p>	CO1, CO2 CO3 CO4	9
<b>IV</b>	<p><b>PLASTICS</b></p> <p>Plastic as a building material. Brief history of their use through examples. Manufacture. properties, types, uses and application of plastics in building industry. Different types of adhesives and sealants.</p> <p>Plastic joints. Specific materials such as polycarbonate sheet and teflon. Introduction to plastic based products in building construction such as such as doors, windows, ventilators, partitions, floors, walls, roofs, handrails. Current innovations</p> <p><i>Understanding of product literature/ shop drawings. Site visits with documentation in the form of sketches/ photos</i></p>	CO1, CO2 CO3 CO4	9
<b>SECOND INTERNAL TEST</b>			
<b>V</b>	<p><b>DAMP PROOFING AND TERMITE PROOFING</b></p> <p>Damp proofing: Causes and methods of damp proofing of foundation, effect of damp proofing, materials used for damp proofing, walls, floors, roofs. DPC treatment in buildings, swimming pools, roof gardens, water tanks.</p> <p>Termite proofing: Anti termite treatment, site preparation and soil treatment, physical and structural barriers, post construction treatments.</p> <p><i>Damp proofing: Causes and methods of damp proofing of foundation, effect of damp proofing, materials used for damp proofing, walls, floors, roofs. DPC treatment in buildings, swimming pools, roof gardens, water tanks.</i></p> <p><i>Termite proofing: Anti termite treatment, site preparation and soil treatment, physical and structural barriers, post construction treatments.</i></p>	CO1, CO2 CO3 CO4	9
<b>END SEMESTER EXAMINATION</b>			

**Text Book**

- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005
- Dr.B.C Punmia , Building Construction.

**Reference Books**

- Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
- H Leslie Simmons, 'Construction – Principles, Material & Methods', 7<sup>th</sup> edition, John Wiley & Sons Inc., New York, 2001.
- Relevant BIS codes.
- Rosen Harold J, Construction materials for Architecture, Krieger Pub Co, 1992
- Doran, David; Cather, Bob; Doran, D. K; Cather, R – Construction materials reference book, Routledge, 2013



APJ ABDUL KALAM  
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**SEMESTER-6**

KTU

Estd.



2014

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART302	SPECIFICATIONS, COST ESTIMATION AND BUDGETING	2-1-0-0	3	2021

**Course Objectives:**

The goal of this course is to provide knowledge about various types of estimation and specification of different civil engineering works. It equips students to analyze the rate of various items of work with reference to the standard data and schedule of rate. This course aims to develop capability of students to prepare the detailed estimate of various items of work related to construction and also preparation of the valuation of land and buildings.

**Course Outcomes:** After completion of the course the student will be able to:

**Course Outcomes:** After completion of the course the student will be able to:

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Explain the basic principles of quantity estimation, rate analysis and valuation	Understanding
CO-2	Formulate general and detailed technical specification for civil engineering projects	Applying
CO-3	Use CPWD data book and schedule of rates to prepare unit rate for various items of work pertaining to a Civil Engineering project work	Applying
CO-4	Compute the quantity of materials and labour to estimate the cost of civil engineering projects	Applying
CO-5	Assess the value of a property using different methods	Analysing

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance

: 4 Marks



**End semester examination pattern:**

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

**Syllabus**

Introduction to specifications and analysis of rates of various items of work. Estimation of building construction cost. Valuation of properties.

**Course Plan**

Module	Topic	Course Outcome	No. of Hours
I	<p><b>Introduction to Quantity surveying</b> - Basic Principles, Roles / Responsibilities of quantity surveyor at various stages of construction</p> <p><b>Specifications:</b> Necessity of specification, importance of specification</p> <p><b>Types of Specification-</b> General or brief specifications and Detailed specifications - Principles of Specification writing.</p> <p><b>General specification</b> for first, second and third class buildings</p> <p><b>Writing of detailed specifications,</b> for items like earthwork excavations in foundation, DPC, PCC, RCC, Brickwork, Wood work for doors and windows, Plastering cement mortars, Pointing cement mortar, White washing, Colour washing, Distempering, Painting, Flooring like terrazzo flooring and tiles, ceramic tiles, marble, granite, distemper, glazing, and weathering course in terrace as per National Building Code and CPWD specifications</p>	CO 1 CO 2	8
II	<p><b>Estimate</b> - Details required - Types of estimates</p> <p><b>Approximate estimates</b> (plinth area method and cubic content method only), basic differences and advantages</p>	CO 1	8

	<p><b>Bill of Quantity</b> - Typical format- <b>Item of works</b>- Identify various item of work from the drawings</p> <p><b>Units of measurement</b> of various materials and works (focus may give to RCC residential building) - Methods of measurement of building and civil engineering works as per IS 1200 (Part 1).</p> <p><b>Introduction to Detailed Building Estimation</b> or item rate estimate - Introduction of the format of details of measurement and calculation of quantities, format to prepare abstract of estimated cost.</p> <p>Details of documents to be accompanied with detailed estimate</p>		
<b>FIRST INTERNAL TEST</b>			
III	<p><b>Introduction to the use of CPWD schedule of rates</b> as per latest DSR and Analysis of rate as per latest DAR.</p> <p><b>Analysis of rates, cost of materials and labour for various works</b> such as Earth work in excavation for foundation, mortars, reinforced cement concrete Works, finishing work, masonry work, stone works, flooring with reference to latest DSR and latest DAR (Data should be given).</p> <p><b>Brief introduction to different methods of execution</b> i.e., piece work, daily basis, lump sum, labour rates and percentage etc.</p>	CO 1 CO 3	10
IV	<p><b>Detailed Estimate</b>- Preparation of detailed measurement using Centre line method and Short wall-long wall (separate wall) method for RCC single storied building (Flat roof) including stair cabin-</p> <p>Material quantity calculation of the items of works such as Earthwork excavation, Foundation, Superstructure (Brick work, Rubble work, Concrete works, Plastering and Painting)</p> <p>Approximate quantity of reinforcing steel required for various</p>	CO 1 CO 4	11

	RCC members (Detailed Calculation of reinforcement bars not required). <b>Introduction to format and purpose of bar bending schedule</b> (Detailed schedule preparation is not required)		
<b>SECOND INTERNAL TEST</b>			
V	<b>Valuation</b> – purpose, factors affecting <b>Introduction to terms</b> -Value, Cost, Price, Income- Gross income, net income, outgoings, annuity, sinking fund, Year's purchase. <b>Depreciation</b> – methods of calculating depreciation – straight line method, constant percentage method, obsolescence. Free hold and leasehold properties <b>Methods of valuation</b> - rental method, direct comparison of capital cost, valuation based on profit, depreciation method. Valuation of land – belting method, development method	CO 1 CO 5	8
<b>END SEMESTER EXAM</b>			

