



**HINDUSTAN**  
INSTITUTE OF TECHNOLOGY & SCIENCE  
(DEEMED TO BE UNIVERSITY)

**SCHOOL OF PLANNING, ARCHITECTURE & DESIGN EXCELLENCE**

**BACHELOR OF ARCHITECTURE  
(B. ARCH)**

**CHOICE BASED CREDIT SYSTEM (CBCS)  
CURRICULUM AND SYLLABUS**

**EFFECTIVE FROM 2016-2017**

**HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE**  
**SCHOOL OF PLANNING, ARCHITECTURE & DESIGN EXCELLENCE**

**BACHELOR OF ARCHITECTURE (B.ARCH)**  
**(10 SEMESTER PROGRAMME)**

**CURRICULUM EFFECTIVE FROM 2016-2017 (CBCS)**

**SEMESTER I**

S. No.	Code No.	Subject Name	L	T	P	C	TCH
Theory							
01.	MAA112	Mathematics	3	0	0	3	3
02.	ARB111	Visual Arts and Appreciation	2	0	2	3	4
03.	ARB112	History of Architecture - I	3	0	0	3	3
Theory Cum Studio							
04.	ARB113	Materials and Construction I	2	0	2	3	4
05.	ARB135	Computer Studio	1	0	4	3	5
06.	ARB114	Architectural Graphics-I	1	0	4	3	5
Studio							
07.	ARB132	Architectural Design - I (Basic Design)	0	0	10	5	10
<b>TOTAL</b>			<b>12</b>	<b>0</b>	<b>22</b>	<b>23</b>	<b>34</b>

**SEMESTER II**

S. No.	Code No.	Subject Name	L	T	P	C	TCH
Theory							
01.	CEB121	Mechanics of Structures - I	3	0	0	3	3
02.	ARB116	History of Architecture - II	3	0	0	3	3
03.	ARB105	Theory of Architecture - I	2	0	0	2	2
Theory Cum Studio							
04.	ARB117	Materials and Construction - II	2	0	2	3	4
05.	ARB118	Architectural Graphics - II	1	0	4	3	5
Studio							
06.	ARB134	Architectural Design – II	0	0	12	6	12
07.	ARB136	Workshop – Carpentry / Fabrication / Modelling	0	0	4	2	4
<b>TOTAL</b>			<b>11</b>	<b>0</b>	<b>22</b>	<b>22</b>	<b>33</b>

**SEMESTER III**

S.No.	Code No.	Subject Name	L	T	P	C	TCH
Theory							
01.	CEB221	Mechanics of Structures – II	3	0	0	3	3
02.	ARB202	History of Architecture – III	3	0	0	3	3
03.	CEB225	Surveying, Levelling and Building Layout	3	0	0	3	3
04.	ARB201	Theory of Architecture -II	2	0	0	2	2
05.	CEB222	Building Services -I	3	0	0	3	3
Theory Cum Studio							
06.	ARB213	Materials and Construction – III	2	0	4	4	6
Studio							
07.	ARB231	Architectural Design - III	0	0	14	7	14
		<b>TOTAL</b>	<b>16</b>	<b>0</b>	<b>18</b>	<b>25</b>	<b>34</b>

**SEMESTER IV**

S.No.	Code No.	Subject Name	L	T	P	C	TCH
Theory							
01.	CEB224	Design of Structures-I	3	0	0	3	3
02.	ARB204	History of Architecture – IV	3	0	0	3	3
03.	ARB207	Building Science	3	0	0	3	3
04.	ARB215	Climate and Built Environment	3	0	0	3	3
05.	ARB208	Building Services - II	3	0	0	3	3
Theory Cum Studio							
06	ARB216	Materials and Construction – IV	2	0	2	3	4
07.	ARB234	Advanced Computer Graphics	2	0	2	3	4
Studio							
08.	ARB233	Architectural Design – IV	0	0	12	6	12
		<b>TOTAL</b>	<b>19</b>	<b>0</b>	<b>16</b>	<b>27</b>	<b>35</b>

**SEMESTER V**

S.No.	Code No.	Subject Name	L	T	P	C	TCH
Theory							
01.	CEB321	Design of Structures – II	3	0	0	3	3
02.	ARB309	Building Services – III	3	0	0	3	3
03.	ARB310	Contemporary Architecture	3	0	0	3	3
04.	ARB311	Sustainable Architecture	3	0	0	3	3
05.	ARB312	Environmental Science for Architecture	2	0	0	2	2
06.	E1	Elective -I	2	0	0	2	2
Theory Cum Studio							
07	ARB313	Materials and Construction - V	2	0	2	3	4
Studio							
08.	ARB331	Architectural Design - V	0	0	14	7	14
		<b>TOTAL</b>	<b>16</b>	<b>0</b>	<b>16</b>	<b>26</b>	<b>34</b>

**SEMESTER VI**

S.No.	Code No.	Subject Name	L	T	P	C	TCH
Theory							
01.	CEB323	Design of Structures - III	3	0	0	3	3
02.	CEB324	Estimation ,Specification and Costing	3	0	0	3	3
03.	ARB314	Interior Design and Furniture	3	0	0	3	3
04.	E2	Elective II	2	0	0	2	2
05.	OE1	Elective – III (Open Elective – From Other Departments)	3	0	0	3	3
Theory Cum Studio							
06.	ARB315	Materials and Construction - VI	2	0	2	3	4
Studio							
07.	ARB332	Architectural Design - VI	0	0	14	7	14
		<b>TOTAL</b>	<b>16</b>	<b>0</b>	<b>16</b>	<b>24</b>	<b>32</b>

**SEMESTER VII**

S.No.	Code No.	Subject Name	L	T	P	C	TCH
Theory							
01.	ARB405	Landscape and Ecology	3	0	0	3	3
02.	ARB406	Human Settlement Planning	3	0	0	3	3
03.	ARB407	Appropriate Technology	3	0	0	3	3
04.	ARB408	Valuation	3	0	0	3	3
05.	ARB409	High Rise Buildings	3	0	0	3	3
06.	OE2	Elective-IV (Open Elective – From Other Departments)	3	0	0	3	3
Studio							
07.	ARB434	Working Drawings	0	0	16	8	16
		<b>TOTAL</b>	<b>18</b>	<b>0</b>	<b>16</b>	<b>26</b>	<b>34</b>

**SEMESTER VIII**

S.No.	Code No.	Subject Name	L	T	P	C	TCH
01.	ARB437	Practical Training	0	0	24	12	24
		<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>12</b>	<b>24</b>

**SEMESTER IX**

S.No.	Code No.	Subject Name	L	T	P	C	TCH
01.	ARB410	Urban Design and Renewal	3	0	0	3	3
02.	ARB411	Professional Practice & Ethics	3	0	0	3	3
03.	ARB412	Construction and Project Management	3	0	0	3	3
04.	ARB413	Advanced Construction Techniques	3	0	0	3	3
05.	E5	Elective-V	2	0	0	2	2
Studio							
06.	ARB435	Architectural Design - VII	0	0	12	6	12
07.	ARB436	Dissertation	0	0	4	2	4
		<b>TOTAL</b>	<b>14</b>	<b>0</b>	<b>16</b>	<b>22</b>	<b>30</b>

**SEMESTER X**

S.No.	Code No.	Subject Name	L	T	P	C	TCH
Theory							
01.	E6	Elective - VI	2	0	0	2	2
02.	E7	Elective - VII	2	0	0	2	2
Studio							
03.	ARB501	Thesis	0	0	30	15	30
		<b>TOTAL</b>	<b>4</b>	<b>0</b>	<b>30</b>	<b>19</b>	<b>34</b>

**TOTAL NUMBER OF CREDITS: 224****Note:**

- 1 Hour of Lecture (L) = 1Credit
- 2 Hours of Studio in Architectural Design / Materials and Construction / Workshop Architectural Drawing /Computer Studio = 1 Credit
- 2 Hours Dissertation/Practical training/Thesis = 1Credit
- P = Studios / Lab / Dissertation / Workshop /PracticalTraining/Thesis
- TCH = Total ContactHours.

## ELECTIVES

Elective No.	Semester	Code No.	Subject Name	L	T	P	C	TCH
I	V SEM	ARC361	Visual Communication and Architecture	2	0	0	2	2
		ARC362	Building Automation	2	0	0	2	2
		ARC363	Vernacular Architecture	2	0	0	2	2
II	VI SEM	ARC364	Architectural Journalism and Photography	2	0	0	2	2
		ARC365	Defects in Buildings and Retrofitting	2	0	0	2	2
		ARC366	Site Planning and Landscape	2	0	0	2	2
		ARC360	Glass Architecture and Design ( <i>Special Elective in association with Glass Academy</i> )	2	0	0	2	2
III	VI SEM	OE1	Open Elective - (From Other Departments)	3	0	0	3	3
IV	VII SEM	OE2	Open Elective - (From Other Departments)	3	0	0	3	3
V	IX SEM	ARC454	Urban Economics and Sociology	2	0	0	2	2
		ARC455	Architecture of the Future	2	0	0	2	2
		ARC456	Landscape Construction	2	0	0	2	2
VI	X SEM	ARC557	Interior Lighting and Detailing	2	0	0	2	2
		ARC558	Metropolitan Planning	2	0	0	2	2
		ARC559	Urban and Rural Housing	2	0	0	2	2
VII	X SEM	ARC560	Infrastructure Planning and Management	2	0	0	2	2
		ARC561	Conservation and Preservation	2	0	0	2	2
		ARC562	Architectural Criticism	2	0	0	2	2

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**EXCELLENCE**

**BACHELOR OF ARCHITECTURE (B. ARCH) - (Effective from - 2016-2017)**

**SYLLABUS**

**SEMESTER I**

<b>MAA112</b>	<b>MATHEMATICS</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b>	To create the awareness and comprehensive knowledge in engineering mathematics.		
<b>Objectives</b>		<b>Outcomes</b>	
<p>The course should enable the students to:</p> <ul style="list-style-type: none"> <li>Understand the representation of points in space, direction cosines and different forms of the plane. Learns symmetrical and unsymmetrical forms of a straight line and the concept of skew lines.</li> <li>Find the inverse of the matrix by using Cayley Hamilton Theorem and diagonalization of matrix using transformation.</li> <li>Learn the solutions of second order linear differential equations of standard types and Euler's linear differential equation.</li> <li>To understand the process of finding out the radius of curvature in geometric forms</li> <li>Learn partial differentiations involving two and three variables and expansions of functions using Taylor series. Understand the concept of envelopes.</li> </ul>		<p>The students should be able to:</p> <ul style="list-style-type: none"> <li>Use 3D object plots the points in space. Evaluate the direction cosines of a straight line. Determines the shortest distance between the skew lines.</li> <li>Identify Eigen value problems from practical areas and obtain its solutions and to understand the transformation and diagonalising the matrix which would render Eigen values.</li> <li>Recognize and to model mathematically and solving, the differential equations arising in science and engineering.</li> <li>Resolve and get the radius of curvature for a given geometrical form.</li> <li>Expands functions using Taylor's theorem. Understand and model the practical problems and solve it using maxima and minima as elegant applications of partial differentiation. Evaluates the envelopes of standard functions.</li> </ul>	

**UNIT I PLANE AND LINES**

**9**

Direction ratios and direction cosines of a line – Equations of a plane and intersecting planes - Symmetric form of a straight-line - Angle between lines and planes - Coplanar lines- skew lines - shortest distance.

**UNIT II MATRIX**

**5**

Characteristic equation, Eigen values and Eigenvectors of a real Matrix - Cayley -Hamilton Theorem without proof . Reduction of a real symmetric matrix to diagonal form.



<b>ARB111</b>	<b>VISUAL ARTS AND APPRECIATION</b>	<b>3 Credits</b>	<b>L T P C 2 0 2 3</b>
<b>Goal</b>	To understand that arts and art forms were simultaneously developing with architecture in cultures and civilization and to disseminate a broad overview of Art and Design and enabling students to understand visual awareness, creativity and cultural understanding of design as a multi-dimensional creative Art.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the students: <ul style="list-style-type: none"> <li>To understand and appreciate the role of art in history of world architecture- past and present.</li> <li>To familiarize students with grammar of art from the study of works renowned artists.(Sculptures'/painter)</li> <li>To study vocabulary of art and its principles, the symbolic relationship of art and architecture.</li> <li>To identify art in terms of its form: content and context -social and cultural and to develop a sense of aesthetics which is a necessary component in architectural design.</li> <li>To study modern art and new directions –‘isms’ evolved during 19th and 20th centuries and art specific to Indian Context.</li> </ul>		The students should be able: <ul style="list-style-type: none"> <li>To identify, understand and appreciate –Art in Architecture.</li> <li>To create built forms incorporating them judiciously.</li> <li>To understand appropriate indigenous art elements.</li> <li>Appreciate the social and cultural identity achieved through art forms</li> <li>Understand the periodical transformations in art forms</li> </ul>	

## **UNIT I UNDERSTANDING ARTS**

**12**

The definition of art – the need and meaning of works of art – Concept of beauty and aesthetics - Appreciation of art forms – Importance of visual perception – Design elements in Nature.

## **UNIT II ART AND DESIGN – A HISTORIC PERSPECTIVE**

**12**

Drawing – architecture – sculpture – painting - printing minor arts (glass wave stain glass, lithographic prints, etc.) – Industrial art (Art Nouveau, Bauhaus) – Art through ages – Egyptian, Greek, Roman, Modern arts, Cubism, Constructivism, Modernism, Post modernism - Evolution of Art and Design. Works of Raja Ravi Varma, Satish Gujral, N. C. Chandra - Tanjore paintings, Madhubani paintings of Bihar, Kalamkari of Andhra Pradesh,

## **UNIT III UNDERSTANDING ART, DESIGN AND ITS EXPRESSION**

**12**

Relationship between Art and Design with man – Space and environment – Concept of Space – Articulation of Form – Sense of enclosure – Organization of Forms and Spaces – Abstract art – Expressionism – Surrealism – Recent Developments in Indian Arts and Architecture.

**UNIT IV INTRODUCTION TO THEORIES****12**

Golden Proportions – Theory of Scale and Proportion – Vitruvian Theory – Principles of Design – Elements of Design.

**UNIT V AMALGAMATING ARTS, DESIGN AND ARCHITECTURE 12**

Form and Function – Design and Architecture, Illustrations and review of selected examples – Brief overview on modern materials and techniques.

**TOTAL 60****TEXT BOOK**

1. Helen Gardner, Fred S. Kleiner, Christin J. Mamiya, “Art Through the Ages: The Western Perspective”, Cengage Learning, 2005
2. Form Space & Order by Francis D.K. Ching, 3rd Edition, 2007, John Wiley & Sons,

**REFERENCES**

1. Gardner’s Art through Ages by Fred S. Kleiner, 12th Edition, 2005, Wadsworth, Inc.
2. Frank O Gehry: Selected Works by Casey Mathewson, 2007, Fireflybook.ltd.,
3. Bauhaus by Jeannine Fiedler, 2006, Könemann.

**WEBSITES**

[www.arthistoryresources.net](http://www.arthistoryresources.net)  
[www.artfactory.com](http://www.artfactory.com)  
[www.artcyclopedia.com](http://www.artcyclopedia.com)

<b>ARB112</b>	<b>HISTORY OF ARCHITECTURE – I</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b>	To apprise development of architecture in India from river-valley civilization to Indo Aryan Period. Exposure will be on selected examples from various historic periods resulting in an understanding of materials, their uses and development of construction technology.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to; <ul style="list-style-type: none"> <li>• Understand contributions to architecture by the river valley, Aryan and Mauryan civilization and the kinds and building materials and techniques adopted by them.</li> <li>• Understand the influence of Buddhism in northern India and architecture of buildings and caves.</li> <li>• Study the mythological evolution of Hindu temple during the Gupta and Chalukyan period.</li> <li>• Understand the rock cut and stone architecture of Dravidian period and later developments in south India.</li> <li>• Understand the plan forms of Indo Aryan temple.</li> </ul>		The students should be able to; <ul style="list-style-type: none"> <li>• Attain comprehensive knowledge about the development of Aryan and Mauryan civilization and identify different building materials &amp; techniques used by them.</li> <li>• Attain a comprehensive knowledge about the development of Buddhist architecture.</li> <li>• Gain knowledge on the evolution of Hindu temple during the Gupta and Chalukyan period</li> <li>• Attain a comprehensive knowledge about the rock cut and stone architecture of Dravidian period and trace later developments in South India.</li> <li>• Appreciate different plan forms of the Indo Aryan temple with the aid of sketches.</li> </ul>	

## UNIT I ANCIENT INDIA

9

Indus Valley Civilization - Culture and pattern of settlement. Impact of Aryan culture - Vedic village and the rudimentary forms of bamboo and wood, wooden construction under the Mauryan rule.

## UNIT II BUDDHIST ARCHITECTURE

8

Hinayana and Mahayana Buddhism - Interaction of Hellenic & Indian ideas in Northern India - Architectural production during King Ashoka's rule - Ashokan Pillar, Sarnath, Rock cut caves at Barabar, Sanchi Stupa. Salient features of a Chaitya hall and Vihara, Rock cut architecture in the Western and Eastern ghats - Karli, Viharas at Nasik, Rani gumpha, Udaigiri - Takti Bahai, Gandhara.

**UNIT III HINDU ARCHITECTURE****10**

Evolution of Hindu temple - Early shrines of the Gupta and Chalukyan periods – Tigawa temple, Ladh Khan and Durga temple, Aihole, Papanatha and Virupaksha temples, Pattadakal.

**UNIT IV DRAVIDIAN ARCHITECTURE****10**

Dravidian culture - Rock cut productions under Pallavas – Shore temple, Mahabalipuram - Dravidian Order – Brihadeeswara Temple, Thanjavur - Evolution and form of Gopuram - Complexity in temple plan due to complexity in Ritual - Meenakshi temple, Madurai.