**Reference Books**

1. Dutta B N, Estimation and costing in Civil Engineering, UBS Publishers and Distributors Ltd., New Delhi
2. Rangwala, Estimation, costing and valuation, Charotar Publishing House Pvt. Ltd.
3. M. Chakraborty, Estimating, Costing, Specification and Valuation in Civil Engineering, Chakraborti, 2006
4. Mahajan S P, Civil Estimating and Costing, Satya Prakashan, 1996
5. IS 1200: 1968, Methods of measurement of building and civil engineering works
6. CPWD DAR 2018 and DSR 2018 or the latest
7. CPWD Specifications vol. 1 and 2 (2019 or latest)
8. Shah N A, Quantity surveying and specification in Civil Engineering, Khanna Publishers, 1976

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART 304	HISTORY OF ARCHITECTURE AND CULTURE- V	3-0-0-0	3	2021

**Course Objectives:**

The course looks at the architectural developments after 1970s when Modernism was criticised and counter movements such as Post Modernism and Deconstructivism etc became the new theoretical narratives. The period also saw rising environmental consciousness and an attempt for sustainable development. The New Architecture which includes many other disciplines started to take root and the period saw the rise of digital technologies in Architecture. The course gives special focus to local developments- the works of Indian, especially Kerala architects.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Learn the new and contemporary trends in Architecture and how the current world view influences architectural styles	Understanding
CO-2	Learn from the works of contemporary international architects	Understanding, Applying
CO-3	Understand the New trends in Architecture in India and works of contemporary masters	Understanding, Applying
CO-4	Study the Development of Architecture in Kerala post-independence	Understanding, Applying

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 7 marks (Total 5x8=40). Part B questions can have subdivisions.

## Syllabus

Post Modernism

Deconstructivism, Critical Regionalism, Sustainability, Parametricism

New typologies in architecture and their evolution.

Contemporary architects and their works.

Post Independent Architecture in India and in Kerala.

## Course Plan

Module	Topic	Course outcome	No. of hours
I	<p>Critique of Modernism- Challenging CIAM declarations- Historic Revivalism - Pop Architecture - Post and Late Modern Architecture - Writings of Venturi- Jane Jacobs- Aldo Rossi - Christopher Alexander. Works of James Sterling, Charles Moore. Theories of Critical Regionalism, Structuralism, Deconstructivism, Parametricism. CAD/CAM and other digital technologies and their evolution in Architecture.</p> <p>Evolution of new typologies such as malls, resorts, IT parks. Atrium concept in architecture.</p>	CO1	9
II	<p>Industrial aesthetics of Richard Rogers, Norman Foster. Works of I.M.Pei, KenzoTange, Minoru Yamasaki, Toyo Ito. Peter Eisenmann, ZahaHadid, Frank Gehry, Bernard Tschumi, Santiago Calatrava.</p> <p>Rising environmental consciousness, Contemporary concepts of Earthships, Energy Efficiency, Sustainability, Floating Architecture, Berm Architecture. Theory of New Urbanism and Sustainable Architecture. Ideas and Works of Fathy-Ken Yeang -Tadao Ando - Geoffrey Bawa.</p>	CO2	9
<b>FIRST INTERNAL TEST</b>			
III	<p>Architecture and urbanism by great Indian masters: BV Doshi (Institute of Indology Ahmedabad, IIM-Bangalore and Gufa, Ahmedabad) and Charles Correa: (RamaKrishna House, Ahmedabad, Kanchen Junga Apartments, Mumbai and MRF Headquarters, Chennai). Raj Rewal and Uttam Jain (Pragati Maidan, New Delhi and Asian Games Village, New Delhi), Achyut Kanvinde(IIT, Kanpur and Nehru Science Centre, Mumbai), Uttam Jain(Lecture Theatres, Jodhpur and Engineering College, Kota).</p>	CO3	9

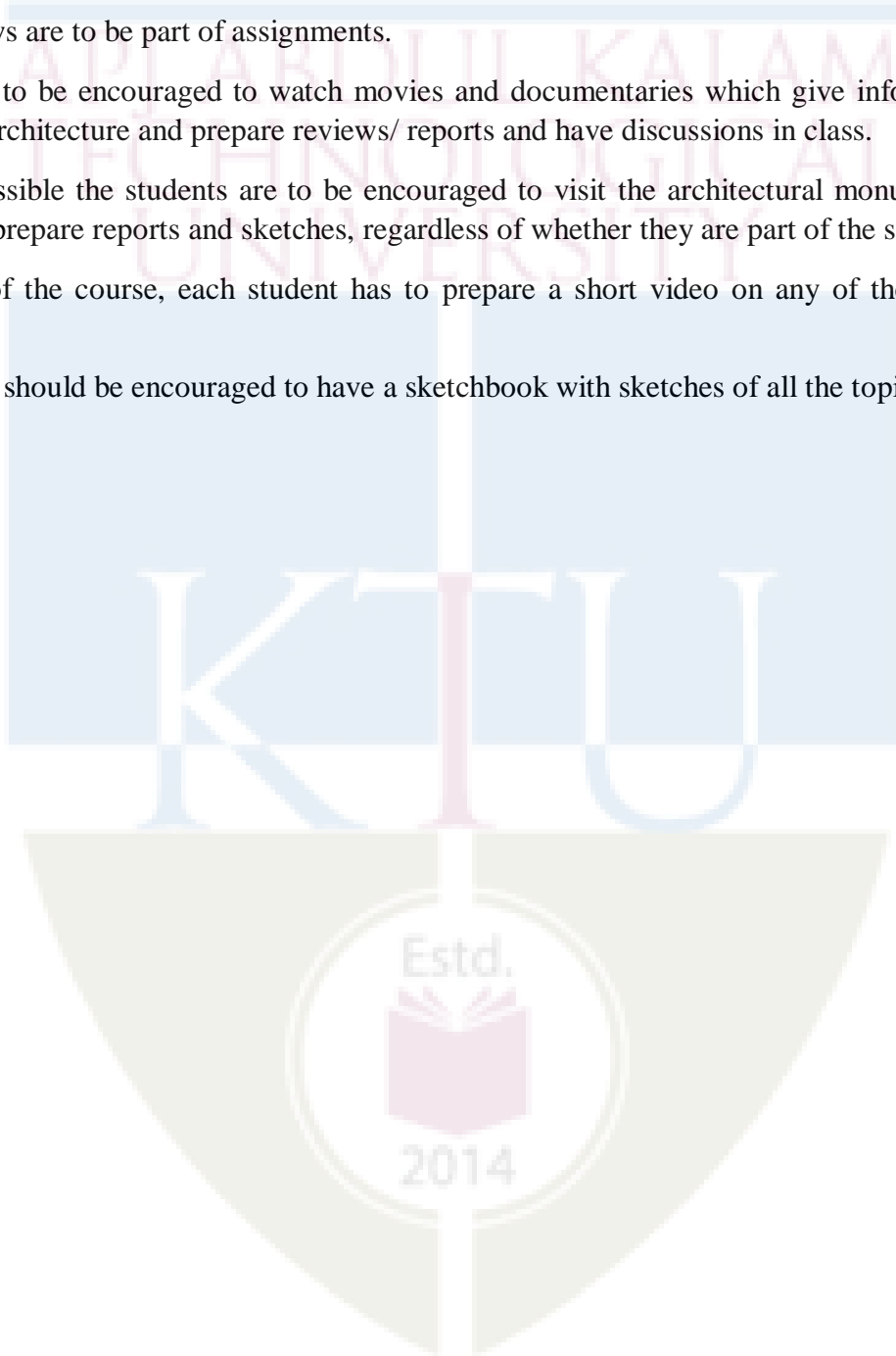
<b>IV</b>	Change in architecture trends from late 1990, Socio-economic changes due to globalization. Rapid urbanisation, Rise of private townships, gated communities and globalised business parks; Rise of informality in production of space. Contemporary theories in Indian Architects like Minimalism, Expressive, Exposed Brick, Earthen Architecture, Sustainable Architecture, etc The concepts of contemporary architects like Hafeez contractor, Christopher Benninger, Sanjay Mohe, Dean D'Cruz, Chitra Viswanath, Jaisim, Morphogenesis Studio etc.	CO3	12
<b>SECOND INTERNAL TEST</b>			
<b>V</b>	Post Independent Architecture in Kerala. Redefining Traditional and Indian Vernacular styles. Change of Role of Courtyard. Works of Contemporary Architects in Kerala. Laurie Baker- CDS, Hamlet.  Study Tour to see Masters' works. Submission of Tour Report.	CO4	7
<b>END SEMESTER EXAM</b>			