**UNIT V INDO ARYAN STYLE****8**

Salient features of an Indo Aryan temple - Lingaraja Temple, Bhuvaneshwar - Sun temple, Konarak. - Kunds and Vavs – Sabali kund vav - Adalaj - Surya kund, Modhera.

**Note:** Practical observation in the form of study visit to a chosen place of interest is preferable to understand the scale and proportion of built up structures.

**TOTAL 45****TEXT BOOK**

1. Satish Grover, "Buddhist and Hindu architecture in India", CBS, New Delhi, 2008
2. The History of Architecture in India from the Dawn of civilization to the End of the Raj, Phaidon, London, 2002
3. Percy Brown, "Indian Architecture (Buddhist and Hindu Period)" - Tarapore Vala and Sons Bombay, 2014.

**REFERENCES**

1. Yatin Pandya, "Concepts of Space in Traditional Indian Arch", Mapin, 2005.
2. Mitchell, George "The Hindu Temple, University of Chicago Press, 1996
3. Spiro Kostof, "A History of Architecture : Setting and Rituals", Oxford University Press, London, 2005 (digitized – 2007).
4. Christopher Tadgell, The History of Architecture in India, Penguin Books (India) Ltd, New Delhi, 1990

**WEBSITES**

<http://library.advanced.org/10098>  
<http://www.encyclopedia.com/articles/05371.html>  
<http://www.cup.org/Titles/09/0521094526.html>

<b>ARB113</b>	<b>MATERIAL AND CONSTRUCTION- I</b>	<b>3 Credits</b>	<b>L T P C 2 0 2 3</b>
<b>Goal</b>	To introduce various building components, elements and conventional materials used in building construction.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student; <ul style="list-style-type: none"> <li>To make understand the basic structural and architectural building components and elements.</li> <li>To develop abilities to learn methods to construct, load bearing and partition walls and piers with simple continuous brick and stone footing foundation.</li> <li>To make students select appropriate building materials based on properties, suitability, application and understand manufacturing process for materials like different types of bricks, stones, terracotta and concrete masonry blocks, embodied energy and impact of the processing and use of these materials on environment.</li> </ul>		The students should be able; <ul style="list-style-type: none"> <li>To differentiate and understand components and different elements of buildings and grasp basics of structural systems such as Load bearing structure, Frame structure and Composite structure.</li> <li>To construct building elements in sub and super structure like load bearing and partition walls and piers with footings in foundations and methods to support side walls of excavation trenches.</li> <li>To select appropriate building materials for different situations.</li> </ul>	

## UNIT I-INTRODUCTION

10

Building components like substructure and super structure , soils, rocks and other types of sub strata - Building elements in sub structure such as foundation, plinth, damp proof course and filling in plinth - Building elements in super structure such as base / sub floor, finished floors of different types, walls- columns, beams sill, lintel, arches, loft, openings and fenestrations like doors, windows, ventilators, fixed glazing, plastering, shading devices, porch and canopies, pergolas, fins, louvres, stairs, intermediate floor, balcony, roof, over hangs, parapet and coping etc

## UNIT II - LOAD BEARING AND PARTITION WALLS , PIERS AND ARCHES 30

Conventional and modular bricks, terminology used, special purpose bricks and bats in bricks - Manufacturing and production methods of burnt and unburnt bricks, compact established earthen, terracotta and concrete masonry blocks. Manufacturing/ processing of sand, aggregate, mud, lime and cement, properties embodied energy and impact on environment - Brick masonry in cement mortar, English bond, Flemish bond, rat trap bond, cavity walls and brick piers. Masonry with compact established earthen, terracotta and concrete masonry blocks. - Types of Hyperbolic Arches in bricks, Principle of load transfer in Arches, terminology used, different components of Arches.

### **UNIT III - STONE/RUBBLE WALLS , PIERS AND ARCHES**

**20**

Classification of rocks, properties, quarrying, cutting and dressing of stone, Terminology used. Embodied energy and impact on environment.- Types of stone masonry like Random rubble, ashlar, coursed and uncoursed rubble masonry etc. - Types of Hyperbolic Arches in stone.

### **UNIT IV- FOUNDATION**

**15**

Definition and function of foundation, types of foundations - Excavation for foundation, timbering in trenches - Foundation base, brick and stone footings in foundation and plinth for load bearing and partition walls and Damp proof courses etc.

### **STUDIO PRACTICALS / SESSIONAL WORKS AND ASSIGNMENTS :**

Manual drafting of Construction drawing sheets/plates, of selected topics in standard format - Periodic visits to the construction sites - Notes /sketches and Site visit reports - Note : Drawing sheets/plates will be evaluated continuously .

**TOTAL 75**

### **TEXTBOOK**

1. S.C. Rangawala, "Engineering Materials", Charotar Publishing House- Anand 2007
2. A.K.Jain & B.C.Punmia, "Building Construction" Laxmi Publications 2008.
3. P.C.Verghese, "Building Materials" Prentice Hall India 2015.
4. B. T.S. Prabhu, V.Paul & C.Vijayan, "Building Design & Civil Engineering Drawing", Spades Publishers 2016.

### **REFERENCE**

1. R. Chudley & R. Greeno, "Building Construction Handbook", Elsevier 2008
2. W.B.Mckay, "Building Construction" Vol 1,2,3- Longmans U.K. 1992.
3. P.C.Verghese, "Building Construction" Prentice Hall India 2016.

### **WEBSITES**

<https://www.naturalstonewarehouse.com>  
<https://weinberger.in>  
<https://www.aboutcivil.org/Stone-Mortars.html>  
<https://theconstructor.org/>

<b>ARB135</b>	<b>COMPUTER STUDIO</b>	<b>3 Credits</b>	<b>L T P C 1 0 4 3</b>
<b>Goal</b>	To introduce the technology of computer system, operation principles, use of other related hardware, with a thrust on 2D and 3D Drafting as a necessity for architects. Coverage will be on drawings objects, fitting, setting, size and dimensioning, with a thrust on advanced 2D and 3D drafting techniques.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• Inform the student, basic understanding of components, operation system, (windows) application software and other accessories.</li> <li>• Make a student understand basic tools of ACAD i.e., formatting (limits, units, etc) drawing tools or drafting, modification of the same.</li> <li>• Make a student to obtain knowledge of advanced tools such as layers, linetype, etc., 2d drafting of building drawings.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Work on systems with ease of the software understanding the performance of the hardware relatively.</li> <li>• Create architectural drawings required for their presentations with precision and accuracy. Revising them without spending much time.</li> <li>• Work at large scale of drawings in terms of Size or complexity in details or levels of a built form.</li> </ul>	

## **UNIT 1 INTRODUCTION TO DRAWING TECHNIQUES**

**10**

Introduction to graphical software; different 2D object drawing methods, editing objects and modifying their associated properties; texts; dimensioning Drawing unit association; scaling; associating limits; model space; organizing drawings in custom layouts, templates.

## **UNIT II ADVANCED 2D DRAFTING TECHNIQUES**

**15**

Concept of blocks and object grouping; styles; organizing objects in layers; hatching techniques; introduction to symbol libraries.

## **UNIT III MISCELLANEOUS CONCEPTS, VIEW AND CO-ORDINATE TOTAL MANAGEMENT**

**15**

Database concepts; Attributes and scripts; Concepts of OLE; Introduction to Auto LISP. Different View management techniques; Concept of UCS; Icon management

## **UNIT IV 3D DRAFTING AND MODELLING**

**15**

Different types of 3D modeling techniques; Solid creation; Editing; Creating complex solids; Boolean operations on solids. Concept of shading; Rendering; Material mapping; Environment attributes

Application of the above in architectural exercises – working drawings such as plan, elevation, section . 3D modelling.

**TOTAL 75**

### TEXT BOOKS

1. AutoCAD 2018 and AutoCAD LT 2018 Essentials ,Scott OnstottScott ,2017 published by sybex and autodesk
2. AutoCAD 2017 Instructor ,James Leach, 2016 SDC publications
3. AutoCAD 2016 For Beginners, kishore Kindle Edition by CAD FOLKS2015
4. Mastering AutoCAD 2016 and AutoCAD LT 2016, George Omur Autodesk Official, Sybex, Inc press 2015
5. Mastering AutoCAD 2016 and AutoCAD LT 2016: Autodesk, [George Omura](#), sybex Inc
6. Tutorial Guide To Autocad 2016, Shawna Lockhart,smith, Schroff Development Corporation,2015
7. Tutorial Guide to AutoCAD 2018, Shawna Lockhart,smith, Schroff Development Corporation,2017

### REFERENCE BOOKS

1. Technical Drawing 101 with AutoCAD 2016,smith, Schroff Development Corporation,2015
2. Technical Drawing 101 with AutoCAD 2015 [Douglas Smith](#), [Antonio Ramirez](#) and [Jana Schmidt](#), Schroff Development Corporation,2014,
3. AutoCAD 2016 Instructor,James Leach, Shawna Lockhart,smith, Schroff Development Corporation,2016
4. Tools for Design Using AutoCAD 2017 and Autodesk Inventor, [Randy Shih](#), Schroff Development Corporation,2016

### WEBSITES

1. <https://www.mycadsite.com/tutorials>
2. <https://www.lynda.com/AutoCAD-training-tutorials/160-0.html>
3. <https://thesourcecad.com/autocad-tutorials>
4. [www.cad-training-course.com](http://www.cad-training-course.com)
5. <https://www.udemy.com/topic/autocad/>

<b>ARB114</b>	<b>ARCHITECTURAL GRAPHICS - I</b>	<b>3 Credits</b>	<b>L T PC 1 0 4 3</b>
<b>Goal</b>	To develop manual sketching and drafting skills through 2D shapes and 3D objects, which is a handy tool to practicing architects.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• Train the student to sketch with pencil &amp; pen drawing and painting both indoor and outdoor using appropriate media.</li> <li>• To comprehend and draw manually using T' Square, set square or parallel drawing in the form of plates.</li> <li>• To understand the relation between Elevation, plan, and section of an object, group of objects and 3D views of simple object, and demonstrate through drawings.</li> <li>• To enable the students to get skillful in presentation techniques.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Have a comprehensive knowledge about the sketching and the usage of color media.</li> <li>• Handle the instruments T square, set square et al manually to draw plan, elevation and section of an object.</li> <li>• Understand the relationship between elevation, plan and section of the objects.</li> <li>• Present architectural drawings professionally.</li> </ul>	

## **UNIT I FREEHAND DRAWING**

**35**

Free hand drawing of object human figures and natural elements – part of building environment, plants, trees, flowers, etc. Outdoor sketching: study of form, their combination balance, etc. Sketching of simple building forms and their relations, simple three-dimensional compositions.

Study of colour, composition, colour rendering of object, plants, interior and exterior spaces. Rendering of objects, built and natural environment with advance presentation skill, surface finishes (human figures, street furniture's, etc.) to communicate meaningfully and effectively.

## **UNIT II GEOMETRICAL DRAWING**

**15**

Plane Geometry - scales and angle construction of planes, curves, circles tangent and regular polygon area construction. Solid geometry - simple projections, projection and development of the solid, section of solids, interpenetration of solids and true shape of sections.

## **UNIT III PRESENTATION TECHNIQUES**

**10**

Introduction to the importance of presentation techniques in working drawings in architectural practice – Working drawing sample – Plan, elevation, section, details to the scale – Format of

the sheet with respect to architectural practice.

## **UNIT IV ORTHOGRAPHIC PROJECTION**

**15**

Introduction to orthographic projections - isometric and axonometric projections. Drawing of lines, basic shapes in different positions. Orthographic projections of planar surface-geometrical shapes like square, circle, hexagon, etc. and combination of shapes. Orthographic projection of 3D object - construction of plan, elevation and section of 3D objects and projections in various positions.

**TOTAL 75**

### **TEXT BOOKS**

1. I.H. Morris, "Geometrical drawing for Art Students", Orient Longman, Kolkata 2004.
2. Albert O. Halse, "Architectural Rendering: The Techniques of Contemporary Presentation", Literary Licensing, LLC, USA, 2011

### **REFERENCES**

1. Julie Collins, Colour Mixing Guide: Watercolour, Search Press, 2015.
2. Francis D.K. Ching, "Architectural Graphics" 5th Ed., Wiley Publications, 2009.
3. Alejandro Bahamon "Sketch Houses", Loft Publications, 2008.
4. Jonathan Andrews, 'Architectural Visions', Brown Publishing AG, 2010
5. Bhatt N.D. Engineering drawing 53rd Edition, Charotar publishing house, 2014.

### **WEBSITES**

<http://freehandarchitecture.com/the-perfect-architectural-drawing-lesson/>  
<http://arch-student.com/pin/category/architecture-students-tutorials/architecture-drawing/>

<b>ARB132</b>	<b>ARCHITECTURAL DESIGN – I (Basic Design)</b>	<b>5 Credits</b>	<b>L T P C 0 0 10 5</b>
<b>Goal</b>	To introduce the meaning of “design” and relate it to “architecture” through an understanding of basic elements and principles of design and analysis of design elements.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• Theoretically understand the various elements of basic design relationship, principles and demonstrate the same through drawing exercises.</li> <li>• Understand the workshop tools and equipments useful for model making and practically experiment with creative design ideas both in exterior and interior applications.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Develop abstract and real compositions in drawings.</li> <li>• Generate concepts and translate them into real and abstract physical models.</li> </ul>	

## **UNIT I BASIC DESIGN I**

**100**

Introduction to Architectural Design through Basic Design. Introduction to elements of design., Properties, qualities, and characteristics of (i) line, (ii) direction, (iii) shape, (iv) size, (v) texture, (vi) value and (vii) colour exercises involving the same including use of the computer. The principles of design relationships - Repetition, Harmony, Contrast. Transformations - Rotation, Reflection, Translation (mirror), Resizing. Symmetry - Reflection symmetry, Rotational symmetry, Point symmetry, Lines of symmetry of plane shapes. Exercises involving the same. The analysis of design elements - Exercises involving the same. Conceptualisation : Generation and translation of concepts as two dimensional drawings and three dimensional models pertaining to above exercises.

## **UNIT II WORKSHOP**

**50**

Use of hand tools and materials in carpentry, masonry and model making. Making mount board models employing cubes, cuboids, square pyramid, cylinder and cones. Space frame models using match sticks, straw, steel wires, bamboo splits. Texture applicability to murals and interior decoration.

**TOTAL**

**150**

## **TEXT BOOK**

1. Maitland Graves – The Art of Colour and Design McGraw-Hill Book company Inc. 1951

## REFERENCES

1. Francis D.K.Ching, “A Visual Dictionary of Architecture”, John wiley & Sons, Inc.1997
2. Professor Miles Lewis, “Architecture – Elements of Architectural Style”, Global Book Publishing Pvt. Ltd.2008.
3. Archiworld Co., Ltd., “Object-Creative Idea & Unique Design” Choseok Publishing2010
4. Edward D.Mills “ Planning -The Architects Hand Book” - Butterworth-HeinemannLtd, London,1985.
5. V.S.Pramar, “Design fundamentals in Architecture”, Somaiya Publications Pvt. Ltd., New Nelhi,1990.
6. Francis D.K.Ching , “Architecture - Form Space and Order”, Van Nostrand Reinhold Co., (Canaa),1980.

## WEBSITES

<http://infinit.net> – elements of design

<http://www.okino.com> - design, visualization, rendering system

<http://www.interface-signage.com>

<http://www.designcommunity.com> – arch rendering, 3D design

## **SEMESTER II**

<b>CEB121</b>	<b>MECHANICS OF STRUCTURES I</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b>	To sensitize students on how structural resolutions become important in realization of architectural design concept. At this stage, students shall be exposed to forces, moments, and resolution that are to be resolved. Concepts of determinate and indeterminate structures. Thrust shall be on steel and concrete structures, and enable students to solve basic, simple problems.		
<b>Objectives</b>		<b>Outcomes</b>	
<p>The course should enable the student to</p> <ul style="list-style-type: none"> <li>• Understand the effect of action of forces on a body and the concept of equilibrium of the body through exercises.</li> <li>• Determine the internal forces induced in truss members due to external loads by working out problems.</li> <li>• Calculate the sectional properties (centroid, moment of inertia, section modulus and radius of gyration) for various sections by working out problems.</li> <li>• Study the stress – strain behaviors of steel and concrete due to axial loads and to determine the stresses and strains developed in solids due to external action through selected problems.</li> <li>• Derive the relationship between elastic constants and solving problems.</li> </ul>		<p>The students should be able to:</p> <ul style="list-style-type: none"> <li>• Understand action of forces on a body</li> <li>• Analyze different types of trusses</li> <li>• calculate centroid, moment of inertia, section modulus and radius of gyration for a given section</li> <li>• Solve problems on stress – strain behaviors of steel and concrete due to axial loads and to determine the stresses and strains developed in solids due to external action</li> <li>• Understand the relationship between elastic constants</li> </ul>	

### **UNIT I FORCES AND STRUCTURAL SYSTEMS**

**5**

Types of force systems - Resultant of parallel forces - principle of moments - principle of equilibrium - simple problems

### **UNIT II ANALYSIS OF PLANE TRUSSES**

**10**

Introduction to Determinate and Indeterminate plane trusses - Analysis of simply supported and cantilever trusses by Method of joints and Method of sections.

### **UNIT III PROPERTIES OF SECTION**

**10**

Centroid- Moment of Inertia - Section modulus – Radius of gyration - Theorem of perpendicular axis - Theorem of parallel axis

#### **UNIT IV ELASTIC PROPERTIES OF SOLIDS**

**10**

Stress strain diagram for mild steel, High tensile steel and concrete - Concept of axial and volumetric stresses and strains.