**Text Books:**

1. Kenneth Frampton, "Modern Architecture": A Critical History, Thames and Hudson, London, 1994
2. Leonardo Benevolo, "History of Modern Architecture", 2 Vols., Routledge & Kegan Paul, London, 1971.
3. Manfredo Taferi/ Francesodalco, "Modern Architecture", Faber and Faber/ Electa, 1980.
4. Sigfried Giedion, "Space Time and Architecture": The Growth of a New Tradition, Havard University Press, 1978.
5. Thomas Metcalf, "An Imperial Vision", Faber and Faber, London.1989.
6. Aldo Rossi, the Architecture of the City, MIT Press, Massachusetts, 1982.
7. Charles Jencks, the Language of Post-Modern Architecture, 1984.
8. Christopher Alexander, Pattern Language, Oxford University Press, Oxford.
9. D. Ghirardo, Architecture after Modernism, Thames and Hudson, London, 1990.
10. Miki Desai et.al, Architecture and Independence, Oxford University Press, New Delhi, 1998.
11. Robert Venturi, Complexity and Contradiction in Architecture, The Architectural Press, London, 1977
12. Lang, J.T (2002). A Concise History of Modern Architecture in India.
13. Lu, D (Ed). (2011). Third World Modernism, Architecture, Development and Identity. Oxon : Routledge.
14. Mehrotra, R. (2011). Architecture in India Since 1990. Pictor.
15. Singh, M. and Mukherjee, R. New Delhi- Making of a Capital. New Delhi : Roli Books.
16. Tafuri, M. (1980). Modern Architecture. Harry N. Abrams Inc.
17. Verma, P. (2010). Becoming Indian – The Unfinished Revolution of Culture and Identity. New Delhi : Penguin India.

### **Course materials, Guidance and Evaluation methods**

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Faculty to act as facilitator and guide rather than one way lecturing.
- Book Reviews are to be part of assignments.
- Students are to be encouraged to watch movies and documentaries which give information about culture and architecture and prepare reviews/ reports and have discussions in class.
- As far as possible the students are to be encouraged to visit the architectural monuments in their vicinity and prepare reports and sketches, regardless of whether they are part of the syllabus.
- At the end of the course, each student has to prepare a short video on any of the topics in the syllabus.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET 302	THEORY OF STRUCTURES-VI	2-1-0-0	3	2021

### Course Objectives:

This course provides fundamental concepts of commonly practiced structural systems which were not apportioned in the previous TOS courses. The structural behaviour and design concepts of industrial steel buildings, flat slab, grid / coffered floor systems, masonry structures, prestressed concrete elements along with seismic design philosophies are dealt in various modules.

### Course Outcomes:

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Summarise the structural behaviour/concept of commonly practiced structural systems such as industrial steel buildings, flat slabs, grid or coffered floor systems, and prestressed concrete.	Understanding
CO - 2	Explain the structural behaviour of masonry structural elements such as pillars, walls, retaining walls and foundations	Understanding
CO - 3	Design masonry structural elements such as pillars, walls, retaining walls and foundations following Indian standards	Creating
CO - 4	Explain the structural behaviour and EQ resistant design provisions of framed and masonry structures	Understanding

### Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

### Continuous internal evaluation pattern:

Attendance	: 4 Marks
Tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

### End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from



each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

**Standards Permitted in the exam hall:**

IS 1905: 1987 Code of practice for structural use of unreinforced masonry, Bureau of Indian Standards.

**Syllabus**

Industrial steel building - Building configuration and components - Portal frame - Flat slab - Grid or coffered floor systems - Design as per IS code approximate method

Brick masonry pillars and walls - working stress and limit state approaches to analysis and design - Design of unreinforced brick masonry pillars, walls, retaining walls and foundation

Seismic design philosophies - Earthquake resistant design and detailing of framed structures based on IS codes -Earth quake resistant design provisions in masonry structures

Pre stressed concrete – Principles - prestressed beams and slabs - Analysis of rectangular prestressed beams - losses in prestress

**Course Plan**

Module	Topic	Course Outcome	No. of hours
I	Industrial steel building - Introduction - Building configuration and components - load and load combination as per IS 875 - Portal frame - analysis only (design not required) Flat slab - components - proportioning of component as per IS 456 - Structural behaviour - concept only Grid or coffered floor systems - Different configuration - Design as per IS code approximate method	CO1	9
II	Introduction to brick masonry pillars and walls - Mechanical behaviour of masonry assemblages under different gravity loads - working stress and limit state approaches to analysis and design of unreinforced, reinforced, confined masonry structures for gravity loads (Theory only) - Design of unreinforced brick masonry pillars and walls (WSM) using IS 1905: 1987	CO2 CO3	9
<b>FIRST INTERNAL TEST</b>			
III	Design of unreinforced masonry retaining walls – lateral earth pressure – stability of retaining walls Design of unreinforced masonry foundation – types of foundation –loads acting on the foundation	CO2 CO3	9

<b>IV</b>	Seismic design philosophies - Stiffness, strength, ductility, damping, center of mass, center of rigidity, torsion. Strong column- weak beam concept Earthquake resistant design of framed structures based on IS 1893- Reinforcement detailing –beams, columns, beam column joints, openings as per IS 13920. Behaviour of Masonry building during earthquakes. Earth quake resistant design provisions in masonry structures	<b>CO4</b>	<b>10</b>
<b>SECOND INTERNAL TEST</b>			
<b>V</b>	Introduction to Prestressed concrete – Principles of prestressing – Introduction to pretensioned and post tensioned beams and slabs (Concept only) – Analysis of rectangular prestressed beams at transfer and at service – Losses in prestress (theory only)	<b>CO1</b>	<b>8</b>
<b>END SEMESTER EXAM</b>			

**Reference Books/ Standards:**

- IS 1905: 1987 Structural use of unreinforced masonry - code of practice, Bureau of Indian Standards, New Delhi
- IS 4326: 1993, Earthquake resistant design and construction of buildings - code of practice, Bureau of Indian Standards, New Delhi
- IS 13920: 1993 Ductile detailing of reinforced concrete structures subjected to seismic forces - code of practice, Bureau of Indian Standards, New Delhi
- IS 1343: 2012 Prestressed concrete - code of practice, Bureau of Indian Standards, New Delhi
- Dayarathnam, P. Brick and reinforced brick structures, Oxford and IBH Publishing Co. Pvt. Ltd.
- Arya, Masonry and timber structures including earthquake resistant design, Nem Chand & Bros, Roorkee
- Harbhajan Singh, Design of Masonry and Timber structures, Abhishek Publications, Chandigarh.
- Pankaj Agrawal, Manish Shrikhande, Earthquake Resistant Design of Structures, PHI learning Pvt. Ltd
- Shashikant K. Duggal, Earthquake Resistant Design of Structures, Oxford P CVR Murty, “Earthquake Tips”, National Information Centre of Earthquake
- Engineering , [www.nicee.org/EQtips.php](http://www.nicee.org/EQtips.php)
- National Building Code of India 2016 Vol.1, Part 6 Section 4 Structural Design - Masonry
- R E Klingner 2010 Masonry structural design, McGrawHill Companies, Inc. New York
- M Tomazevic 1999 Earthquake-resistant design of masonry buildings, Series on Innovation in Structures and Construction, Vol. 1, Imperial College Press, London
- MJN Priestley and T Paulay 1997 Seismic design and assessment of reinforced concrete and masonry buildings, John Wiley and Sons.
- RG Drysdale, AA Hamid, LR Baker 1994 Masonry Structures: Behaviour and design, Prentice Hall, New Jersey, USA.
- AW Hendry 1981 Structural Brickwork, The Macmillan Press Ltd. Publications

**NPTEL COURSE:**

- NPTEL course on Design of Masonry Structures, by Prof. Arun Menon, IIT Madras, <https://nptel.ac.in/courses/105106197>

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ART 306	BUILDING SERVICES-IV (ARCHITECTURAL ACOUSTICS)	2-0-0-1	3	2021

### Course Objectives

The objective of the course is to develop a basic understanding of the principles of architectural acoustics, the way we hear and perceive sound both indoors and outdoors, the appropriate criteria for listening environment and acoustical privacy, and the architectural decisions of layout and material selection in design.

### Course Outcomes:

After the completion of this course, the student will be able to

Course Outcome	Description of Course Outcomes	Prescribed learning level
CO-1	Identify relevant IS specifications for Acoustic design.	Remembering
CO-2	Understanding the basic concepts of Acoustic design.	Understanding
CO-3	Application and Calculation of Acoustical values	Applying

### Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

### Continuous internal evaluation pattern:

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

### End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carries 8 marks.

## Syllabus

Hearing and Perception-Behaviour of sound in enclosed spaces - Room Acoustics and Reverberation-Sound Absorption- Sound Transmission- acoustical materials- acoustical defects-Design Principles of Auditorium -Air borne & Structure Borne Noise- Planning against noise.

## Course Plan

Module	Contents	Course outcomes	Hours
I	<p><b>Introduction to Architectural acoustics</b></p> <p>The nature of sound - propagation of sound-velocity, frequency and wavelength of sound.</p> <p>Sound pressure - Sound intensity and loudness- Decibel and Phons</p> <p>The human ear and hearing characteristics - Instruments and equipment"</p>	CO2	6
II	<p><b>Room Acoustics</b></p> <p>The behaviour of sound in enclosed spaces (sound phenomena).- Absorption, Diffraction, Diffusion, Reflection, Refraction and Transmission. Design Factors for enclosed spaces- Ray diagram.</p> <p>Acoustic properties of materials and types-Sound absorption coefficient, Sound absorbing materials, Porous materials, Panel materials, and Resonators. Space absorbers - variable absorbers.</p>	CO2, CO3	9
<b>FIRST INTERNAL TEST</b>			
III	<p>Understanding Reverberation Time, Frequency and Volume of spaces.</p> <p>Calculation of reverberation time - Sabine's formula.</p> <p>Acoustical defects in the enclosed spaces.</p> <p><b>Acoustical Design Principles of Auditorium</b></p> <p>Different acoustical defects in auditoriums and their solutions, acoustical correction design and modification techniques.</p> <p><i>Task: Calculating RT of classroom.</i></p>	CO2, CO3, CO1	12

IV	<p><b>Effect of noise on human beings</b></p> <p>Noise sources - airborne and structure borne- Methods of preventing airborne and structure borne noises.</p> <p>Sound transmission- Noise criteria –NC curve - Transmission loss - permissible noise levels for different types of spaces.</p> <p><i>Task: Measuring the noise level of a room, comparing it with IS code recommendations.</i></p>	CO2, CO3, CO1	9
<b>SECOND INTERNAL TEST</b>			
V	<p>Planning for noise control</p> <p>Reduction of noise by Town Planning and regional planning considerations - landscaping, campus planning and building design.</p> <p><i>Task: Acoustical analysis of a neighbourhood/ campus and suggesting remedies.</i></p>	CO2, CO3	9
<b>END SEMESTER EXAM</b>			

### References

- Cavanaugh, Hoboken, Architectural acoustics : Principles and practice, : Wiley & sons, 2010.
- Design for Good Acoustics and Noise Control, Macmillan Education, 1988.
- Ducan Templantation, Acoustics in the built environment, Oxford ; Boston : Architectural Press, 1997.
- J. Flynn, J. A. Kremers, A. W. Segil, G. Steffy, Architectural Interior Systems, Lighting, Acoustics, Air Conditioning, Van Nostrand Reinhold, 1992. .
- Kinsler and Fry, Hoboken, Fundamental of acoustics, NJ : Wiley, 2000
- Knudson and Harris, Acoustical Designing to Architecture, ‘American Institute of Physics for the Acoustical Society of America, 1978
- M. D. Egan , Architectural Acoustics, Mc Grawhill Inc., 1988.
- M. D. Egan, Concepts in Architectural Acoustics, 1972

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT 302 (1)	CULTURALLY RESPONSIVE BUILT ENVIRONMENT	2-0-0-0	2	2021

**Course objectives:**

To Introduce the concepts and theories of cultural discourse and its impact on Built Environment and appreciate built environment as a manifestation of a broader cultural and intellectual setting.