#### **UNIT V ELASTIC CONSTANTS**

**10**

Elastic constants - Relation between elastic constants - Application to problems.

**TOTAL : 45**

#### **TEXT BOOKS**

1. R.K.Bansal, "A textbook on Engineering Mechanics". Lakshmi Publications, Delhi 2013.
2. R.K.Bansal, "A textbook on Strength of Materials" Lakshmi Publications, Delhi 2012.

#### **REFERENCES**

1. P.C.Punmia, "Strength of Materials" and "Theory of Structures" Vol. I, Laxmi publications, Delhi, 2005.
2. S.Ramamrutham, "Strength of materials", Dhanpatrai & Sons, Delhi, 2011.
3. W.A.Nash, "Strength of Materials" Schaums Series – McGraw-Hill Book Company, 2010.
4. R.K. Rajput "Strength of Materials", S. Chand & Company Ltd., New Delhi 2012

<b>ARB116</b>	<b>HISTORY OF ARCHITECTURE –II</b>	<b>3 Credits</b>	<b>L T PC 3 0 0 3</b>
<b>Goal</b>	To imbibe the development of architecture from pre-historic to Byzantine period through study of selected examples of buildings and their uniqueness in terms of form, material and construction techniques.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• Understand the progress in civilization leading to the development of shelter and how art and architecture emerged in Egyptian civilization.</li> <li>• Understand how science emerged during the Sumerian period and how architecture and planning evolved.</li> <li>• Gain an understanding on the scientific techniques adopted in building construction and art forms introduced by the Greek.</li> <li>• Understand the concept of republican state and the architectural character of Romans.</li> <li>• Appreciate the influences of Christianity on art and architecture and the evolution of Byzantine style.</li> </ul>		The students should be able : <ul style="list-style-type: none"> <li>• To attain a comprehensive knowledge about the development of shelter and art and architecture in Egyptian civilization.</li> <li>• To attain a comprehensive knowledge about the development of science during the Sumerian period and the evolution of architecture and planning.</li> <li>• Express the development of architecture and its contribution towards growth of Greece with the help of sketches.</li> <li>• Articulate knowledge on the development of republican state and the influences it had on the architectural character during the Roman era.</li> <li>• To assimilate the recognition gained by the Christianity in built forms.</li> </ul>	

## **UNIT I PREHISTORIC AGE AND EGYPT**

**6**

Old Stone Age - the Agricultural revolution – The New Stone Age - Development of Shelter. Nature of Art and Architecture - Factors influencing Architecture - Outline of Architectural Character – Great Pyramid of Cheops, Gizeh, Great temple of Ammon, Karnak.

## **UNIT II WEST ASIA**

**10**

Evolution of Sumerian, Babylonian and Persian cultures - Factors influencing architecture - Outline of architectural character – Ziggurat at Ur, Uruk, Palace of Sargon, Khorsabad - Palace at Persepolis.

## **UNIT III GREECE**

**10**

Evolution of city states - Development of Art, Sculpture, architecture in the archaic and classic periods – Factors influencing architecture - Outline of architectural character – optical illusion in buildings, golden section proportioning system, Orders in architecture - Doric Ionic and Corinthian, Parthenon; Erechthion, Athens, Theatre of Epidauros; Tower of Winds.

## **UNITIV ROME**

**9**

Evolution of Republican states - Factors influencing architecture - outline of architectural Character Forum Romanum; Rome; Thermae of Caraculla; Colloseum Rome; Pantheon, Rome: Circus Maximus, Rome.

## **UNIT V EARLY CHRISTIANAND BYZANTINE**

**10**

The characteristic features of Byzantine Architecture- Evolution of church forms - Factors influencing architecture - Outline of Architectural character - St. Clement, Rome St. Sophia, Constantinople ; St. Marks, Venice; St. Vitale, Ravenna.

**TOTAL 45**

## **TEXT BOOK**

1. Sir Banister Fletcher, “A History of Architecture”, University of London, CBS 2002, 20th edition.

## **REFERENCES**

1. John North Hopkins– The Genesis of Roman Architecture, Yale University,2016.
2. Cyril M. Harris- Illustrated Dictionary of Historic Architecture–Mc graw hill,2013.
3. Mark J. Johnson, Amy Papalexandrou, “Approaches to Byzantine Architecture andits Decoration”, Ashgate Books , 2016

## **WEBSITES:**

1. <https://www.khanacademy.org/humanities/ancient-art-civilizations/roman/beginners-guide-rome/a/roman-architecture>
2. [https://www.ancient.eu/Egyptian\\_Architecture/](https://www.ancient.eu/Egyptian_Architecture/)
3. [https://www.ancient.eu/Greek\\_Architecture/](https://www.ancient.eu/Greek_Architecture/)
4. <http://www.buffaloah.com/a/archsty/byz/>

<b>ARB105</b>	<b>THEORY OF ARCHITECTURE- I</b>	<b>2 Credits</b>	<b>L T P C 2 0 0 2</b>
<b>Goal</b>	To establish the understanding that architecture is a social/human need and to develop a vocabulary for future design processes in understanding the relation and impacts of Space & Mass, elaborating and discussing aesthetic components in design & finally introducing the use of color in architecture.		
<b>Objectives</b>		<b>Outcomes</b>	
<p>The course should enable the student to:</p> <ul style="list-style-type: none"> <li>• Understand various definitions of architecture and justifications for architecture creations</li> <li>• Understand the relationship between function and aesthetics through analysis of selected buildings.</li> <li>• Understand the relationship between mass, geometrical form and space through analysis of selected buildings.</li> <li>• Understand the definition and use of components of design by studying representative examples.</li> <li>• Understand the definition, combination and relationship and symbolism of using color in architecture</li> </ul>		<p>The students should be able to:</p> <ul style="list-style-type: none"> <li>• Define architecture and recognize its influence on society</li> <li>• Connect function and aesthetic in future design processes</li> <li>• Recognize the relation between of space and mass and translate it into design</li> <li>• Develop a design vocabulary for the various aspects of aesthetic components in design and actively apply them.</li> <li>• Apply color in architecture with the theoretical knowledge about the physical and psychological effects</li> </ul>	

## **UNIT I INTRODUCTION TO ARCHITECTURE**

**5**

Definition of Architecture - Elements of Architecture backed by need and followed by fulfillment of need.

## **UNIT II SCOPE OF ARCHITECTURAL DESIGN**

**5**

Architectural design - An analysis - Integration of aesthetic and function.

## **UNIT III ARCHITECTURAL SPACE AND MASS**

**5**

Mass and space, visual and emotional effects of geometric forms and their derivatives - The sphere, the cube, the pyramid, the cylinder and cone.

## **UNIT IV AESTHETIC COMPONENTS OF DESIGN**

**10**

Proportion, scale, balance, rhythm, symmetry, hierarchy, pattern and axis with building examples.

Effect of colour in Architecture - Colour symbolism – A case study on colour theory in any famous architectural buildings - A small scale project incorporating all the principles learnt in all the units.

**TOTAL 30**

**TEXT BOOKS**

1. Francis D.K.Ching, “Architecture-Form, Space and Order”, 3rd ed. John Wiley,2007
2. Simon Unwin, Analysing Architecture, Routledge, London,2003.
3. V.S.Pramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Delhi, 1997.

**REFERENCES**

1. Leland M. Roth - Understanding Architecture, its experience history and meaning, Craftsman house, 1994.
2. Peter von Meiss -Elements of architecture - from form to place, Spon Press1992.
3. Rudolf Arnheim- The dynamics of architectural form, University of California Press2009.
4. Paul Alan Johnson - The Theory of Architecture - Concepts and themes, Van Nostrand Reinhold Co., New York,1994.
5. James F. Eckler - The language of space and form, John Wiley and sons, New Jersey,2012.
6. ThefourelementsofArchitecture-SemperGoltfried-CambridgeUniversitypress,London,2011

**WEBSITES**

<https://www.archdaily.com/488929/a-theory-of-architecture-part-1-pattern-language-vs-form-language>  
[http://www.arch.ttu.edu/people/faculty/Neiman\\_B/bldgex06/2006\\_09\\_15\\_theory\\_arch\\_analysis.pdf](http://www.arch.ttu.edu/people/faculty/Neiman_B/bldgex06/2006_09_15_theory_arch_analysis.pdf)

<b>ARB117</b>	<b>MATERIALS AND CONSTRUCTION-II</b>	<b>3 Credits</b>	<b>L T P C 2 0 2 3</b>
<b>Goal</b>	To enable students learn about different types flooring in different materials, openings like doors, windows and Ventilators etc.in Timber and other allied materials and to learn about flooring, trussed lean-to and sloping roofs of the building, using Timber and other allied materials with more emphasis on use of new innovative use of timber, timber products and allied environment friendly materials.		
<b>Objectives</b>		<b>Outcomes</b>	
<p>The course should enable the student</p> <ul style="list-style-type: none"> <li>• To understand and learn materials and construction of different types of flooring.</li> <li>• To understand and learn construction of Timber Flooring and with use of innovative materials.</li> <li>• To familiarize students with different types of openings as doors, windows, ventilators etc, in buildings, using timber and timber products</li> <li>• To understand learn different types of roofs, fundamental principle of trussed roof with Different types of conventional roof covering materials.</li> </ul>		<p>The students should be able:</p> <ul style="list-style-type: none"> <li>• To design and construct different types of flooring with different materials including timber and its byproducts and new materials, in different situation as per their functional role and suitability.</li> <li>• To understand and learn, design and construction techniques of making Timber openings, and joints in timber.</li> <li>• To understand and learn to construct different trussed roofs and to use different conventional roof covering materials</li> </ul>	

## **UNIT I– FLOORING**

**15**

Introduction to flooring, subfloor and finish floor, different types of flooring materials - manufacturing process, qualities, embodied energy and impact on environment. - Method of construction and laying of Indian patent stone (IPS) flooring, Terrazzo / Mosaic - casting in situ flooring, tiles and cut stone flooring like cement tiles, marble mosaic tiles, ceramic - tiles, glazed tiles, cut stone tiles like marble, granite, kota, cuddappah, etc.,- Fixing of tiles in floor, skirting, dado.

## **UNIT II –TIMBER FLOORING**

**20**

Types of timber, properties, limitations, usages cutting, sawing, seasoning and defects. - Manufacturing process of Plywood, Particle boards, Fiber boards, chip boards and other innovative materials, - properties, limitations, impact on environment and embodied energy.- Introduction to different types of Timber flooring and flooring with use of other timber products like Ply wood, Particle boards and other innovative environment friendly materials . - Structural system to support floor boards/planks.

### **UNIT III - FENESTRATION / OPENINGS IN TIMBER AND TIMBER PRODUCT 20**

Introduction to openings, functional role, locations and terminology used- Timber Doors/Windows like single / double shutters, partly paneled, Partly glazed door/windows, fully glazed doors of different types like ledged and battened, Paneled doors / flush doors etc., - Special purpose and decorative glazed / paneled doors like revolving, sliding and folding. - Guard bars grill, fittings and fixtures and accessories used with door/windows.- Different types of ventilators and fan lights like, top hinged, side hinged, centrally pivoted and louvered both adjustable and fixed.

### **UNIT IV – TIMBER AND OTHER TIMBER BYPRODUCT TRUSSES 20**

Introduction to trusses, terminology used, element of trusses and their classification, load transfer

in trusses etc. - Different elements of trusses and terminology used. - Different types of trusses on different supports like, brick pier, RCC column etc., - Conventional roof covering materials and fixing details.

### **STUDIO PRACTICALS / SESSIONAL WORKS AND ASSIGNMENTS**

Manual drafting of Construction drawing sheets/plates, of selected topics in standard format - Periodic visits to the construction sites.- Notes /sketches and Site visits reports.

Note : Drawing sheets/plates will be evaluated continuously preferably in studio.

**TOTAL 75**

### **TEXTBOOK**

1. S.C. Rangawala, "Engineering Materials", Charotar Publishing House- Anand 2007
  2. A.K.Jain & B.C.Punmia, "Building Construction" Laxmi Publications, 2008.
  3. P.C.Verghese, "Building Materials" Prentice Hall India 2015.
- B. T.S. Prabhu, V.Paul & C.Vijayan, "Building Design & Civil Engineering Drawing", Spades Publishers 2016.

### **REFERENCE**

1. R. Chudley & R. Greeno, "Building Construction Handbook", Elsevier 2008
2. W.B.Mckay, "Building Construction" Vol1,2,3- Longmans U.K. 1992.
3. P.C.Verghese, "Building Construction" Prentice Hall India 2016.

### **WEBSITES**

[https:// www. timberproducts.com](https://www.timberproducts.com)  
<https://mangalore tiles.com>  
<https://theconstructor.org/>

<b>ARB118</b>	<b>ARCHITECTURAL GRAPHICS - II</b>	<b>3Credits</b>	<b>L T PC</b> 1 0 4 3
<b>Goal</b>	To perceive built environment in terms of their detail, form, colour, texture, so as to present architectural design solutions in a realistic way.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to : <ul style="list-style-type: none"> <li>• Make the student conversant with architectural drafting using instruments, train him to draw and write with knowledge on composition, of selected components and details of a building.</li> <li>• Enable a student understand the theory of perspective to draw an object and later on simple buildings in perspective by doing series of exercises.</li> <li>• Make a student understand the theory and purpose of casting shade and shadows in buildings in simple objects and later in simple building through selected exercises</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Articulate knowledge on composition and detailing in measured drawing.</li> <li>• Identify and understand the perspective.</li> <li>• Understand the casting of shade and shadow on any object.</li> </ul>	

## **UNIT I MEASURED DRAWING**

**30**

Principle of basic architectural drafting - line value lettering basic, multiview projections and sections - presentation formats. Measured drawing of simple objects (like furniture, entrance gates, etc.) and building components (like columns, cornice, door, window, etc.) Detailed measured drawing/documentation of historic and architectural monument or building.

## **UNIT II PERSPECTIVE**

**30**

Characteristics of Perspective Drawings, Perspective systems and methods, Two point perspective of simple objects, outdoor and indoor view of a building, etc. One point and three point perspective of interiors Perspective theory and practice

## **UNIT III SCIOGRAPHY**

**15**

Principles of shades and shadows - Shadows of lines and circles, Shadows of architectural elements, circular solids, buildings, etc.

**TOTAL 75**

## **TEXT BOOKS**

1. T.Jeyapoovan “Engineering Drawing and Graphics Using Autocad” Vikas Publishing House, Pvt. Ltd.,2010.
2. K. V. Natrajan, “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai(2006)

## **REFERENCES**

1. Francis D K Ching “Design Drawing”, Wiley India Pvt Ltd,2012
2. Jonathan Andrews “Architectural Visions: Contemporary Sketches,Perspectives, Drawings”, Thames & Hudson, 2010.
3. Francis D.K. Ching, “Architectural Graphics” 5 th Ed., Wiley Publications,2009
4. Bhatt N.D. Engineering drawing 53 rd Edition, Charotar publishing house,2014.
5. Rendow Yee, Architectural Drawing: A Visual Compendium of Types and Methods, John Wiley & Sons; 4th Edition, New Jersey,2013.

## **WEBSITES**

<http://www.drawinghowtodraw.com/drawing-lessons/Perspective- Drawing/#basic>  
<https://www.studentartguide.com/articles/one-point- perspective-drawing>

<b>ARB134</b>	<b>ARCHITECTURAL DESIGN – II</b>	<b>6 Credits</b>	<b>L T P C</b> 0 0 12 6
<b>Goal</b>	To bring in confidence as to how basic design principles and knowledge are used in solving simple space, small span buildings and create spaces and buildings responding to human anthropometrics and creating environments which are barrier free.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Enable a student understand the basics of anthropometrics, its application in articulating vertical, horizontal space and later on in simple buildings including considerations for physically challenged through a design process resulting in specific typologies, as specified.</li> <li>• Enable a student to work with hand, details, and simple models of selected elements of components of a building. Later on the students are to be trained to make models of simple buildings and structure, which they design in their exercises.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Trained to solve design solutions based on simple typologies</li> <li>• Present design solution in the form of drawings</li> </ul>	

## **UNIT I DESIGN STUDIO**

**100**

The problems involve simple space organization starting with single spaces single use-small span Horizontal movement-single bay-passive energy type spaces. The study of space standards and anthropometrics related to each problem is stressed upon. Anthropometry as related to physically handicapped and elderly persons are required to be studied.

Examples of exercises include Design of toilet for a physically handicapped person, hostel room, bedroom, kitchen, Shop, pavilions, snack bar, Residence, petrol bunk, fire station, police station.

## **UNIT II WORKSHOP II**

**80**

Elementary models indicating wall surfaces floral designs, ceilings, glass areas, lawn, water bodies, etc. Block models of small campuses using wood, thermacol mount board, soap, cork board, etc.

Detailed model of a small buildings like branch bank, small residences, bus shelter, snack bar, including landscape details.

**TOTAL: 180**

### **TEXT BOOKS:**

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time – Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).

4. Ed.By.Quentin Pickard RIBA “The Architects’ Hand Book”, Bladewell ScienceLtd., 2002

## **REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi,1997
2. National Building book of India 2005, Bureau of Indian Standards, NewDelhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London,1982
4. A visual dictionary of Architecture, Francis D.K.Ching, John wiley & Sons, Inc.1997

## **WEBSITES**

1. [www.design basics.com/](http://www.designbasics.com/)-(on house type –Americans)
2. <http://www.geosystems.gatech.edu/> - (on detail designmethod)
3. <http://www.c.s.berkely.edu/> - (on bubble diagram builder withinteraction)
4. <http://www.plannet.com/resources.htm> - (on resource info)

<b>ARB136</b>	<b>WORKSHOP -I</b>	<b>2 Credits</b>	<b>L T PC</b> 0 0 4 2
<b>Goal</b>	To introduce conventional as well as contemporary materials and techniques used for Model Making, Carpentry and Fabrication.		
<b>Objectives</b>		<b>Outcome</b>	
The course should enable the students to: <ul style="list-style-type: none"> <li>• Be familiar with the knowledge on design method for assembling, sculpting and fabricating. Also know about partial safety factor, stress - strain relationship of materials.</li> <li>• Be acquainted with the knowledge on design of models.</li> <li>• Gain knowledge on different materials and their safe usage.</li> <li>• Be familiar with the importance of Site tidiness and Safety measures to be undertaken.</li> <li>• Gain knowledge on load distributions, Balance and Stabilization in relation to laws of Physics while erecting models.</li> </ul>		The students will be able to: <ul style="list-style-type: none"> <li>• Develop knowledge about modelmaking.</li> <li>• Use the laws of physics for molding stabilized models.</li> <li>• Use different materials and techniques.</li> <li>• Use conventional as well as contemporary materials and their usage techniques.</li> </ul>	

#### **UNIT I MATERIALS AND TECHNIQUES(Carpentry)**

**5**

Introduction to tools and equipment - Materials such as Timber, Plywood, System formwork components: their classification, identification, selection, properties - Site tidiness and Safety measures - Techniques used for Cutting and Joining - Different Joineries.

#### **UNIT II DESIGN (Carpentry)**

**15**

Model Making – Building Construction models - Conceptual Derivations in terms of innovations brought in the material's usage – Timber Joineries – Furniture Making

#### **UNIT III MATERIALS AND TECHNIQUES(Modeling)**

**5**

Introduction on Sculpture making - Nature study, study of Human Body limbs, study of Animals and Birds Body - Brief understanding on history of Sculpture making - Different Materials introduction- P.O.P, Thermocol, Clay, Wires - Introduction to tools and methods of using – Water – Material ratios - Safe usage of tools and Site tidiness

#### **UNIT IV DESIGN (Modeling)**

**15**

Model Making - Thermocol Model, Furniture model, Sculpture making - Conceptual Derivations in terms of innovations brought in the material's usage – Understanding Physical Properties of materials by their usage.

**UNIT V MATERIALS AND TECHNIQUES (Fabrication) 5**

Introduction on conventional installations done in an around world using contemporary materials - Different materials introduction – Tensile materials, Dry leaves, repetition of fundamental material - Preparation techniques and smart tricks to make the material's use efficient - Techniques for load bearing and self-stabilized fabrications - Safe usage of tools and Site tidiness

**UNIT VI DESIGN (Fabrication) 15**

Model Making – Tallest model with Lightest Material, Tin Boxes, Tensile/Dry leaves canopy, Abstract installations - Conceptual Derivations in terms of innovations brought in the material's usage - Understanding Physical Properties of materials by their usage

**TOTAL: 60**

**REFERENCES**

1. Model making: Materials & Methods by David Neat, 2008, Crowood.
2. Timber Construction Manual by Herzog, Schweitzer, Volz, Winter 4 th Edition, 2005, Birkhauser
3. Architectural Origami: Create models of the World's great buildings by Ingrid Siliakus, Apple 2009
4. "Fun with paper folding" by Atsuko Nakata, Kazuo Kobayashi Publisher: Froebel-Kan Co.Ltd.,
5. Carpentry by Floyd Vogt, 6 th Edition, 2014, Delmar Learning.

**WEBSITES**

[www.firstpalette.com](http://www.firstpalette.com)  
<https://www.youtube.com/watch?v=FaWKjzIp7d0>  
<https://www.youtube.com/watch?v=YX5H71rLGB8>  
<https://www.youtube.com/watch?v=1wgsXuAW2W8>  
[www.startwoodworking.com](http://www.startwoodworking.com)

## SEMESTER III

<b>CEB221</b>	<b>MECHANICS OF STRUCTURES II</b>	<b>3 Credits</b>	<b>L T PC</b> 3 0 0 3
<b>Goal</b>	To impart the students with knowledge about different types of parameters for the design of beam and column		
<b>Objectives</b>		<b>Outcome</b>	
The course should enable the students to <ul style="list-style-type: none"> <li>• Understand shear force and bending moment.</li> <li>• Understand shear stress distribution and bending moment distribution</li> <li>• Learn to find slope and deflection of beams</li> <li>• Understand the behaviour of long and short columns</li> <li>• Learn the behaviour of continuous beams</li> </ul>		The course should enable the students to <ul style="list-style-type: none"> <li>• Impart knowledge on shear force and bending moment.</li> <li>• Learn shear stress distribution and bending moment distribution</li> <li>• Learn to find slope and deflection of beams</li> <li>• Understand the behaviour of long and short columns</li> <li>• Learn the behaviour of continuous beams</li> </ul>	

### UNIT I- SHEAR FORCE AND BENDING MOMENT

**10**

Concepts of shearing forces and bending moments - shear force and bending moment diagrams for cantilever and simply supported beams subjected to point load, uniformly distributed loads and their combinations

### UNIT II -STRESSES IN BEAMS

**10**

Theory of simple bending - bending stresses in beams, shear stresses in beams - examples on simple sections. Stress distribution diagrams.

### UNIT III- DEFLECTION OF BEAMS

**10**

Slope and deflection at a section - Double Integration method for calculation of deflection for simply supported and cantilever beams for concentrated loads and uniformly distributed loads.

### UNIT IV- THEORY OF COLUMNS

**10**

Short and long columns - Euler's theory and its limitations - Derivations of Euler's formula (for different end conditions) – Rankine's formula for columns (No derivations) – Application to simple problems.

### UNIT V- INTRODUCTION TO INDETERMINATE STRUCTURES

**5**

Concept in Analysis of continuous beams, fixed beams, and partial frames (No analysis problems).

**TOTAL: 45**

**TEXT BOOKS**

1. R.S.Khurmi, N. Khurmi, “Strength of Materials”, S.Chand & Company Ltd., New Delhi. 2015.

2.M.M.Ratwani& V.N.Vazirani, “Analysis of Structure”, Vol.1, Khanna Publishers – Delhi, 2008

**REFERENCES**

1. Timoshenko, S.P., and D.H. Young, “Elements of Strength of Materials”, Fifth edition, East West

Press, 2015.

2. B. C. Punmia Ashok Kr. Jain Arun Kumar Jain, “Strength of Materials and Theory of Structures”, Vol. 1, Laxmi publications, New Delhi 2017.

3. R.K. Rajput “Strength of Materials”, S.Chand & Company Ltd., New Delhi.2012.

<b>ARB202</b>	<b>HISTORY OF ARCHITECTURE -III</b>	<b>3 Credits</b>	<b>L T PC</b> 3 0 0 3
<b>Goal</b>	To inform the development of architecture of Europe from the Romanesque period to the Renaissance period, (6 <sup>th</sup> - 16 <sup>th</sup> Century AD). To understand the impact of various geographical, cultural, social, religious and political forces on architecture.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Understand how religious and civic buildings were constructed with grammar.</li> <li>• Understand the synthesis of structure and aesthetics during the Gothic period in France.</li> <li>• Understand the architectural character of Gothic style of buildings with plans, elevations and sections of selected buildings.</li> <li>• Understand social and cultural influences contributed to Renaissance architecture in Italy.</li> <li>• Understand the philosophy of Renaissance architects of France and England, as to how they designed world renowned buildings.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Articulate knowledge on the construction of religious and civic buildings with grammar.</li> <li>• Have a comprehensive knowledge about the development of Gothic Period in France and express the synthesis of aesthetics and structure with the aid of sketches.</li> <li>• Articulate knowledge on the architectural character of Gothic style of buildings in Europe and express them with sketches of plans, elevations and sections.</li> <li>• Have a comprehensive knowledge about the philosophy of Renaissance and how they influenced architecture in England and France.</li> </ul>	

## **UNIT I ROMANESQUE**

**8**

The medieval ages - learning in the monasteries, evolution of the guilds - Factors influencing architecture - outline of architectural character in Italy, France and England- Examples: Pisa group, Italy Abbay aux Hommes, Caen, Tower of London.

## **UNIT II FRENCH GOTHIC**

**6**

Religious and social influences - evolution of vaulting and development of structural systems - outline of Architectural character - Examples: Notre Dame, Paris.

## **UNIT III ENGLISH AND ITALIAN GOTHIC**

**6**

Development of English gothic vaulting - outline of Architectural character in England and Italy - Examples: Westminster Abbey, Hampton Court Palace, London, Doges Palace, Venice, Milan Cathedral.

## **UNIT IV ITALIAN RENAISSANCE**

**15**

The idea of rebirth and revival of art - sociological influences in art and architecture - Development of thought, emergence of merchant communities and their patronage. Outline of the Architecture during the early Renaissance, High Renaissance and Baroque Periods - Features of a typical Renaissance palace, eg. Palazzo Ricardi, Study of life history philosophy, contribution of the following architects; Brunelleschi, Michelangelo, Andrea Palladio.

Outline of the architectural character of French and English Renaissance-Domestic Architecture in England - Study of the life, philosophy and works of the following architects: Sir Christopher Wren, Inigo Jones.

**TOTAL 45**

**TEXT BOOKS**

1. Rolf Toman "Gothic Architecture, sculpture, Painting" - 2010
2. Ross King "Brunelleschi's dome" -2000
3. Rolf Toman "Romanesque : Architecture , Sculpture, Painting" -2010
4. Peter Murray "The Architecture of Italian Renaissance" -2009

**REFERENCES**

1. Yatin Bandya, "Concepts of Space in Traditional Indian Arch", Mapin, 2005.
2. Mitchell, George (1996) "The Hindu Temple, University of Chicago Press.
3. Spiro Kostof , "A History of Architecture : Setting and Rituals", Oxford University Press, London, 2005 (digitized –2007).
4. Pier Luigi Nervi, "History of World Architecture Series". Harry N. Abrams Inc. Publication, New York,
5. Meaning in Western Architecture - Christian Norberg-Schulz-Rizzoli, New York

**WEBSITES**

<http://www.lib.virginia.edu/-> Renaissance and baroque

<http://schools.cms.k12.nc.us/renaissanceOHS/Lists/Announcements/Attachments/63/APAHSummerreading.pdf>

[https://www.researchgate.net/publication/236883619\\_Brunelleschi%27s\\_dome\\_in\\_Florence\\_The\\_masterpiece\\_of\\_a\\_genius](https://www.researchgate.net/publication/236883619_Brunelleschi%27s_dome_in_Florence_The_masterpiece_of_a_genius)

<http://www.madeinsouthitalytoday.com/medieval-gothic-art-in-italy.php>

<http://www.victorianweb.org/art/architecture/romanesque/french.html>

<http://www.britainexpress.com/architecture/early-english.htm>

<http://www.victorianweb.org/art/architecture/gothic/perpendicular.html>

<b>CEB225</b>	<b>SURVEYING, LEVELLING AND BUILDING LAYOUT</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b>	To understand the principles of surveying, types of surveys, their applications and to make students learn 'plotting of building on site'.		
<b>Objectives</b>		<b>Outcomes</b>	
<p>The course should enable the student to</p> <ul style="list-style-type: none"> <li>• Understand the principles of surveying.</li> <li>• Know about the chain surveying and plane table surveying</li> <li>• Understand the concept of theodolite surveying.</li> <li>• Get exposed to total station surveying, GIS and GPS.</li> <li>• Understand and learn to survey sloping and contour sites.</li> <li>• Understand the concepts of levelling and its applications, prepare the site to start the construction activities.</li> <li>• Learn plotting of building on site.</li> </ul>		<p>The students should be able to:</p> <ul style="list-style-type: none"> <li>• Gain the knowledge about the usage and principles of various surveying instruments with proper care and adjustments.</li> <li>• Describe the bearing systems and the instruments used in chain surveying and plane table surveying.</li> <li>• Use the instruments of levelling for levelling and contouring purposes.</li> <li>• Do the temporary and permanent adjustments of Vernier transit, measurement of horizontal and vertical angles using theodolite.</li> <li>• Know the various uses of total station, GIS and GPS instrument.</li> </ul>	

#### **UNIT I – CHAIN SURVEY AND LEVELLING**

**10**

Chain survey- Principles, classification - Instruments used -ranging, reciprocal ranging, leveling-methods of leveling -booking and reduction of levels- longitudinal leveling, cross sectioning- errors in leveling, problems in leveling- contouring.

#### **UNIT II – THEODOLITE SURVEY**

**8**

Understand Theodolite survey-measurement of horizontal and vertical angles -problems tackled like center line of building- setting out angles, etc.

#### **UNIT III –CONTOUR SURVEY**

**9**

Contouring methods- Characteristics and uses of contours- Understand and learn to survey sloping site making of contour plan and section

#### **Unit IV–ADVANCED SURVEYING**

**9**

Introduction and fundamental concepts of electronic measuring instruments –EMD, Total station, Geographic Information System (GIS) and Global Positioning System (GPS)

#### **Unit V –SITE PREPARATION AND BUILDING LAYOUT**

**9**

Making site fit to start construction activities - Barricading the site, making arrangements for site office, stores, temporary accommodation of workers etc. with necessary power and water connections- Marking and plotting roads, pathways, buildings and other facilities on site with center/grid lines.

**Practical Exposure in using surveying equipment to be given to the students.**

**TEXT BOOKS:**

1. Punmia B.C., “Surveying”, Laxmi Publications Private Limited, 2005.
2. Venkataramaiah, “Text book of Surveying”, University Press, 2006.
3. Kevin Lynch, Site Planning, MIT Press Cambridge, 2008.

**REFERENCES**

1. Joseph De. Chiarra and Lee Coppleman, Planning Design Criteria Van Nostrand Reinhold Co., New York.
2. Beer R, Environmental Planning for Site development, Turner, Landscape Planning and Environmental Impact Design.
3. T.P. Kanetkar, S.V. Kulkarni, “Surveying and Levelling”, Vol I, Pune Vidyarthi Griha Prakashan, 2004
4. Arora. K.R. “Surveying”, Vol I, Standard Book, New Delhi, 2009.
5. Kanetkar T.P., and Kulkarni. S.V., “ Surveying and Levelling (Part-1)”, Pune, Vidyarthi Griha Prakashan.
6. P.B. Sahani, “Modern Surveying”, Nemichand & Bros., Roorkee, UP.

**WEBSITES**

<https://civilmentor.com/levelling/>  
<https://theconstructor.org/surveying/types-of-leveling-methods/14679/>  
<http://www.civileblog.com/levelling/>

<b>ARB201</b>	<b>THEORY OF ARCHITECTURE II</b>	<b>2 Credits</b>	<b>L T PC</b> 2 0 0 2
<b>Goal</b>	Understand the principals of organization of forms and spaces, their variations and application in architectural design by highlighting the connection between architecture and society by exposure to character and style of various forms of architectures and the driving forces behind it.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the students to: <ul style="list-style-type: none"> <li>Expose student to the relation between form and spaces, resulting in defined relationships and various forms of organization influencing the concept of design.</li> <li>Explain selected architectural styles and their characteristic features. Lead the students to understand the reasons and driving forces behind developments and changes in Architectural forms and styles in various cultures over the centuries.</li> <li>Expose the students to various principals of composition</li> <li>Highlight the importance of the aspect of movement and circulation and their implications in design with selected samples</li> <li>Expose the students to the ideas and concepts and philosophy of contemporary architects through analysis of selected samples.</li> </ul>		The course should enable the students to: <ul style="list-style-type: none"> <li>Identify and apply the vocabulary of organizing form and spaces</li> <li>Identify the various styles in architecture and understands the driving forces involved in architectural changes.</li> <li>Aware of various principles of composition and can apply them in design</li> <li>Understands the aspects of circulation and the need for circulation diagrams and their influence/importance in the design for specialized buildings.</li> <li>Understands concepts and theories behind contemporary architecture.</li> <li>Aware that architecture with lasting impact has a theoretical background.</li> </ul>	

## **UNIT I- ORGANISATION OF FORMS AND SPACES**

**5**

a) Spatial Relationships: i) Space within space, ii) Interlocking spaces, iii) Adjacent spaces, iv) Space linked by a common space b) Spatial Organization: influencing factors and their types i) Centralized, ii) Linear, iii) Radial, iv) Clustered, v) Grid c) Articulation of forms and spaces types: i) Edges and corners, ii) Surface. A Project on Creation of forms & spaces using the principles learnt.

## **UNIT II- CHARACTER AND STYLE IN BUILDINGS**

**9**

Factors influencing the character and style of buildings. Study of examples from Buddhist, Hindu and Islamic Architecture in India- Greek, Roman, Gothic Renaissance, Modern and Post Modern Movement.

## **UNIT III- PRINCIPLES OF COMPOSITION**

**3**

Unity, harmony and specific qualities of design to include dominance, punctuating effect, dramatic effect, fluidity, climax, accentuation and contrast with building examples.

## **UNITIV-CIRCULATION**

**4**

Function of building circulation components of building circulation - The building approach, The building entrance, configuration of the path, path space relationship, form of circulation space with examples. Simple circulation diagram for buildings.

## **UNIT V -WORKS OF CONTEMPORARY ARCHITECTS**

**9**

Works of following modern and post modern architects and their ideologies and philosophies in brief - Louis Sullivan, F.L.Wright, Louis Khan, Le Corbusier, Philip Johnson, Charles Correa, and Michael Graves.

**TOTAL: 30**

### **TEXT BOOKS:**

4. Francis D.K.Ching, "Architecture-Form, Space and Order", 3rd ed. John Wiley, 2007
5. Simon Unwin, Analysing Architecture, Routledge, London, 2003.
6. V.S.Pramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Delhi, 1997.