To develop an understanding of cultural expression in built environment as a resultant of the Socio-economic-political roots of the society.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Familiarizing culture and its significance in the development of Built Environment.	Understanding
CO-2	Responsive Built Environments –Theories and Concepts.	Understanding
CO-3	Dwellings, settlement and traditions -Cultural expressions, Contextual cues and their responses in the built environment.	Analyzing
CO-4	Determinants of built form - study of various Socio-political and Economic responses and case studies.	Analyzing
CO-5	Appreciation of the Physical manifestation of built form with respect time to understand the complexity and diversity of Built environments.	Applying

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

### Syllabus

An overview of the development of Responsive built Environment, concepts and theories of culture and built environment, place Identity, Different Cultural expressions, Cultural and contextual cues and their responses in the built environment, Determinants of built form, various Socio-political and Economic responses and various developments across landforms and analysis of specific cases through the complexity and diversity of Indian subcontinent.

### Course plan

Module	Contents	Course outcome	No. of Hours
I	<p><b>Introduction to Culture and Built Environment.</b> Definition of Culture and cultural discourse. Elements of culture and society, Tangible and intangible aspects of culture. Cosmopolitan Society- cultural diversity and multi-cultural mélange.</p> <p>Dwellings, settlements and traditions - Types and evolution of Built environments. Factors influencing the built form. Culture and context, their responses to built environment. Architecture of a Place- Identity and its Significance.</p>	CO1	6
II	<p><b>Theories and concepts of Culture and built environments.</b> Different concepts and theories to study the cultural discourses in Architecture, Organization of space, Concepts of place and spaces. Identity of a place, Place making. Various Dimensions of culturally responsive built environments. Responsive Environments and various determining factors.</p>	CO2	6
<b>FIRST INTERNAL EXAMINATION</b>			
III	<p><b>Architecture as a process and a product of Culture.</b> Vernacular architecture, Resource, materials and technology. Development of various cultural Expressions with case studies from different regions of the world.</p> <p>Understanding the Context -Variations in social-cultural Elements, economic, political and climatic influences and its effects in Built form. Dynamics of Urban and Rural setting, Cultural heritages, Relationship between people and places. Cultural disasters.</p>	CO3	6
IV	<p><b>Determinants of Built Environments.</b> Built form and various elements of built form, Typology of built forms, factors influencing cultural and contextual determinants of built form. Contextual cues, mapping and analysing tools for exploring the built forms in a context and listing the contextual cues</p>	CO4	6

	of a place. Cultural responsiveness from different civilizations/cultural contexts - Europe, Africa, America, Asia and Oceania.		
<b>SECOND INTERNAL EXAMINATION</b>			
V	<b>Perception of Built Environment- Regional context.</b> Understanding the Topographical, Climatic, cultural equilibriums in built environment. Appreciate the evolution of built environment as an outcome of various socio-political, economic influences with respect to the various cultural landscapes of India. Exploring the Parameters of user experience and spatial qualities to responsive built environments, Cultural responsiveness of the following regions: North east India cultural region, Dravidian- cultural region, Bengali cultural region, Sikh cultural region, Kashmiri Muslim cultural region, Ladaki-buddhist cultural region.	CO5	6
<b>END SEMESTER EXAMINATION</b>			

### Reference Books

- Amos Rapoport, *Culture, Architecture and design*, (2005), Locke Science Publishing Company
- Amos Rapoport, *House, Form & Culture*, Prentice Hall Inc 1969.
- King A. (2004). *Spaces of Global cultures: Architecture urbanism identity*. London: Routledge.
- King A (ed) (1997) *Culture, Globalization and the world systems: Contemporary conditions for the representation of Identity*. Minneapolis: University of Minnesota.
- Bourdier J and Alsayyad N (eds) (1989). *Dwellings, settlement and Tradition*. Lanham, Maryland: University press of America.
- Leo Hansen, (2012), *Culture and Architecture, an integrated history*, Cognella Academic Pub.
- Adam Sharr, (2012), *Reading Architecture and Culture: Researching buildings, spaces and documents*, Routledge.
- Bryan Christiansen, Gülşah Koç, Marie-Thérèse Claes, (2016), *Cultural Influences on Architecture*, IGI Global.
- Kingston Heath, (2009), *Vernacular Architecture and Regional Design: Cultural process and Environmental Response*, Architecture press.
- Qian Yin, (2012), *When Culture Meets Architecture*, Design Media Pub.
- Paul Emmons, Jane Lomholt, John Shannon Hendrix, (2012), *The Cultural Role of Architecture, contemporary and historical perspectives*, Routledge.
- Castells M (1997), *The power of Identity*. Oxford: Blackwells.
- Ian Bently, Alan Alcock, Paul Murrain, Sue McGlynn, Graham Smith, (2013) *Responsive Environments- a manual for designers*, Taylor & Francis Ltd.



- Vellinga Marcel, Oliver Paul & Bridge Alexander, *Atlas of Vernacular Architecture of the World*, Taylor & Francis Ltd ,2008
- G.H.R. Tillotsum – *The tradition of Indian Architecture Continuity, Controversy – Change since 1850*, Oxford University Press, Delhi, 1989.
- Oliver, Paul (1987) *Dwellings: the house across the world*. (1987), University of Texas Press.
- Oliver (2006) *Built to meet needs: Cultural issues in Vernacular Architecture*. Oxford: Architectural Press.
- Lang, J Desai M (ed) (1997) *Architecture and Independence: the search for identity –India 1880 to 1980*, Oxford University press.
- Carmen Kagal, *VISTARA—the Architecture of India*, Pub: The Festival of India, 1986.
- Cooper, I. *Traditional buildings of India*. Thames and Hudson Ltd, London, 1998
- Kathleen Kuiper, *the Culture of India*, (2010), Britannica Educational Publishing.
- Dora P. Crouch, Professor Emerita Dora P Crouch, June Gwendolyn Johnson, (2001), *Traditions in Architecture: Africa, America, Asia and Oceania*, Oxford University Press.



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT 302 (2)	THEORY OF DESIGN	2-0-0-0	2	2021

**Course Objectives:**

- To help students to understand the basics of language of architecture
- To make the students to understand substances of Architecture to develop visual language
- To equip students to understand the language of architecture which establishes relationship of space with user
- To do evaluation of Case Studies to effectively understand the poetics in the language of architecture.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To understand the basics of language of architecture	Understanding
CO2	To understand substances of Architecture to develop visual language	Understanding, analysing
CO3	To understand language of architecture that helps them to establish relationship with user	Understanding
CO4	To analyse and summarize the language of architecture through examples	Understanding Evaluating

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

**Syllabus**

Experiencing Architecture, Sensory Experience, Language of Architecture, Evaluation

**Course plan**

Module	Contents	Course outcome	No. of Hours
I	<b>Introduce the essential elements one needs to develop a visual language and the skills for critical thinking:</b> Analysis, Concept, Representation <b>The elements of design process:</b> Program, Context, Environment	CO1 CO2	8
II	<b>Physical Substances of Architecture:</b> Mass, Structure, Surface, Materials <b>Ephemeral Substances of Architecture:</b> Space, Scale, Light, Movement	CO1 CO2	6
<b>FIRST INTERNAL EXAMINATION</b>			
III	<b>Conceptual devices that contribute to Poetics of Architecture:</b> Dialogue, Tropes, Defamiliarization, Transformation <b>Organisational devices that contribute to Poetics of Architecture:</b> Infrastructure, Datum, Order, Grid, Geometry	CO3	6
IV	<b>Considerations an architect might have for the implicit possibility of construction:</b> Fabrication, Prefabrication	CO3	4
<b>SECOND INTERNAL EXAMINATION</b>			
V	<b>Evaluation of Case Studies to effectively understand the Poetics in Language of Architecture</b>	CO4	6
<b>END SEMESTER EXAMINATION</b>			

**Text Books:**

1. Andrea Simitch, Val Warke - The Language of Architecture 26 Principles Every Architect Should Know (2014, Rockport Publishers)

**Reference Books**

1. Juhani Pallasmaa - The Eyes of the Skin - Architecture and the Senses (2012, Wiley)
2. Kate Nesbitt (editor) - Theorizing a new agenda for architecture - an anthology of architectural theory, 1965-1995- Princeton Architectural Press (1996)
3. Leon Krier - The Architecture of Community (2011, Island Press)
4. Steen Eiler Rasmussen - Experiencing Architecture (1964, MIT Press)
5. Anthony C. Antoniades- Poetics of Architecture: Theory of Design (Wiley, 1992)

**Course materials, Guidance and Evaluation methods**

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Representing architecture through drawing, painting, photography, sculpting, printing, physical models etc. can be given as class exercises
- The students can be encouraged to visit architecture through study tours and develop the skill of architectural appreciation by documenting. Each student should be encouraged to have a sketchbook with notes, graphical interpretations, sketches of all the topics covered



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT 302 (3)	APPROPRIATE BUILDING TECHNOLOGIES	2-0-0-0	2	2021

**Course Objectives:**

- To give exposure to the concepts of appropriate building technology and services suitable in global as well as Indian context, and its applicability in both rural and urban environment.
- To give exposure to techniques which encompass choice and application that is small-scale, affordable, decentralized, labor-intensive, energy-efficient, environmentally sustainable, and locally autonomous.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Understand use of appropriate technology and materials suited to the climate, socio-economic conditions and natural resources of an area	Understanding
CO - 2	Study alternative materials and construction techniques developed in recent past and vernacular setting	Understanding
CO - 3	Apply knowledge of science of materials and technology to building construction	Applying
CO - 4	Application of Technologies devised by Research Institutes in architectural design projects	Applying

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance : 4 Marks  
 Continuous assessment tests (2 numbers) : 20 Marks

**End semester examination pattern:**

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

**Syllabus**

Study of appropriate technology and materials suited to the climate, socio-economic conditions and natural resources of an area, and which contribute to sustainable development. Study of alternative materials and construction techniques developed in the recent past.

**Course plan**

Module	Contents	Course outcome	No. of Hours
I	<b>Introduction to appropriate technology and Materials-</b> Definition of appropriate technology, Need, Objectives, Selection of Technologies, Evaluation of appropriateness, Role of appropriate building technology in sustainable development, Types, Advantages, Limitations in use of Technologies	CO1	6
II	<b>Appropriate building materials and technology in vernacular architecture</b>  Timber-frame construction, Wattle & daub walls, rammed earth walls, adobe walls, etc. Walls, vaults, domes using soil cement, compressed mud blocks, Nubian arch roof.  Bamboo as building material, its properties.	CO2	6
<b>FIRST INTERNAL EXAMINATION</b>			
III	<b>Evolutionary trends in Appropriate building technologies</b> – for walls, floors, roofs, joinery- Precast building components- Prefab brick panel system, concrete panel system, jack-arch panel system, earthen construction techniques, pre-cast joists, 3D printing technology, Instant shelter for disaster relief	CO1, CO3	6
IV	<b>Evolutionary trends in Appropriate building materials</b> – for walls, floors, roofs, joinery- Fly ash- sand lime gypsum bricks, compressed earth bricks, ferrocement wall panels, coir polymer composite boards, Non-erodable mud plaster, Ferro cement plaster for mud walls and fire-retardent thatch roof, Ferro cement roofing channels, bamboo mat corrugated roofing sheet, GRP door shutters and frames, fly ash/red mud polymer doors and panel boards Utilisation of waste materials, construction and demolition waste, plastics, supplementary cementitious materials.	CO1, CO3	9

<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	<p><b>Material research, technologies and development by Research Institutes–</b></p> <p>Latest advances in techniques in building construction - Central Building Research Institute (CSIR-CBRI), Structural Engineering Research Centre (CSIR-SERC), National Environmental Engineering Research Institute (CSIR-NEERI), Building Materials and Technology Promotion Council (BMTPC), Centre of Science and Technology For Rural Development (COSTFORD), Auroville Centre for Scientific Research (CSR), Centre for Sustainable Technologies (CST, Indian Institute of Science) and other State level Institutes.</p> <p>Application of these techniques in architectural design projects</p>	CO4	9
<b>END SEMESTER EXAMINATION</b>			

### Reference Books

- S K Duggal, Building Materials, New Age Publishers, 2019
- B C Punmia and Ashok Kumar Jain, Building Construction, Laxmi Publications, New Delhi, 2005
- Henry J Cowan and Peter Smith, The Science and Technology of Building Materials, Van Nostrand Reinhold, 1988.
- Kent A. Harries and Bhavna Sharma, Nonconventional and Vernacular Construction Materials – Characterisation, Properties and Applications, Woodhead Publishing, 2020
- Varis Bokalders and Maria Block, The Whole Building Handbook – How to Design Healthy, Efficient and Sustainable Buildings, Routledge, 2010.
- Gernot Minke, Building with Earth – Design and Technology of a Sustainable Architecture, Birkhäuser Basel, 2006
- Handbook on Energy Conscious Buildings by J.K. Nayak and J.A. Prajapati
- Nayak, J.K. and Prajapati, J.A. Handbook on Energy Conscious Buildings, 2006

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT 302 (4)	TROPICAL ARCHITECTURE	2-0-0-0	2	2021

**Course Objectives:**

To introduce students to the regional, climatic, cultural features of the tropics and the resultant architecture in response to local characteristics.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Interpret the geographical and climatic influences in tropics.	Understanding
CO - 2	Identify the comfort factors for human bioclimatic needs in the tropics.	Understanding
CO - 3	Examine climate responsive passive design strategies in vernacular and modern buildings in tropical zones.	Analysing
CO - 4	Appraise climate responsive and culturally significant vernacular design strategies in shelters for tropical climates.	Evaluating

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

**End semester examination pattern:**



There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

### Syllabus

Regional characteristics of the tropics. Relationship between nature and built form - Architecture in the tropics. Examples of climatic design. Vernacular influence and local architecture in various tropical countries, Warm humid Tropical climate with special reference to Kerala.