### **REFERENCES:**

7. Leland M. Roth - Understanding Architecture, its experience history and meaning, Craftsman house, 1994.
8. Peter von Meiss -Elements of architecture - from form to place, Spon Press 1992.
9. Rudolf Arnheim- The dynamics of architectural form, University of California Press 2009.
10. Paul Alan Johnson - The Theory of Architecture - Concepts and themes, Van Nostrand Reinhold Co., New York, 1994.
11. James F. Eckler - The language of space and form, John Wiley and sons, New Jersey, 2012.
12. The four elements of Architecture - Semper Gottfried - Cambridge University press, London, 2011

### **WEBSITES:**

<https://www.archdaily.com/488929/a-theory-of-architecture-part-1-pattern-language-vs-form-language>

[http://www.arch.ttu.edu/people/faculty/Neiman\\_B/bldgex06/2006\\_09\\_15\\_theory\\_arch\\_analysis.pdf](http://www.arch.ttu.edu/people/faculty/Neiman_B/bldgex06/2006_09_15_theory_arch_analysis.pdf)

<b>CEB222</b>	<b>BUILDING SERVICES – I</b>	<b>3 Credits</b>	<b>L T PC</b> 3 0 0 3
<b>Goal</b>	To sensitize students that efficiency of building function also depends on integration of services like sewage disposal system, water supply systems, identification of sources, segregation, treatment, augmentation, distribution, the important equipments and gadgets involved, their installation and maintenance.		
<b>Objectives</b>		<b>Outcome</b>	
The course should enable the students to: <ul style="list-style-type: none"> <li>• Have knowledge on rainwater harvesting, management, and how to recycle wastewater from the buildings and at city levels.</li> <li>• Understand theoretical fundamentals of sewage treatment, their collection and disposal at campus level and construction system involved in services.</li> <li>• Understand other city level disposal collection, conveyance, recycling, and storm water drains and dispersals.</li> <li>• Understand the need of rain water management and conservation of raw and wastewater.</li> <li>• Understand the selection and choice, installation and maintenance of various types of pumps</li> </ul>		The students will be able to: <ul style="list-style-type: none"> <li>• Find the type of impurity present in water and the effect of the impurities in human body.</li> <li>• Know the Fundamentals of sanitation in buildings, various sewage treatment process, and construction details of sewer and connections.</li> <li>• Know about the collection, conveyance, recycling and disposal of town refuse systems.</li> <li>• Select, install and maintain the various pumps as available in the Indian market.</li> <li>• Collect rain water and conserve raw and wastewater. Use them for appropriate purposes.</li> </ul>	

## **UNIT I WATER QUALITIES, PURIFICATION, TREATMENT AND DISTRIBUTION**

**12**

Surface and ground water sources - quality/quantity - nature of impurities - treatments - water supply systems - treatment systems - centralized treatment - user and treatment - Desalination - ozonisation - reverse osmosis etc. - Distribution system in small towns - Types of pipes used - Laying, jointing, testing internal water supply in buildings - Municipal byelaws, regulations, standards.

## **UNIT II RAIN WATER MANAGEMENT AND CONSERVATION OF RAW AND WASTEWATER**

**6**

Water conservation, rainwater collection - methods of harvesting - storm water drains in layouts, towns and cities - Waste water recycling.

## **UNIT III FUNDAMENTALS, SEWAGE TREATMENT AND SEWERAGE SYSTEMS**

**12**

Environmental sanitation - Sanitation in buildings. Primary and secondary treatment - Activated sludge - Intermittent and trickling sand filters - Arrangement of sewerage systems in Housing, large factories, shopping centers - sewage pumping station, sewage disposal, construction details of sewers and connections.

**UNITIV CITY LEVEL SERVICESAND DISPOSAL****6**

Collection, conveyance, recycling and disposal of town refuse system - sanitation in unsewered areas of cities - alignment of storm water drains in residential areas and cities.

**UNITV PUMPS AND MOTORS, SANITARY FIXTURES AND FITTING -  
PRODUCTRANGE****9**

Pumps including reciprocating, centrifugal, deep well, submersible, sewage pumps - their selection and choice, installation and Maintenance.

**TOTAL :45****TEXT BOOKS**

1. K.N.Duggal, "Elements of Environmental Engineering", Chand & Co.,2010
2. P.C.Punmia, "Environmental Engineering 1" Vol I – Water Supply, Vol II Waste water, Laxmi Publication,2016.
3. S.K.Garg, "Environmental Engineering" Vol I, Khanna Publishers,2001

**REFERENCES**

1. S.C.Rangwala, "Water Supply and Sanitary Engineering, Charotar Publishing House, Anand 388 601,2010.
2. G.M.Fair,J.C.GeyerandD.Okun,"WaterandWasteWaterTechnology",Vol.II,JohnWiley & Sons, Inc., New York, 2010.
3. "ManualofWatersupplyandTreatment",SecondEdition,CPHEEO,MinistryofWorksand Housing, NewDelhi,
4. "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Works and Housing, NewDelhi,.

<b>ARB213</b>	<b>MATERIAL AND CONSTRUCTIONIII</b>	<b>4 Credits</b>	<b>L T PC 2 0 4 4</b>
<b>Goal</b>	To introduce knowledge of how cement, concrete and reinforcements are used in various building components like foundations, columns, beams, slabs and staircases. The input is provided as theoretical knowledge base and practical applications in the form of construction drawings as included in objective below.		
<b>Objectives</b>		<b>Outcomes</b>	
<p>The course should enable the student to</p> <ul style="list-style-type: none"> <li>• Provide information and knowledge about the ingredients of concrete like cement -its varieties, properties uses and applications</li> <li>• Aggregates, types of rocks, sizes of aggregates, sand and its properties.</li> <li>• Understand how cement concrete, reinforcement are used in different building components.</li> <li>• Load transfer in RCC frame building and role of different RCC structural members.</li> <li>• Construction of simple RCC framed building with RCC footings, columns, lintels, lofts, shading devices, beams and slab, etc.</li> <li>• Concrete stairs according to profile namely straight flight, quarter turn, dog- legged open well bifurcated, helical and spiral. Structural system for stairs, waste slab, stringer-trimmer, cantilever steps, folded plate/slab steps.</li> <li>• Embodied energy and impact of the processing and use of these materials on environment.</li> </ul>		<p>The students should be able to:</p> <ul style="list-style-type: none"> <li>• Design medium span low rise RCC frame structure building with detailing of all RCC element/components at different levels like foundation, plinth, lintel &amp; slab level</li> <li>• Design RCC staircase of appropriate form and structural system with details.</li> </ul>	

## **UNIT I - CEMENT AND CEMENT CONCRETE**

**18**

Varieties of cement, composition, properties and uses, tests for cement mortar for various works.- Ingredients suitability requirements for aggregates, grading of aggregates- water mix in concrete admixtures, properties of concrete.- Concreting process its properties, grades in concrete, batching, mixing, transporting, placing, compaction, curing, quality control, tests for concrete, joints in concrete, concrete finishes.

## **UNIT II - REINFORCED CEMENT CONCRETE (R.C.C)**

**12**

Introduction to R.C.C - Types of reinforcement bars, cutting, bending and binding of reinforcement bars- Pattern of reinforcement in RCC element -concrete cover- Centering, shuttering and form work.

## **UNIT III - RCC FRAME STRUCTURE BUILDING**

**27**

Introduction to framed structures -Concrete in foundations, types of RCC foundations like isolated, combined, continuous, strap footing- RCC columns in sub- structure and super structure-RCC elements at ground and plinth level like beams, slabs-RCC elements at lintel level like lintels, lintel beams, shades, canopy, porch, lofts, etc-RCC elements at roof/slab or intermediate floor level like simply supported, continuous and cantilever beams, one way, two way, cantilever and continuous slab.

#### **UNIT IV –CONCRETE STAIRCASES**

**12**

Factors involving staircase design, types of staircases like straight flight, doglegged, quarter turn, bifurcated, spiral, helical, etc- Different support conditions like inclined slab, cranked slab, continuous, cantilever foundations, finishes for staircase, detailing of handrails and balusters.

#### **UNIT V– MISCELLANEOUS ELEMENTS IN RCC AND FERROCEMENT**

**6**

RCC base floor, RCC walls, louvers, fins, pergolas, parapets, copings, RCC drops, Ferro cement shelves, grill/ jali, interlocking paver blocks, etc.

#### **STUDIO PRACTICALS / SESSIONAL WORKS AND ASSIGNMENTS:**

Manual drafting of Construction drawing sheets/plates, of selected topics in standard format- Periodic visits to the construction sites- Notes /sketches and Site visit reports.

**Note:** Drawing sheets/plates will be evaluated continuously.

**TOTAL 75**

#### **TEXT BOOKS:**

1. Dr.B.C.Punmia, “Building Construction”, Firewall Media,2005.
2. Francis D.K. Ching, ‘Building Construction Illustrated’ , John Wiley and Sons,,Inc., 2002

#### **REFERENCES**

1. W.B.Mckay , “Building Construction”, Vol. 1, 2,3- Longmans U.K2010.
2. S.C.Rangwala , “Engineering Materials”, Charotar Publishing House – Anand2007
3. Alan Banc, “Stairs, steps, ramps”, Butter worth Heinemann Ltd.,1996
4. M.S. Shetty, “Concrete Technology- Theory and Practice”, S.Chand & Co.Ltd., New Delhi, 2005.
5. Stephen Emmit , Christopher A.Gorse, “Barry’s Introduction to Construction of Buildings”- Second edition, Wiley –Blackwell,2013.
6. StephenEmmit,ChristopherA.Gorse,“Barry’sAdvancedConstructionofBuildings”-Second edition, Wiley –Blackwell,2014.

#### **WEBSITES:**

1. Economy/companies/construction/concrete/materials
2. <http://www.easyads.co.2a/yellow/india/construct>
3. <http://www.concrete.t.v-tokyo.ac.jp>
4. [www.larsentoubro.com](http://www.larsentoubro.com)
5. [www.dalmiacement.com/index.html](http://www.dalmiacement.com/index.html)

<b>ARB231</b>	<b>ARCHITECTURAL DESIGN – III</b>	<b>7 Credits</b>	<b>L T PC</b> 0 0 14 7
<b>Goal</b>	To enable the student into the process of design articulate, glorify spaces in respect of buildings of small scale, small span, horizontal and vertical movements (two or three levels), incorporating barrier free elements and details.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Enable student to familiarize with the given design topic by choosing, relevant and appropriate case studies within the region, visiting the sites and analyzing the same.</li> <li>• Expose students to familiarize with the given topic of design by arranging special lectures from architects.</li> <li>• Expose him/her to knowledge available on the relevant design at international level, through books and websites.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Learn single level planning in small scale</li> <li>• Solve design solution and present in the form of drawing.</li> </ul>	

## UNIT I DESIGN STUDIO

**180**

Single level planning in small scale, small span, horizontal movement and simple vertical movement, data collection, case studies, analysis and presentation of studies – Data collection with respect to design and detailing for physically handicapped persons - Concepts and presentation of design with scaled models

**Examples:** Residential buildings, Institutional buildings: banks, nursery or primary schools, primary health center, school for children with learning disabilities, neighborhood market, etc.

**TOTAL: 180**

## TEXT BOOKS:

1. De. Chiara and Callender, “Time-saver Standards for Building Types”, McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time – Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed. By. Quentin Pickard RIBA “The Architects’ Hand Book”, Bladewell Science Ltd., 2002

**REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K. Ching, John Wiley & Sons, Inc. 1997

**WEBSITES**

1. <http://www.hamptons.com/freshair>
2. <http://www.columbiamedical.com>
3. <http://www.mgarchitects.com>

## SEMESTER IV

<b>CEB224</b>	<b>DESIGN OF STRUCTURES-1</b>	<b>3 Credits</b>	<b>L T PC</b> 3 0 0 3
<b>Goal</b>	To enable students understand on steel structures. At this stage they would be exposed to the design of riveted and welded joints and steel beams and columns.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Inform to students the need for Steel Structures, the concept of abstract and detailed Design of steel structure.</li> <li>• Inform the importance and contribution of Bolt Connections, Weld connections</li> <li>• Make students know about the Design of steel beams &amp; columns.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Understand the need for steel structure, and the concept of abstract and detailed Design of steel Structure.</li> <li>• Calculate the stability of Bolt &amp; Weld Connections.</li> <li>• Design steel column and beams for the various Support Condition.</li> </ul>	

### UNIT I PROPERTIES OF STEEL & INTRODUCTION TO LIMIT STATE DESIGN

**5**

Structural properties of steel – code provisions and design requirements of steel - Limit state - characteristic load and characteristic strength of materials - partial safety factor - stress-strain relationship of steel - safety and serviceability requirements.

### UNIT II BOLTED JOINTS

**10**

Bolted joints-lap joints-butt joints, Analysis and Design.

### UNIT III WELDED JOINTS

**10**

Types of welding, permissible stresses, Design of fillet welds (excluding eccentric connections)

### UNIT IV STEEL BEAMS

**10**

Allowable stresses, General specifications, Design of laterally supported beams.

### UNIT V STEEL COLUMNS

**10**

Allowable stresses, various shapes, built - up sections, Design of columns – simple cross sections only.

**TOTAL 45**

### TEXT BOOKS

1. Ramachandra S., “Design of Steel Structures”, Standard Book House, Delhi, 2006.
2. IS 800:2007 General Condition in Steel – Code of practice

3. Comprehensive Design of Steel Structures, Punmia, A.K Jain, Lakshmi Publications, Delhi 2009
4. Composite Structures of Steel & Concrete: Beams, Slabs, Columns & Frames for buildings, Volume-1, R.P Johnson, 2013

## REFERENCES

1. “National Building Code of India – 2005”, Part VI, Structural Design.
2. L.S Negi “Design of steel Structures”, Tata McGraw-Hill Book Company, New Delhi 2009.
3. S.K Duggal, Design of Steel Structures, Tata McGraw-Hill Book Company, New Delhi .2010
4. “Teaching Resources for Structural Steel Design” – Vol I and II – INSDAG Kolkata

## WEBSITE:

1. [www.steel\\_insdag.org](http://www.steel_insdag.org)

<b>ARB204</b>	<b>HISTORY OF ARCHITECTURE - IV</b>	<b>3 Credits</b>	<b>L T PC</b> 3 0 0 3
<b>Goal</b>	To inform the students on the influence of Islamic and British Neoclassical style in India.		
<b>Objectives</b>		<b>Outcomes</b>	
<p>The course should enable the student to:</p> <ul style="list-style-type: none"> <li>Understand the emergence of Islamic Architecture with the need for newer typologies of buildings and to know how style is unique in terms of its elements, décor, materials and construction systems.</li> <li>Identify and critically discuss the predominant Delhi or imperial style as well as the characteristic features of provincial style through study and drawings of selected buildings.</li> <li>Be exposed to various Mughal rulers who contributed to Islamic architecture and the development of its famed landscapedesign.</li> <li>Realize the impact of colonialism in India - the adoption of Neo-classical architecture and the development of the Indo Saracenicstyle.</li> </ul>		<p>The students should be able to:</p> <ul style="list-style-type: none"> <li>Identify and discuss the finer points and nuances of Islamic architecture and its influence on the development of Architectural sciences and styles.</li> <li>Provide an understanding on the various styles and the ruler patrons who influenced the development of this style of architecture.</li> <li>Realize the techniques and wonders behind various Islamic architectural and landscaping elements and principles and re-interpret them in today's context.</li> <li>Discuss the impact of colonialism and the wealth of architectural legacy the period introduced in India</li> <li>Critically evaluate historical principles and methods and impart that learning to create informed and relevant current architectural solutions that are meaningful and rooted in our historic and traditional knowledge and wealth.</li> </ul>	

## **UNIT I INTRODUCTION TO ISLAMIC ARCHITECTURE**

**8**

Influences on Islamic Architecture – a Brief study on the Islamic Architectural Character: the mosque, the tomb, and minaret, the madarasa, the palace, the caravanserai, vernacular architecture, the market - important principles, elements and character of Islamic architecture in terms of structure, materials and methods of construction, elements of decoration, color, geometry, light.

## **UNIT II DELHI OR IMPERIAL STYLE**

**5**

Development of architectural style during the rule of the slave, Khalji, Tuqlaq, Sayyid and Lodhi Dynasties - important examples for each period.

## **UNIT III PROVINCIAL STYLE**

**12**

Development of the provincial styles in different regions - Punjab, Jaunpur, Bengal, Gujarat, Malwa, the Deccan (Bijapur, Golconda, Bidar and Gulbarga) - important examples for each style.

## **UNIT IV CONTRIBUTION OF RULERS OF ISLAMIC INDIA**

**12**

Development of the Mughal style under the different rulers - Babur, Shershah, Humayun, Akbar, Jahangir, Shahjahan, Aurangzeb - important examples - development of the Mughal garden - important examples.

Colonialism and its impact - Early British Neo-classical Architecture - Indo-Sarcenic Architecture and the works of Chisholm - P.W.D. and the Institutionalization of Architecture - Building New Delhi.

**TOTAL 45**

**TEXT BOOK**

1. Sir Banister Fletcher, "A History of Architecture", University of London, The Athlone Press 1996, 20th edition.
2. Percy Brown, "Indian Architecture (Islamic Period.)" - Tarapore Vala and Sons Bombay 1996.
3. Satish Grover, "Islamic Architecture In India", CBS Pub., 2003

**REFERENCES**

4. Sir H.M. Elliot. K.C. B "The History of India, by its own historians, The Muhammadan Period".
5. Dr. G. Venkataraman "History of Historical Building and Monuments in and around Chennai".
6. Thomas. R. Metcalf - "An Imperial Vision".
7. J Duncan M Derrett, 2007 "Indian Islamic Architecture: Forms and Typologies, Sites and Monuments".
8. Bianca Maria Alfieri, - "Islamic Architecture of the Indian SubContinent"
9. The History of Architecture in India from the Dawn of civilization to the End of the Raj, Phaidon, London, 2002
10. Christopher Tadgell, The History of Architecture in India, Penguin Books (India) Ltd, New Delhi 1990.
11. Catherine Asher, Architecture of Mughal India, Cambridge University Press 2001.