### Course plan

Module	Contents	Course outcome	No. of Hours
I	<p><b>Introduction to Tropical regions</b></p> <p>Tropics – definition based on geography and climates.</p> <p>The state of the tropics –Brief on region, ecosystems, environment, cultures, economic and infrastructure growth.</p> <p>Climate change in tropics and impacts, Tropical expansion.</p> <p>Urban growth trends in tropics, Heat effects and indicators, Urban Heat Island (UHI) phenomenon, UHI Classifications, Case studies.</p>	CO1	9
II	<p><b>Climatic response and comfort perceptions.</b></p> <p>Climate of the tropics and classification – Tropical wet climate, Tropical dry climate and Tropical monsoon climate zones. Physiological needs in tropical climatic conditions, Thermal comfort in the tropics – Bio climatic needs of humans</p> <p>Indoor comfort indices for the tropics: Effective temperature (ET), Standard effective temperature (SET), PMV, Comfort Temperature, Adaptive Comfort Model</p> <p>Thermal comfort in the urban outdoors, outdoor comfort indices: WBGT, PET, OUT-SET.</p>	CO1	9
<b>FIRST INTERNAL EXAMINATION</b>			
III	<p><b>Examples of climatic design in various tropical countries</b></p> <p>Vernacular and Contemporary Architecture in the tropics and Subtropical regions.</p>	CO2	9
IV	<p><b>Warm humid tropical climate</b></p> <p>Characteristics of climate, landscape, evolution of climate responsive built forms and architectural features, external and internal spaces. Passive strategies for comfort and energy efficiency. Design treatment of construction elements.</p>	CO3	9

<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	Study of vernacular influence and local architecture as response to climatic conditions of Kerala. Field trip and Climate analysis through observation.	CO4	9
<b>END SEMESTER EXAMINATION</b>			

### Reference Books

- Koenisberger O. H., Ingersoll T. G., Mayhew A., Szokolay S. V., Manual of Tropical Housing and Building, Orient Blackswan, 1975.
- Givoni B., Man, Climate and Architecture, Elsevier Publishing Company Limited, 1969.
- Olgyay V., Design with Climate, Princeton University Press, 2015.
- Krishan A., et al., Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, Tata McGraw-Hill Education, 2001.
- Fry, M. and Drew, J., Tropical Architecture in the Dry and Humid Zones. Londres: Bstford, 1964
- Barreneche, R. A. Tropical Modern Thames and Hudson, London 2003
- Lippsmeier, G., Building en the Tropics, Munich: Callwey, 1969
- Made Wijaya, Architecture of Bali-A Sourcebook of Traditional & Modern Forms, 2011
- Hyde, Richard. Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates. 2013.



Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARD 302	ARCHITECTURAL DESIGN-V	0-0-10-0	10	2021

**Course Objectives:**

- To introduce the students, the design of multifunctional and multi-storied buildings having a complex array of activities.
- To design functionally complex buildings with an understanding of structural systems and the application of various building services and circulation systems.
- To understand advanced construction technology and latest building materials.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Understand and identify different residential typologies and how they relate to spatial use and experience Understand through data collection/literature study/case study, different typologies of multi-story, multi-functional buildings with integration of structural design and building services.	Understanding
CO-2	Application of knowledge to initiate architectural design process within the selected site context by using relevant space standards and building rules to formulate concepts and design. Visualize design concepts and make block and site models and arrive initial design	Applying
CO-3	Analysis and inference through data collection, case studies of projects related to the design project and developing skills so as to create a design programme	Analysing and evaluating
CO-4	Arriving at final site-specific design solution integrating the various requirements of the design programme	Creating

**Mark distribution:**

<b>Total marks</b>	<b>Continuous internal evaluation marks</b>	<b>End semester Jury examination marks</b>	<b>End semester Jury examination duration</b>
100	50	50	2-3 days

**Continuous internal evaluation pattern:**

Attendance : 5 Marks

Design Assignments/Reviews/Tests/ CAD Assignments : 45 Marks

**Syllabus:**

The studio involves the design of multi-functional and multi-storied buildings such as in healthcare (hospitals), hospitality (hotels), apartment complexes, mixed use commercial complexes, etc. The design studio focuses on building services, structural systems, building materials & technology. The studio encourages students to explore functionality, space optimization, conformity with standards & building rules, integration of structural systems and building services in architectural design.

**Course Plan:**

<b>Module</b>	<b>Topic</b>	<b>Course outcome</b>	<b>No. of hours</b>
<b>I</b>	Study of different typologies in multi-functional, multi-storied buildings with emphasis on building services, structural systems, building materials & technology. They will also learn about site planning and landscaping in tight spatial context.	CO-1, CO-2, CO-3	30
<b>II</b>	Study of Space Standards and building codes for design of multi-functional, multi-storied buildings. Detailed study about various building services, structural systems, building materials & advanced construction technology used in multi-functional multi-storied buildings. Arriving at architectural design programme based on user requirements, literature studies, case studies & design standards.	CO-2	30

**FIRST INTERNAL TEST**  
B ARCH 2021

<b>III</b>	Understanding the site, climate & context through site analysis. Application of knowledge to initiate architectural design process within the selected site context by using relevant space standards and building rules to formulate concepts and design. Visualize the design concepts in 3D and make block and site models and arrive initial design.	CO-1, CO-3	30
<b>IV</b>	Critical analysis of the effectiveness of initial design with respect to local context, climate, circulation within site & within building, structure, services, user behavioral patterns, etc. and revising the design accordingly.	CO-1, CO-3	30

**SECOND INTERNAL TEST**

<b>V</b>	Detailed design development with integration of structural systems and building services in architectural layout and construction.  Preparation of final presentation drawings including layout with parking & landscaping, architectural drawings with plans, section & elevations, detailed drawings of building services & structural systems, detailed 3D models, etc.	CO-4	30
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**END SEMESTER EXAMINATION/ JURY****Reference Books**