**WEBSITES**

<http://www.islamicart.com/pages/archcrea/index.htm>  
<http://libraries.mit.edu/rvc/aka/agakhan/index.html>  
<http://www.greatbuildings.com/types/styles/islamic.html>  
<https://www.saylor.org/site/wp-content/uploads/2011/06/ARTH303-DelhiSultanate-FINAL.pdf>  
<http://indiagateway.com/culture/architecture.html>  
<https://academy.gktoday.in/article/architecture-of-delhi-sultanate>  
<http://www.ets.uidaho.edu/arch499/nonwest/Islam1.html>

<b>ARB207</b>	<b>BUILDING SCIENCE</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b>	To educate students about importance of building sciences and its role in enhancing functional efficiency of architectural creation.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• Understand basics of heat flow through building elements and heat exchange of building and its control.</li> <li>• Learn effect of solar radiation on built environment and principles of thermal design.</li> <li>• Expose to the basics of good acoustical design in a building and means to control noise.</li> <li>• Inform about daylight, prediction technique of daylight and its role in energy efficiency.</li> <li>• Learn about ventilation and air movement in and around the building and importance of convective cooling.</li> <li>• Enable students to learn about sources of renewable energy and its use in buildings and built environment.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Control heat flow through buildings and apply principles of thermal design in built environment to control thermal radiation of different building facades and roof.</li> <li>• Create comfortable living and working condition inside the building.</li> <li>• To design buildings with good and satisfactory acoustics.</li> <li>• To design a low energy building with passive methods to reduce our dependency on artificial energy based lighting, cooling and heating of buildings.</li> </ul>	

## UNIT I – HEAT AND THERMAL QUANTITIES IN BUILT ENVIRONMENT 12

Temperature, heat, specific heat, volumetric specific heat- Heat flow – conduction, convection, radiation, conductivity, resistivity, conductance, transmittance, role of density and cavity, transmittance of heat through single and multi-layered body, recommended values of transmittance through building elements- Heat exchange and heat balance of human body- Heat exchange of buildings, heat flow rate due to conduction, convection and radiation, heat gains and heat loss simple calculation- Insulation and time lag -Radiation through atmosphere and its distribution, spectrum of radiation, green house, effect in an enclosed space and at global level - Solar Radiation quantity, Radiation on the surface of the earth, cosine law, angle of incidence - Position of the sun in relation to the building façade, solar altitude angle, solar azimuth angle, wall azimuth angle

## UNIT II– DAYLIGHT

9

Introduction to light and day light-nature, transmission, reflection, color of light, photo metric quantities - Illumination, visual efficiency, illumination quantity and quality, visual field - Sources of daylight, daylight factor concept, design variables, design sky concept, daylighting in tropics, in hot-dry, warm humid and other types of climate - Means of admitting daylighting in building-Daylight requirement & prediction technique-Clear sky and overcast sky conditions- Use of light tube and optical fiber

### **UNIT III – ACOUSTICS AND NOISE CONTROL**

**8**

Introduction to sound and sound waves, power and intensity - Nature of sound  
Noise in enclosed space- Airborne sound transmission - Direct and reverberant sound, eco,  
means of noise control - Reflective and absorbing surfaces, sound insulation and materials  
for sound insulation - Distances, screening, sound barriers - Planning and design

### **UNIT IV – VENTILATION AND AIR MOVEMENT IN AND AROUND BUILDING**

**8**

Function of ventilation, supply of fresh air, convective cooling, stack effect, temperature and  
pressure difference - Air flow around the building- factor affecting normal air movement  
and velocity - Effect on windward side, effect on leeward side, orientation, shape and form  
of the building wind shadow - Air flow inside the building, position, size and number of  
openings, external features on the building façade, cross ventilation and air movement  
inside, effect of sashes, shades, louvres and other accessories and controls

### **UNIT V – RENEWABLE ENERGY**

**8**

Introduction to renewable energy and its importance in today's context - Solar energy- its  
use and application in hot water supply, cooking and producing electricity using photo-  
voltaic cells - Space requirement, installation, connection with grid power and financial  
vitality - Wind energy, types of wind turbine, their installation, utility and financial vitality -  
Tidal energy/ energy from small fast moving water channels- Geo thermal energy -  
Bureau of energy efficiency (BEE) building code

**TOTAL 45**

#### **TEXT BOOKS:**

1. O.H. Koenigsberger and others, "Manual of tropical housing and building climatic design",  
University press, Chennai, 2010.
2. A.Konya, Design Primer for Hot Climates, Architectural Press, London, 2002
3. Energy Efficient Buildings in India- Published by TERI – 2001
4. Fuller Moore, "Environmental Control Systems", McGraw-Hill, Inc., New Delhi, 2003

#### **REFERENCES**

1. M.Evans, "Housing, Climate and Comfort", Architectural Press, London, 2002
2. Joseph de Chiara and Le Copplemann, "Planning and Design Criteria", McGraw-Hill, New  
York 2006
3. B.Givoni, Man, "Climate and Architecture, Applied Science", Banking Essex, 2004
4. Ms.Sudha, N.K.Bansal and M.A.S.Malik, "Solar Passive Building", Pergamon Press.
5. Energy Conservation Building Code

#### **WEBSITES:**

1. [www.teriin.org/](http://www.teriin.org/)
2. <http://solstice.crest.org/efficiency/index.shtml>

<b>ARB215</b>	<b>CLIMATE AND BUILT ENVIRONMENT</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b>	To create awareness that architecture to a large extent gets influenced by climate by exposing the student to elements of climate, climatic zones, and methods to design climate responsive buildings in order to reduce our dependency on artificial energy and fossil based fuel for creating comfortable living and working conditions in built environment.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• Provide information on factors that contribute to climate and what is a comfortzone.</li> <li>• Enable students to understand the movement of sun itspaths.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Control heat flow through buildings and apply principles of thermal design in built environment to control thermal radiation of different buildingfacades androof.</li> <li>• Create comfortable living and workingcondition inside thebuilding.</li> <li>• To design buildings with good and satisfactory acoustics.</li> <li>• To design a low energy building with passive methods to reduce our dependency onartificial energy based lighting, cooling and heating of buildings.</li> </ul>	

## UNIT I – ELEMENTSOFCLIMATE

12

Introduction to climate and weather, atmosphere, Tilt in earth's axis and Earth-sun relationship - Elements of climate-temperature, humidity, vapor pressure, precipitation, driving rain, sky conditions, solar radiations, wind and vegetation, climatic data and its measurement, methods of representing climatic data in the form of tables, graphics etc., five useful values - Introduction to Global climate, earth thermal balance, solar radiation-quality and quantity, spectrum of solar radiation, passage of radiation through atmosphere global wind pattern, classification of tropical climate, climatic zones, tropical climate, warm humid climate, warm humid island climate, hot-dry desert climate, hot- dry maritime desert climate, composite or monsoon climate, tropical uplandclimate-Siteclimate/microclimate-effectofsiteconditionsonvariousclimaticelements, variation from climate of theregion.

## UNIT II – COMFORT AND THERMAL COMFORT INDICES

9

Introduction to thermal comfort factors - Heat production of human body - Thermal balance of human body and effect of prolonged exposure to extreme climatic conditions - Thermal comfort indices, comfort scale, Effective Temperature, Corrected Effective Temperature, Resultant temperature and other indices with special emphasis on tropical thermal index, bio climatic and Psychro-metric chart - Effective temperature and its use - Revisions of ET scale, Mean radiant temperature, Finding the CET, Kata thermometer, Comfort zone, Use of CET, Climate analysis with CET, Effective Temperature histogram, ET isopleths

### **UNIT III – MEANS OF THERMAL CONTROL**

**8**

Introduction to thermal control, passive and active methods, potential of climatic control, objectives of thermal control - Structural, constructional or architectural controls- need for architectural control, thermal insulation and solar control - Cooling by ventilation, earth tunnel, evaporative cooling, cooling by other passive methods - Building orientation, four principle orientations, climatic elements influencing orientation - Openings and fenestrations, effect of shading devices, accessories, blinds and curtains.- Introduction to different types of shading devices – horizontal shading devices, vertical shading devices, egg- crate shading devices, adjustable and moveable shading devices - Shadow angles, Sun path diagrams/Solar chart for different latitudes, design and calculation of projection of shading devices.

### **UNIT IV – PRINCIPLES OF CLIMATIC DESIGN**

**8**

Introduction to climatic design - Climatic design at settlement planning and urban design stage - Climatic design at architectural design and construction stage

### **UNIT V – SHELTERS IN DIFFERENT CLIMATIC ZONES**

**8**

Nature of the climate - Major climatic issues involved affecting design of the shelters in Hot-Dry and Maritime desert climates, Warm-humid climates, Composite climates and Tropical Upland climates with emphasis on - Functional and climatic requirements, Shape and form of the shelters - planning, outdoor / Semi out door spaces - External surfaces and finish, Openings/fenestration and shading devices - Ventilation and Air movement.- Vernacular architecture in the above climatic zones.

**TOTAL 45**

#### **TEXT BOOKS:**

1. O.H. Koenigsberger and others, “Manual of tropical housing and building climatic design”, University press, Chennai, 2010.
2. A.Konya, Design Primer for Hot Climates, Architectural Press, London, 2002
3. Energy Efficient Buildings in India- Published by TERI –2001
4. Fuller Moore, “Environmental Control Systems”, McGraw-Hill, Inc., New Delhi, 2003

#### **REFERENCES**

1. Arvind Krishnan, “Climate Responsive Architecture- A Design Handbook for Energy Efficient Buildings”, Tata Mc.Graw Hill publications Co., Ltd, New Delhi, 2004
2. Mili Mjumdar, “Energy Efficient Buildings in India”, TERI press, New Delhi, 2002.
3. M.Evans, “Housing, Climate and Comfort” , Architectural Press, London, 2002
4. Joseph de Chiara and Le Copplemann, “Planning and Design Criteria”, Mc.Graw-Hill, New York 2006
5. B.Givoni, Man, “Climate and Architecture, Applied Science”, Banking Essex, 2004
6. Ms.Sudha, N.K.Bansal and M.A.S.Malik, “Solar Passive Building “, Pergamon Press.

## WEBSITES

1. [www.teriin.org/](http://www.teriin.org/)
2. <http://solstice.crest.org/efficiency/index.shtml>
3. [cpwd.gov.in/CPWDNationBuilding/InaugurationPM25.02.../architectural\\_design.pdf](http://cpwd.gov.in/CPWDNationBuilding/InaugurationPM25.02.../architectural_design.pdf)
4. <http://mnre.gov.in/>

<b>ARB208</b>	<b>BUILDING SERVICES II</b>	<b>3 Credits</b>	<b>L T PC</b> 3 0 0 3
<b>Goal</b>	To explore integration of all the allied building services into their Architectural Design. To explore all the fundamentals, by laws, Rules and Regulations, Codes and understand the importance of references and Recommendations. Example: National Building Code, National Plumbing code, National Electrical Code, EGBC for Lighting and International Lighting Codes.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to:		The students should be able to:	
<ul style="list-style-type: none"> <li>Expose the students on the basics of acoustics and its relation with the building profile.</li> <li>Give detailed input on low and high voltage supplies, precautionary methods required for safety, electrical circuit supply and distribution and knowledge on Sub-station required for public buildings and campuses.</li> <li>Enable students to understand the importance of lighting in buildings for visual appreciation, factors and laws involved in illumination.</li> <li>Give additional knowledge on sources of light, its classification and intensities required for various types of gadgets, their advantages and disadvantages in usage.</li> <li>Expose the students on basics of mechanized transportation in buildings and complex services.</li> </ul>		<ul style="list-style-type: none"> <li>Exercise on soundscape and Acoustical Design brief for a Design Context like Lecture Halls, Classrooms, Conference room, Theatres and Auditoriums.</li> <li>Understand Electrical Symbols used in Electrical Layouts and understand reading an Electrical layout as SLD and understand the technical design brief for an Electrical Design for a Building. Understand the concept of Safety, Security and control in Electrical System.</li> <li>Understand the Design of Lighting and Integration of same with Architectural Design and explore all the fundamentals of Lighting in arriving at a technical Design brief for a Building.</li> <li>Understand the Selection criteria of Lighting fixtures and fittings based on comparison of technical specification of various vendors available in the Market.</li> <li>Browse catalogues of various vendors of Elevators, Escalators, Dumpwaiters, Car Lifts, Freight Lifts and Hospital Lifts, Fire Lifts and provide a comparative Statement on the Technical specification of selected Vendors.</li> </ul>	

## UNIT I ACOUSTICS

10

Acoustic fundamentals-properties of sound and waves, characteristics of sound, acoustic materials and their properties. Sound field in enclosures, sound propagation and transmission inside the building. Noise control criteria and regulations- instrumentation- noise source- room acoustics- wall, barriers and enclosures.

## UNIT II ELECTRICAL SYSTEM AND INSTALLATION

10

Basics of Electricity: electrical supply system, supply voltage, voltage drop, phase & line, voltage and current relationship. Use of single phase, two phase, three phase etc. Main Boards

& sub distribution boards for multi storied buildings, Standby power supply distribution, layout of substation, transformers, switch gears and safety methods.

Principles and practices of Earthing: definition, types, lightning arrestor. ISI specification.

Protective devices in electrical installation. Types of wires, wiring system and designing the electrical layout for a building, factors and constraints. Case studies on electric core

### **UNIT III LIGHTING ILLUMINATION AND DESIGN**

**15**

Characteristics of light, visual task, factors affecting visual task, synthesis of light, room reflectance, glare, Measurements of lighting, Intensity, flux, luminous efficiency, Work surface, laws of illumination, MSCP, MHCP, color temperature, color rendering, space height ratio, depreciation factor, utilization factor day light factor.

Artificial light sources: characteristics, types of lamps, luminaries cost and its application, artificial lighting- types, arrangement methods, types of fixtures, lighting controls etc. methods of mounting and lighting control Luminaries classification. Lumen method for design.

Minimum level of illumination required for physically challenged and visually challenged.

Exercises- designing of modern lighting- stores, office, residence, etc

### **UNIT IV CONVEYING SYSTEMS**

**10**

Mechanized transportation in buildings: lifts, escalators, conveyors, travelators. Location of service core in buildings. Lifts – types, Basic dimension, Traffic analysis, Round trip time, lift pit, machine room, lift operation, arrangement of lifts, capacity, car size, design criteria.

Escalators – basic dimension, Characteristics, arrangement and disposition. Conveyors and Walkways

**TOTAL 45**

### **TEXT BOOKS**

1. Norbert Lechner - “Plumbing Electricity, Acoustics, Sustainable Design methods for Architecture”.

2. Joseph B Wujek, Frank R. Dagostino “ Mechanical and Electrical Systems in Architecture, Engineering and Construction –2010

### **REFERENCES**

1. Lighting Modern Buildings by Derek Philips 2000
2. David Egan “Architectural Acoustics” McGraw-Hill Inc., US
3. Philips, “Lighting in Architectural Design”, McGraw-Hill, New York,.
4. “Light Architecture” – New Edge city, Gianni Ranulo, Birkhauser – Publishers for Architecture
5. “Lighting Design”, Ulrike Brandt Light, , Institute for International Architectural Documentation GMBH & Co.KG
6. “Road Lighting for Safety”, Da.Schrender, Dr.Ir,Dr.Schreuder,

### **WEB SITE**

[www.certainteed.com/resources/www.erc](http://www.certainteed.com/resources/www.erc)

[o.com/handbookoflightingdesignwww.zu](http://o.com/handbookoflightingdesignwww.zu)

[mtobel.com/lichtandbuchwww.electrical](http://mtobel.com/lichtandbuchwww.electrical)

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[knowhow.orgwww.electricaltechnology.o](http://knowhow.orgwww.electricaltechnology.o)

[rgwww.beeindia.gov.in](http://rgwww.beeindia.gov.in)

<b>ARB216</b>	<b>MATERIAL AND CONSTRUCTIONIV</b>	<b>3 Credits</b>	<b>L T PC 2 0 2 3</b>
<b>Goal</b>	To enable the students to understand and learn structural and non- structural, ferrous and non- ferrous metals and construction of building elements like roof trusses and steel frame structure building components including manufacturing process of steel and other ferrous and non- ferrous metals, properties and usages.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• Study ferrous and non- ferrous metals in detail and their role in construction industry, manufacturingprocess.</li> <li>• Study steel construction in detail like steel trusses and steel structuralframe.</li> <li>• Study aluminum alloys, copper, brass, tin and lead.</li> <li>• Study aluminum doors, windows, partitions etc. Use of copper, bronze brass in buildingconstruction.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Understand the progressive achievements of cast iron to steel, types of steel. Its properties, application in construction industry and present developments.</li> <li>• Understand the steel in foundation, columns, beams and roofs. Details on steel stair cases, doors, windows.</li> <li>• Understand and learn construction of steelframe structurebuilding.</li> <li>• Understand properties and use of ferrous and non- ferrous metals in buildingindustry.</li> <li>• Understand in detail how aluminum, its alloys and its products are used in construction industry.</li> </ul>	

## UNIT I - IRONANDSTEEL

10

Brief study on manufacture, properties and uses of cast iron, wrought iron, pig iron and steel anticorrosive measures for steel, mechanical and heat treatment of steel, market forms of steel, structural steel, stainless steel, steel alloys, properties and uses of current developments .- Steel rolled sections.

## UNIT II - STEEL TRUSSES AND STEELFRAME BUILDING

28

Understand different types of steel trusses supported by brick pier, RCC column and steel structures with MS sections, load transfer, tensile & compressive members, terminology used, joints in trusses. - Roof covering sheets, G.I. and cement corrugated sheets, P.V.C and F.R.P Sheets, Aluminum and coated steel profiled sheets etc, fixing details - Types of connections and joints in steel, steel frame building, steel foundations, columns/ stanchons / and beams/girders .- Joints between different steel structural members in different locations and detailing.

### **UNIT III - STEEL STAIRS AND OPENINGS**

**14**

Steel staircases and handrails, balusters, standard doors and windows, collapsible gates, rolling shutters.

### **UNIT IV – NON-FERROUS METALS**

**8**

Aluminum and aluminum alloys, brief study on properties and uses, aluminum products extrusions, foils, castings, sheets, etc. - Brief study of other non-ferrous metals like copper, bronze, brass, tin and lead, properties and uses - Current developments.

### **UNIT V – ALUMINUM DOORS, WINDOWS AND FIXED GLAZING**

**15**

Aluminum openable, sliding, sliding and folding glazed/panelled doors - Aluminum openable, sliding windows and fixed glazing - Aluminum fixed glazing for showrooms, shops, showcases, etc.

### **STUDIO PRACTICALS / SESSIONAL WORKS AND ASSIGNMENTS:**

Manual drafting of Construction drawing sheets/plates, of selected topics in standard format - Periodic visits to the construction sites- Notes / sketches and Site visit reports.

Note: Drawing sheets/plates will be evaluated continuously.

**TOTAL 75**

### **TEXT BOOKS:**

1. S.C. Rangwala, "Engineering Materials", Charotar Publishing House, India, 2007.
2. W.B. McKay, "Building Construction", Vol. 1, 2, 3- Longmans U.K 2010.
3. Dr. B.C. Punmia, "Building Construction", Laxmi Publications Pvt. Ltd., New Delhi, 2005.

### **REFERENCES**

1. Arthur Lyons, "Materials for Architects and Builders an Introduction" Arnold, London, 2004.
2. Harold B. Olin, Construction Principles Materials and Methods, The Institute of Financial Education, Chicago, 2006.
3. Don A. Watson, Construction Materials and processes, McGraw Hill Co., 2003
4. Francis Ching, 'Building Construction Illustrated', John Wiley and Sons, Inc, 2002
5. Stephen Emmitt, Christopher A. Gorse, "Barry's Introduction to Construction of Buildings"- Second edition, Wiley – Blackwell, 2013.
6. Stephen Emmitt, Christopher A. Gorse, "Barry's Advanced Construction of Buildings"- Second edition, Wiley – Blackwell, 2014.

### **WEBSITES:**

1. <http://www.britmetfed.org.uk/frmedu.html>
2. <http://www.indiabusinessonline.com>
3. <http://www.nrwas.com>
4. <http://www.arcadiaproducts.com>
5. <http://www.sail.com.in>

<b>ARB234</b>	<b>ADVANCED COMPUTER GRAPHICS</b>	<b>3 Credits</b>	<b>L T PC</b> 2 0 2 3
<b>Goal</b>	To inspire the students with theories of digital media, along with, using the high-end software for developing the conceptual designs and presentation techniques. The students are also to be exposed to current trends in presentation and portfolios using latest software.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Provide information on historic and contemporary theories and developments in the digital era.</li> <li>• Enable the students to use the Digital Media, not just as a drafting tool but also as a design process and presentation tool.</li> <li>• Make the students understand the need for the visualization and latest presentation techniques.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Know how digital evolved over a period of time affecting architecture.</li> <li>• Evolve design as a process through digital media or computational methods.</li> <li>• Provide complete solution using the digital media to compete in the architectural field.</li> </ul>	

## **UNIT I INTRODUCTION**

**10**

Past trends and theories of digital media – the influence of digital media on the perception of space and architecture, Virtual spaces.

## **UNIT II VISUALIZATION STUDIO**

**15**

Role of visualization as a tool in the interpretation of design- development of conceptual models – design wall, windows, openings, roofs, staircase, design library, generate – elevations, sections, perspective views – schedule tables – layer management- exercises involving the same.

## **UNIT III ADVANCED 3 D MODELLING**

**10**

Enhancing the virtual model with the application of light, color, materials, texture, environments - introducing cameras.

## **UNIT IV SKETCH UP 3D MODELLING**

**10**

Introduction to sketch up interface – Working with Tool Operation - principal tool- texts- drawing tools – Modification tool-construction tool – camera tools – walkthrough tools – sand box tools – Model setting and managers – Entities – materials-colors-textures- Development of conceptual design models in 3d

## **UNIT V PHOTOSHOP PRESENTATION TOOL**

**15**

Documentation and presentation – introduction to interface layout – Palettes – Tool box – Selection tool – Alternation tools – Drawing and selection – color boxes and models –

**TOTAL:60**

### **TEXT BOOKS**

1. Autodesk 3ds Max 2016 Essentials by [Dariush Derakhshani](#), [Randi L. Derakhshani](#), SDC publications and Autodesk, 2014,
2. Autodesk 3ds Max 2015 Essentials: Autodesk, Sybex, 2014
3. Autodesk 3ds Max 2016: A Comprehensive Guide, [Prof Sham Tickoo Purdue Univ](#), Cadcim Technologies, 2015
4. Autodesk 3ds Max 2016 for Beginners: A Tutorial Approach, [Prof Sham Tickoo Purdue Univ](#), Cadcim Technologies, 2015
5. Photoshop CS6, Photoshop CS6, O'Reilly Media, 2012
6. SketchUp for Interior Design: 3D Visualizing, Designing, and Space Planning, [Lydia Cline](#), Wiley, 2014
7. Sketchup & ,Layout for Architecture: The Step by Step Workflow of Nick Sonder, Matt Donley Bizfound, LLC, 2016

### **REFERENCE BOOKS**

1. Max 2016 Complete Reference Guide, Kelly L. Murdock's, SDC publications, 2015
2. 3D Photorealistic Rendering: Interiors & Exteriors with V-Ray and 3ds Max, Jamie Cardoso, CRC PRESS, 2016
3. Adobe Photoshop CC, Martin Evening, Focal Press, 2015
4. SketchUp - A Design Guide for Woodworkers: Complete Illustrated Reference, [Joe Zeh](#) Popular Woodworking Books; Illustrated edition, 2015

### **WEBSITES:**

1. <https://www.creativebloq.com/top-3ds-max-resources-10121033>
2. <https://www.autodesk.com/products/3ds-max/over>
3. <https://www.lynda.com/3ds-Max-training-tutorials/138-0.html>
4. <https://blog.miragestudio7.com/8-excellent-free-3d-model-websites-for-3d.../4168/>
5. <https://evermotion.org/>

<b>ARB233</b>	<b>ARCHITECTURAL DESIGN – IV</b>	<b>6 Credits</b>	<b>L T PC</b> 0 0 12 6
<b>Goal</b>	To enable the student into the process of design in different context (Urban and Rural) by choosing relevant topics of community or civic importance. Thrust will be on rural materials, construction techniques and design details. Exposure to Computer usage is to be given importance.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• To enable students to familiarize with given topic of design by choosing appropriate case studies through visits and documentation.</li> <li>• To give additional input on the topic of design by organizing special lectures from expert architect.</li> <li>• To enable students understand the knowledge available at international level through books, literatures and websites.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Understand more about rural materials, construction techniques and design details</li> <li>• Convert the details into drawings using appropriate software</li> </ul>	

## UNIT I DESIGN STUDIO

**60**

Problem related to multi room, single use, small span - multiple story, Horizontal and vertical movement, Active cum passive energy, conventional and frame type buildings. **Examples:** Departmental store, Library, higher secondary school, campus students center, etc. The projects will consciously provide for movement and use by the physically handicapped and elderly.

## UNIT II DESIGN STUDIO -RURAL STUDY

**120**

Problems related to Rural Housing - Visits to selected village - surveys on socio-economic, physical, housing and surveys, etc. to study existing conditions - analysis of survey data - preparation of report, documentation and presentation in a seminar - preparation of design brief solutions for housing and community facilities.

**TOTAL : 180**

## TEXT BOOKS:

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time – Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed.By.Quentin Pickard RIBA "The Architects' Hand Book", Bladewell Science Ltd., 2002

## **REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work).  
Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K. Ching, John Wiley & Sons, Inc. 1997

## **WEBSITES**

1. <http://www.focusnet.co.uk/cib/library/physdishous94.htm>
2. <http://www.ourvirtualmall.com/cloth.htm>
3. <http://www.ddimagazine.com/>
4. <http://www.atlasmagazine.com/photo/lande6>

## SEMESTER V

<b>CEB321</b>	<b>DESIGN OF STRUCTURES -II</b>	<b>3 Credits</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>Goal</b> To introduce design of reinforced cement concrete structures by working stress and limit state design methods based on IS codes IS 456 for design of beams and slabs.			
<b>Objectives</b>		<b>Outcome</b>	
The course should enable the students to : <ul style="list-style-type: none"> <li>• Be familiar with the knowledge of limit state design method for concrete structures and also know about partial safety factor, stress- strain relationship of concrete.</li> <li>• Be acquainted with the knowledge of limit state design of beam including singly reinforced, doubly reinforced and flanged beam.</li> <li>• Gain knowledge of limit states design of R.C.C slab using IS code.</li> <li>• Be familiar with the limit state method of design of R.C.C column of rectangular and circular section.</li> <li>• Gain knowledge of working stress design of foundation. Isolated pad footing and combined footing.</li> </ul>		The students will be able to: <ul style="list-style-type: none"> <li>• Develop knowledge about of limit state design methods for concrete structures.</li> <li>• Use the limit state design methods to design RCC beam.</li> <li>• Use the limit state method to design R.C.C slabs.</li> <li>• Use the limit state methods to design RCC column.</li> <li>• Use working stress method to design footing for foundation.</li> </ul>	

### UNIT I LIMIT STATE DESIGN FOR CONCRETE STRUCTURE 5

Introduction -Limit state - characteristic load and characteristic strength of materials - partial safety factor – stress-strain relationship of concrete - safety and serviceability requirements.

### UNIT II LIMIT STATE DESIGN OF BEAMS 10

Design of rectangular sections for bending - singly reinforced, doubly reinforced and flanged sections

### UNIT III LIMIT STATE DESIGN OF SLABS 10

Design of one-way and two-way slabs using IS Code co-efficient for various edge conditions.

### UNIT IV LIMIT STATE DESIGN OF RCC COLUMNS 10

Behaviour of Columns - Code provisions - Design of axially loaded short columns of rectangular and circular sections - ties and spiral reinforcements. Concept of Long columns (No Design calculations).

### UNIT V WORKING STRESS DESIGN OF FOUNDATION 10

Types of foundations - Isolated pad footings for simple design problems –Structural Concept of combined footings (No Design calculations)

**NOTE:** Reference to IS codes and tables be permitted in the examination.

**TEXT BOOKS**

1. P.C.Varghese, “Limit state Design of Reinforced Concrete”, Prentice Hall of India , 2011.
2. Limit State Design of Reinforced Concrete, B.C Pumia, A.K Jain, 2010
3. Reinforced Concrete Design, N.Krishnaraju & R.N. Pranesh, New Age International Publications, 2010.

**REFERENCES**

1. S.N. Sinha, “Reinforced Concrete Design”, Tata McGraw-Hill, New Delhi 2011.
2. Dr.B.C.Punmia, Reinforced Concrete Structures, Laxmi publication, Delhi, 2004.
3. P.Dayaratnam, “Design of Reinforced Concrete Structures”, Oxford and IBH Publishing Co., 2002.
4. S.Unnikrishnan Pillai & Devados Menon, “Reinforced Concrete Design”, Tata Mc.Graw Hill 2016.
5. N.C.Sinha and S.K.Roy, “Fundamentals of Reinforced Concrete”, S.Chand & Co., New Delhi, 2013.

<b>ARB309</b>	<b>BUILDING SERVICE III</b>	<b>3 Credits</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>Goal</b> To develop knowledge of role of building services in determining building performance and to understand various types of building service equipment work and how they are integrated into a building.			
<b>Objectives</b>		<b>Outcome</b>	
<ul style="list-style-type: none"> <li>• Introduction to building automation and its effects on energy consumption and cost of building systems.</li> <li>• Introduction to energy consumption and methods of conserving energy.</li> <li>• Introduction to basics of refrigeration and building cooling equipment and operations.</li> <li>• Give additional knowledge of airconditioning systems and how they can be integrated into design.</li> <li>• Expose students to fire and safety regulations and equipments for the same.</li> </ul>		<ul style="list-style-type: none"> <li>• Understand use of building automation in reducing building energy consumption and maintenance cost compared to a non-controlled building.</li> <li>• Expose the students to design methods which will aid in conserving energy and creating sustainable environment.</li> <li>• Understand placement of equipment and providing for systems as per by laws.</li> <li>• Exercise on calculating AC loads and reading drawings on AC installation as per various system.</li> <li>• Understand location and provision of fire and safety equipment in building design.</li> </ul>	

## **UNIT I BUILDING AUTOMATION AND CONTROL SYSTEM**

**8**

concept of building automation system, scope, the need and its significance- introduction to automatic control system in building – safety & security system, fire alarm system, access control system, telecom system, CCTV surveillance system, Computerized HVAC Systems, IBMS system and its components .

## **UNIT II ENERGY CONSERVATION AND AUDITING**

**10**

Trends in energy consumption. Energy audit- weather normalization method, impact of people behavior, approaches, materials and equipment's, operation strategies- method of energy savings- optimum selection of energy source- fundamental of energy conservation- use of computer model. Basics of energy demand and supply, principles of energy management and audit programme.

## **UNIT III BASIC REFRIGERATION PRINCIPLES**

**7**

Introduction to A/C conditions, basic of refrigeration systems, components of refrigeration system. Temperature- latent heat of fusion, sensible heat, evaporation, sublimation- saturation temperature- sub cooled liquid- pressure temperature relationship for liquids- vapor compression cycle- Refrigerant control devices- Air handling Units

## **UNIT IV AIR CONDITIONING SYSTEM AND APPLICATION**

**10**

Types of Window and split A/c. Package units, Centralized plants and Chilled water plants, DX system, Chilled Water System, Air Cooled and Water Cooled condensers, Air Distribution system, VAV & VRV Systems- Comparison of various systems - Space requirements for A/c units, AHU's & a/c plant, ducting, testing and maintenance on ducts and pipes .

## **UNIT V FIRE SAFETY, FIRE DETECTION AND FIGHTING INSTALLATIONS**

**10**

Introduction, fire triangle, methods of fighting fire, Classifying fire, objectives of fire safety- Causes of fire in buildings, fire protection, standards- NBC guidelines- Multistoried building. Special features required for physically handicapped and elderly in building types- firefighting equipment's and its installations- detectors, alarm, extinguishers, dry & wet riser, sprinklers, etc.

**TOTAL 45**

### **TEXT BOOKS**

1. Rodger W Haines , “ HVAC systems Design handbook , 5 th edition, MGH ,2009.
2. Robert Brown Butler, “ Architectural Egg System design: Mechanical system” 2002
3. Hall , “Building Services & equipment. Vol.2&3, Routhledge,2000
4. Scott Berinato, The HBR Guide to making smarter, More persuasive data visualization, 2016.

### **REFERENCES**

- 1.Design of Special Hazards and Fire Alarm Systems by Robert Gagnon, Thomson Delmar Learning; 2nd edition, 2007.
- 2.HVAC Controls and Systems by Levenhagen, John I.Spethmann, Donald H., McGraw-Hill Pub.
- 3.HVAC Control in the New Millennium by Hordeski, Michael F, Fairmont press, 2001.
- 4.Process Control-Instrument Engineers Handbook by Bela G. Liptak, Chilton book co.

### **WEBSITES:**

1. <http://nptel.ac.in/video.php>
2. <https://buildingsolutions.honeywell.com/en-US/Pages/default.aspx>
3. <http://www.isa.org>
4. <http://www.controleng.com/>
5. <http://www.schneider-electric.com/b2b/en/solutions/system/s1/buildings-systems.jsp>
6. <http://www.automation.siemens.com/>
7. <http://coep.vlab.co.in/?sub=33&brch=97>

<b>ARB310</b>	<b>CONTEMPORARY ARCHITECTURE</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b> To expose to students the knowledge about impact of industrialization, invention of new materials, Revolutionary thinking and philosophies of Architects, emerging schools of thought, and contributions made by architects of international fame.			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Be exposed to various architectural movements and manifestoes over the past century</li> <li>• To study the work of pioneering architects and institutions and comparing varied schools of thought.</li> <li>• Understand the impact of technological and philosophical progress which produced radical new thoughts such as the deconstructivist theory, digital architecture and Fractile geometry.</li> <li>• Be aware of architecture and urban design in post independent India, including both works of</li> <li>• foreign architects and Indian masters.</li> </ul>		<ul style="list-style-type: none"> <li>• The students should be able to:</li> <li>• Provide considerable insight on the progress of architectural philosophies globally over the past century and discuss current trends and theories knowledgably.</li> <li>• Independently research trends in architecture and form critical opinions on differing ideologies and schools of thought.</li> <li>• Look beyond singular history text books and develop an understanding of ‘why’ things happen and what their impact can be, more than simply ‘what’ happened.</li> <li>• Practice in India with an understanding of what the architectural community has been</li> <li>• developing in the country after independence and sharing a common vision for the benefit of all.</li> </ul>	

## **UNIT I INTRODUCTION**

**4**

Brief on Neo-Classicism - Enlightenment Architects: Boulle and Ledoux. Industrial Revolution; Invention of Materials and Technologies and their influence on Architecture.

## **UNIT II ARCHITECTURAL MOVEMENTS**

**6**

Art Nouveau and the works of Gaudi, Horta, Macintosh – A brief study of the Early works of F.L.Wright, Adolf loos ; Futurists Movement Manifestos and the works of Sant'Elia – Expressionism and the works of Mendelsohn, Taut, Polzeig - Cubism and Constructivism and its influence on Architecture - Destijl: Ideas and works.