- Baiche, B. and Walliman, N. (2012). Neufert Architects Data, 4th Ed. Oxford: Wiley-Blackwell.
- Chiara, J. D. and Michael, J. C. 2001. Time Savers Standards for Building Types. Singapore: McGraw Hill Professional
- Geoffrey Broadbent 'Design in Architecture' John Wiley and Sons, 1973.
- Neuferts' Architect's Data
- Roth, L. M. 'Understanding Architecture: Its Experience History and Meaning', 3rd Ed. Philadelphia: West-view press, 2013.
- Rudolf, A 'The dynamics of architectural form', Berkeley and Los Angeles: University of California Press, 1977.
- Aouad, G, 'Computer Aided Design Guide for Architecture, Engineering and Construction', Taylor & Francis Publication, 2011
- Parker, D. And Wood, A. (2013). The Tall Buildings Reference Book. New York: Routledge.
- Wood, A. and Ruba, S. (2012). Guide to Natural Ventilation in High Rise Office Buildings. New York: Routledge.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS 302	<b>BUILDING MATERIALS, CONSTRUCTION TECHNIQUES AND WORKING DRAWING</b>	1-0-0-3	4	2021

**Course objectives :**

The goal of this course is to expose the students to elementary building materials and their applications. It aims to familiarize students to contemporary as well as vernacular and traditional building materials. It will also introduce students to prevailing & relevant BIS specifications and detailed Architectural working drawings. After this course, the students will be able to recognize construction techniques, working drawings and materials in the market and use them in their design visualization.

**Course Outcomes:**

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify the relevant BIS specifications.	Remembering
CO2	Introduce Architectural working drawings.	Understanding, Applying
CO3	Working drawings including detailed construction drawings	Understanding, Applying
CO4	Use the various building materials in their design processes appropriately	Applying
CO5	Understanding advanced concrete and prefabrications	Applying

**Mark distribution:**

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

**Continuous internal evaluation pattern:**

Attendance	: 5 Marks
Continuous assessment tests (2 nos.)	:15 Marks
Portfolio presentation (15) / drawings(15)	: 30 Marks

**End semester examination pattern:**

There will be three parts; Part A, B and C. Part A will contain 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions. Part B will contain 2 questions from each module, of which the student should answer any one. Each question carries 4 marks. Part C will have one essay question which can have subdivisions, to assess the student's capacity for analysing the topics and linking it with other subjects studied. The question carries 15 marks.

**Syllabus**

Wall finishes: Types of Wall finishes. Plaster. Paints and Varnish and Wall cladding. Floor finishes: Types of floor finishes- selection criteria- Methods of fixing. Working Drawings: Detailed working drawings of plan, section and elevations- Construction Details like foundation, joinery etc. Advanced Structural concepts in Architecture : Study of advanced concrete: Light weight, high density, fibre reinforced, polymer concrete- Properties and uses- Admixtures: Pre stressed concrete structures: Precast pre stressed construction Tensile structures: Plate structures

**Course plan**

<b>Mod ule</b>	<b>Topic</b>	<b>Course outcome</b>	<b>No. of hours</b>
<b>I</b>	<p><b>WALL FINISHES AND FLOOR FINISHES</b></p> <p><b>WALL FINISHES:</b> Plaster: Lime plaster and gypsum plaster. Fire resistant plaster, X-Ray shielding plaster and acoustic plaster. Paints and varnish: Characteristics of an ideal paint and varnish. Classification – various types of paints. Painting process. Defects in painting works. Process of varnish. Wall cladding: stone cladding, tile cladding, Wooden cladding and metal cladding. Stucco finish and other finishes.</p> <p><b>FLOOR FINISHES:</b> Types of flooring, methods of laying, furnishing of floors with different floor finishes like cement, coloured cement, mosaic, terrazzo, tiles, wood, parquet flooring, stone, brick etc. Classification &amp; properties of tiles used in flooring. Selection criteria &amp; Methods of fixing various types of tiles</p> <p>Different type of resilient and vibration resistive floor like rubber, Linoleum and PVC flooring.</p>	CO1, CO2, CO3, CO4	<b>10</b>
<b>II</b>	<p><b>WORKING DRAWINGS</b> Introduction to Architectural Drafting. Detailed working drawing of Plans, Elevations, and sections.</p>	CO1, CO2, CO3, CO4	<b>15</b>

<b>FIRST INTERNAL TEST</b>			
<b>III</b>	<p><b>WORKING DRAWINGS</b></p> <p>Construction Details- Foundation details, joinery details, structural plans etc.</p>	CO1,CO2, CO3,CO4	<b>15</b>
<b>IV</b>	<p><b>ADVANCED STRUCTURAL CONCEPTS IN ARCHITECTURE</b></p> <p>Pre stressed concrete structures: Precast pre stressed construction. Two-way waffle slab, Two-way flat plate, Pre tensioning, Post tensioning, Hollow core slabs, T beam and slab.</p> <p>Tensile structures: Concept of tensile structures, classification, uses, materials used. Application of cable structures in architecture.</p> <p>Plate structures: Definition, classification and application, folded plates, flat slab and coffered slab.</p> <p>Special Structures: Concept, Classification and Application of Pneumatic Structures, Kinetic Structures and Mobile Structures, Portal frames: Definition, and Application.</p> <p><i>Sketches: folded pate, Post tensioned slab, Pre tensioned slab, Portal frame.</i></p>	CO1,CO2, CO3,CO4	<b>10</b>
<b>SECOND INTERNAL TEST</b>			
<b>V</b>	<p><b>STUDY OF ADVANCED CONCRETE</b></p> <p>Lightweight, high density, fibre reinforced, polymer concrete, outline of manufacture, properties and uses of the above.</p> <p>Admixtures - Water repellent, waterproofing compounds, accelerators, air entraining agents, hardeners, plasticizer - Their properties and uses.</p> <p><b>PRE-FABRICATION &amp; MODULAR CO-ORDINATION</b></p> <p>Introduction to concepts of Modular Coordination. Definition of Basic Module.</p> <p>Modular controlling dimensions, Planning Modules.</p> <p>Introduction to concepts of prefabrication. Advantages &amp; disadvantages of onsite &amp; off-site prefabrication. Methods of prefabrication. Process of prefabrication.</p> <p>Various issues related to prefabrication industry &amp; Examples of</p>	CO1,CO2, ,CO3,CO4	<b>10</b>



	prefabrication concepts.		
<b>END SEMESTER EXAMINATION</b>			

**Text Book**

- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005
- B C Punmia and Ashok Kumar Jain, Building Construction, Laxmi Publications, New Delhi, 2005

**Reference Books**

- Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
- H Leslie Simmons, 'Construction – Principles, Material & Methods', 7<sup>th</sup> edition, John Wiley & Sons Inc., New York, 2001.
- Relevant BIS codes.
- Rosen Harold J, Construction materials for Architecture, Krieger Pub Co, 1992
- Doran, David; Cather, Bob; Doran, D. K; Cather, R – Construction materials reference book, Routledge, 2013