## **UNIT III INSTITUTIONS**

**6**

Werkbund and Bahaus/Works of Behrens and Gropius - Cannonising Modernism - InternationalStyle - CIAM Congresses and Declarations. Works and Ideas - LeCorbusier - Mies - Later Works of Wright - Alvar Alto

## **UNIT IV MODERNISM, POST MODERNISM AND LATER**

**8**

Brief on critiquing modernism, through writings of Venturi, Jane Jacobs, Aldo Rossi – Christopher Alexander. Historic Revivalism - Pop Architecture - Critical Regionalism - Deconstructive Theory and Practice - their limitations. Later Ideas and selected Works of - Fathy - Baker - Ando - Soleri - Bawa. works of Zaha Hadid, Frank O Gehry, Peter Eissenman Rem Koolhaas, Skidmore, Owings and Meryl, Michel Graves - study of concepts like Digital Architecture– Fractile Geometry and influence of Digitization and Globalisation on Architecture.

Chandigarh and Bhuvaneshwar experiments - Influence of Corbusier, Louis Khan , Koeinsberger - The formation of Institutions - Debates on Tradition as a source and burdern – works and ideas: Nari Gandhi - Doshi - Kanvinde - Correa - A. Raje - U.C.Jain - Stein Housing  
Exercise: Every student shall come up with five present day architects and learn about their works and philosophies.Eg: Sanjay Mohe, Bijoy Jain, Hafeez Contractor etc.

**TOTAL : 45****TEXT BOOK**

1. Alan Colquhoun, “Modern Architecture”, Oxford University Press ,2002
2. Neil Levine, “Modern Architecture: A Critical History”, Yale University,2009..
- 3.Liane Lefaivre, and Alexander Tzonis,“The Emergence of Modern Architecture: A Documentary History from 1000 to 1810” , Routhledge Publication,2010

**REFERENCES**

1. Bill Risebero, “Modern Architecture and Design”, MIT Press ,
2. Kenneth Frampton, “Modern Architecture: Representation & Reality:
3. James Steele, “The Complete Architecture of Balakrishna Doshi” , Thames and Hudson

**WEBSITES:**

1. <https://www.e-architect.co.uk/contemporary-architects>
2. <http://www.theartstory.org/movement-cubism.htm>
3. <https://study.com/academy/lesson/expressionism-architecture-examples.html>
4. <https://www.archdaily.com/364856/happy-70th-birthday-peter-zumthor>

<b>ARB311</b>	<b>SUSTAINABLE ARCHITECTURE</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b> To expose to students to how architecture is related to sustainable and green building concepts on the planning process ;how the environment has an impact on the society ;the conventions which binds the nations ;global agenda to tackle it; and how architects can contribute to building and planning concept through understanding of climate resilient materials and technologies.			
<b>Objectives</b> The course should enable the student to: <ul style="list-style-type: none"> <li>• Understand the meaning definition and relationship between architecture environment and climate.</li> <li>• Evaluate how spaces have been organized and utilized by using the concept of sustainable materials and technologies.</li> <li>• Examine the usage and selection of spaces for designing the global conventions ,eco systems balance and environment friendly buildings</li> <li>• Make students know about the policies and actions of government.</li> </ul>		<b>Outcomes</b> The students should be able to: <ul style="list-style-type: none"> <li>• Have comprehensive knowledge on the evolution and impact of environmental aspect and sustainable issues</li> <li>• Be equipped to handle the architectural design process from the studies analysis interpretation and design in accordance to the case studies done on the green building concepts.</li> <li>• Have a knowledge on the government policies and actions towards sustainable society and latest technologies involved in the building process</li> <li>• Have knowledge on the organic and sustainable building materials used in the design and execution.</li> </ul>	

## **UNIT I INTRODUCTION**

**4**

Concept and definition-1970;Stock home declaration -1972;Burnt land commission 1987;Earth Summit-1992(UCED). Rio declaration-Agenda 21.

Environmental impact on human development related activities due to population growth, pace of urbanization, increase in consumption of energy, natural resources ,waste generation, deforestation and pollution.

## **UNIT II IMPACT OF CONSTRUCTION INDUSTRY ON ENVIRONMENT 6**

Depletion of earth resources, minerals and energy ,towards anthropogenic climate changes-towards hotter and drier, Desertification ,coastal flooding and erosion, water shortage-decline in water quality, food security-threatened ,Imbalance in eco system.

## **UNIT III BUILDING WITH REGIONAL /RENEWABLE MATERIALS 6**

Building with regional/renewable materials:

Bamboo,casuarina,types of thatch, palm trunks, palm rafters, Straw, Reed, Mud, lime, Stabilised mud blocks, Rammed Earth construction, Terracotta - Hollow bricks, jallis, Mangalore tiles,hollow clay roofing blocks,Athangudi tiles, Stone, Timber, Brick.

## **UNIT IV SUSTAINABLE CONSTRUCTION**

**10**

Passive design with respect to various climatic types including hot dry, warm humid, cold, temperate and composite. Modern sustainable construction techniques such as Pre-Fab, etc. Introduction to green materials - Local material and their significance, Recycled materials, Reused materials, salvaged materials, etc.

## **UNIT V EMERGING TRENDS IN SUSTAINABLE ARCHITECTURE 10**

Introduction to various Renewable power systems, concepts of life cycle analysis, carbon footprint reduction. Emerging ideas of Green Buildings including Net Zero Energy, Net zero water, Earth ships, etc. Green Building rating systems such as LEED, GRIHA, IGBC. Case Studies of various Green Building Projects across India..

**TOTAL : 45**

### **TEXT BOOK**

1. Cooper, Ilay & Dawson, Barry, Traditional buildings of India, Thames & Hudson, 2001
2. Majumdar, Mili (ed.), Energy Efficient Buildings in India, Tata Energy Research Institute and Ministry of Non Conventional energy Sources, 2001.
3. Krishnan, A. (ed.), Baker, N., Yannas, S., Szokolay, S., Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, Tata McGraw Hill Publishing Company Limited, New Delhi, 2001.
4. Joo-Hwa Bay and Boon Lay Ong, Tropical Sustainable Architecture, Social and Environmental Dimensions, Architectural Press, Elsevier ltd, 2006.

### **REFERENCES**

1. KlansDukeberg, Bambus – Bamboo, Karl Kramer verlag Stuttgart Germany, 2000
2. Building with straw - Design and Technology of a Sustainable Architecture Gernot Minke and Friedmann Mahlke Birkhauser – Publisher for Architecture Berlin – Boston, 2005.
3. Caring A.Langston Grace K.C.Ding, “Sustainable practices in built environment”, 2nd Edition, Publishers: Butterworth-Heinmann Linacre House Jordanhill Oxford, 2001

### **WEBSITES:**

1. [http://www.unesco.org/education/pdf/RIO\\_E.PDF](http://www.unesco.org/education/pdf/RIO_E.PDF)
2. <https://www.thenbs.com/knowledge/an-introduction-to-renewable-materials>
3. <http://businessfeed.sunpower.com/articles/explaining-what-is-green-building>

<b>ARB312</b>	<b>ENVIRONMENTAL SCIENCE FOR ARCHITECTURE</b>	<b>2 Credits</b>	<b>L T P C 2 0 0 2</b>
<b>Goal</b> To educate students on the environmental awareness across the world, to integrate the environmental knowledge into the education to connect students with the nature right before starting their architectural practices.			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• integrate environmental concerns with education, connecting the current political system of the whole world where actions, plans and policies can be formulated and executed at national level and by and large at the international level.</li> <li>• to understand the birth of the term “sustainability” and its positive impact on the growth of climatic concerns worldwide.</li> <li>• to assess the environmental situation and the conditions leading to the damage of the environment and changes in our lives to make a huge difference to the environment.</li> <li>• conserve the nature and environment through architectural practices and by the usage of materials in construction, not to let deplete the natural resources.</li> <li>• take responsibility in saving the environment through practicing architecture with environmental concerns to be implemented directly or indirectly to reach its maximum benefit.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Select and use necessary actions, plans and policies to be formulated for environmental protection.</li> <li>• Provide appropriate remedies and changes after assessing any damage in any environmental conditions to uplift the surroundings.</li> <li>• Design and construct buildings with all the concerns towards the surrounding environment.</li> <li>• Select and provide proper practicing techniques with sustainable development.</li> <li>• Select and use right type of materials, practicing techniques and frameworks for executing sustainable development.</li> </ul>	

### **UNIT I-ENVIRONMENTAL PROBLEMS IN INDIA**

**6**

Definition – Causes, effects and control measures of: - Air pollution - Water pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution - Nuclear pollution -Solid waste Management– Role of an individual in prevention of pollution - global warming-Acid rain-Ozone layer depletion

### **UNIT II – ENVIRONMENTAL SUSTAINABILITY**

**6**

Introduction to Biodiversity – India as a mega-diversity nation - Threats to biodiversity-hotspots, habitat loss, poaching of wild life, loss of species - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity - Natural Calamities floods, earthquake, cyclone and landslides – Settlement and built forms in Disaster prone regions - Threats to cultural heritage sites -Initiatives by Government, Private sector and Local Community to achieve environmental sustainability.

### **UNIT – III SOCIAL ISSUES AND ENVIRONMENTS**

**5**

Social issues and the environment, from unsustainable to sustainable development-urban problems related to energy-human population and environment- population explosion, resource exploitation and depletion, loss of wet lands, mangroves, increasing desert areas, recycling

## **UNIT IV – ARCHITECTURE AND NATURE**

**7**

Types of ecosystems, characteristics features, structure and functions of Ecosystems – Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries). Land, Forest, Water and Energy as environmental resources. Strategies to transform the built environment to meet the risks of climate change - BIOMIMICRY – an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies - Exercises / workshops / Creative studios – to come out with innovative ideas by the students aiming to solve the existing climatic and environmental problems.

## **UNIT V – ENVIRONMENTAL LEGISLATIONS, CODES AND POLICIES**

**6**

Introduction to Environmental Acts, - Water (Prevention and Control of Pollution) Act, - Air Prevention and Control of pollution act- Environmental Protection Act, Wild life protection Act, Forest Conservation Act, etc. Environmental aspects in Accessibility laws; ECBC, EIA, ASHRAE, NBC, permitted activities in coastal Regulation zone. Sustainable Practices in India and World.

**TOTAL 30**

### **TEXT BOOKS:**

1. S.V.S. Rana, "Essentials of Ecology and Environmental Science", PHI publications, 5<sup>th</sup> edition.
2. R S Kholyangbam, Navindu Gupta, "Introduction to Environmental sciences", The Energy and Resource institute, 2012
3. Walter Leal Filho & Paul Pace, "Teaching Education for Sustainable development at University Level", Springer Publications, 2015.
4. Jeffrey D. Sachs, "The age of Sustainable Development", Oxford press, 2011.

### **REFERENCES**

1. Simon, Jilian, "The Ultimate Resource", Princeton University press, N.J, 1981
2. Brown, Lester, "Building a sustainable society", Norton, 1981
3. Neville Nicholls, "A Letter to Nature", Australian Bureau of Meteorology Research Center, 1997
4. Adams, W.M. and Jean Renaud, "Transition to Sustainability: Towards a Humane and diverse world", Gland, Switzerland
5. Agarwal, K. C. (2001). Environmental Biology. Bikaner : Nidhi Publications Ltd.
6. Benny, J. (2005) Environmental Studies. New Delhi : Tata McGraw Hill
7. Bharucha, E. (2005)). Text book of environmental studies for undergraduates courses. New Delhi : Universities Press, UGC. .
8. Brunner, R.C. (1989). Hazardous Waste Incineration. New Delhi : McGraw Hill.
9. Kaushik, A. and Kaushik, C. P. (2010). Basics of Environment and Ecology. New Delhi : New Age International Publishers.

### **WEBSITES:**

1. <http://www.globalfootprints.org>
2. <http://www.curlie.org/Science/Environment>
3. <http://www.sustainabledevelopment2015.org>
4. <http://www.un-documents.net/our-common-future>
5. <http://www.un.org/geninfo/bp/enviro.html>

<b>ARB313</b>	<b>MATERIAL AND CONSTRUCTION V</b>	3 Credits	<b>L T P C 2 0 2 3</b>
<b>Goal</b> To educate students on various internal partitions and false ceilings, structural glazing and cladding, different types of floor and wall covering, protective coating and painting on walls, methods of water proofing and tanking.			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• Understand causes and various methods of damp/water proofing in buildings.</li> <li>• Understand material and method for cladding over internal and external walls.</li> <li>• Understand different types of floor &amp; wall coverings. Properties uses and its laying methods.</li> <li>• Understand different types of paints and its applications.</li> <li>• Understand different types of patent and structural glazing including their fixing details</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Incorporate present practices and materials for damp &amp; water proofing including tanking in basements and swimming pools, terraces etc.</li> <li>• Design and construct appropriate internal partitions and false ceilings using suitable materials.</li> <li>• Select and provide appropriate wall cladding.</li> <li>• Use floor &amp; wall coverings in appropriate manner.</li> <li>• Select and use coatings and paints over different surfaces as per functional requirement.</li> </ul>	

## **UNIT I DAMP AND WATER PROOFING**

**20**

Damp proofing hot applied and cold applied emulsified asphalt, bentonite clays, butyl rubber, silicon, vinyl's, Epoxy resins and metallic water proofing materials properties, uses. (waterproofing membranes such as rag, asbestos, glass, felt plastic and synthetic rubber, vinyl, butyl rubber, neoprene polyvinyl chloride (PVC) prefabricated membranes sheet lead, asphalt properties and uses.

Application of the above under various situations and tanking for basements, swimming pool, terraces, etc.

## **UNIT II PARTITIONS AND FALSE CEILINGS**

**15**

Aluminum partitions, internal screen walls, fittings and fixtures. False ceilings, aluminum sections and profiles used, Method of fixing/suspension, HVAC ducting, electrical cabling, providing lighting and other fixtures etc.

## **UNIT III - CLADDING ON WALLS AND STRUCTURAL /PATENT GLAZING 20**

Timber/plywood/ metal sheet etc. paneling over wall. Stone/cut- stone tiles, terracotta, glazed, ceramic, acid resistant and different types of tiles cladding over internal and external walls. Structural /patent glazing and screen wall as external façade and building envelope, design criteria, members used and fixing details, etc.

## **UNIT IV FLOOR AND WALL COVERINGS**

**10**

Floor coverings with softwood, hardwood resilient flooring, vinyl, rubber, cork tiles/rolls, carpeting of different types, properties and method of fixing. Wall coverings with wall papers of different types, Porcelain, enameled metal, wood veneer, vinyl, paneling properties, uses, special types of wall lining in x-ray room and any other similar type of spaces with harmful radiation.

## **UNIT V          PROTECTIVE AND DECORATIVE COATINGS**

**10**

Paint enamels, distempers, plastic emulsions, cement based paints properties, uses and applications. Preparation of surface, application of primer and base coat. Clear coatings and strains varnishes, lacquer, shellac, wax polish and strains Properties, uses and applications. Special purpose paints Bituminous, Luminous; fire retardant and resisting paints properties, uses and applications.

### **STUDIO PRACTICALS / SESSIONAL WORKS AND ASSIGNMENTS:**

- Manual drafting of Construction drawing sheets/plates, of selected topics in standard format
- Periodic visits to the construction sites.
- Notes /sketches and Site visit reports.

Note: Drawing sheets/plates will be evaluated continuously.

**TOTAL 75**

### **TEXT BOOKS:**

1. S.C.Rangwala , “Engineering Materials”, Charotar Publishing House, India, 2007.
2. Dr.B.C.Punmia, “Building Construction”, Laxmi Publications Pvt. Ltd., New Delhi, 2005.
3. Francis.D.K. Ching , “A Visual Dictionary of Architecture”, Van Nostrand Reinhold- 2004
4. Arora S.P. and Bindara S.P., Building Construction Planning Techniques and method of construction, Dhanpat Rai Sons, 2003.

### **REFERENCES**

1. W.B.Mckay, “Building Construction”, Vol. 1, 2, 3- Longmans U.K 2010.
2. Jack M. Launders, “Construction Materials, Methods”, Careers pub, J.Holland, Illinois Wileox CO.,Inc.1983
3. Arthur R.Llons, “Materials for architects and builders An introduction,” Holder Headline group, Great Britain, 1997.
4. Don A. Watson, Construction Materials and processes, McGraw Hill Co., 2003
5. Stephen Emmit, Christopher A.Gorse, “Barry’s Introduction to Construction of Buildings”- Second edition, Wiley – Blackwell, 2013.
6. Stephen Emmit, Christopher A.Gorse, “Barry’s Advanced Construction of Buildings”- Second edition, Wiley – Blackwell, 2014.

### **WEBSITES:**

1. <http://www.bwpda.co.uk>
2. <http://www.spectrumpaints.com>
3. <http://www.soundesigns.net>
4. <http://www.bmtpc.com>

<b>ARB331</b>	<b>ARCHITECTURAL DESIGN V</b>	<b>7 Credits</b>	<b>L T P C</b> <b>0 0 14 7</b>
<b>Goal</b> The students will be further oriented on design of small complexes or buildings involving technology, structural clarity and services in terms of lighting, ventilation, movement, fire safety, security, water supply, sewage etc.			
<b>Objectives</b>		<b>Outcome</b>	
The course should enable the students to : <ul style="list-style-type: none"> <li>• Train the student to gather knowledge on the given design project based on books / literature and websites.</li> <li>• Students are to be exposed to expert lecture from expert architect, for each project or design.</li> <li>• Make the student understand the complexity, functioning and salient features of the design project through organizing field visit, train them to document and present the findings.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Work on multi planning and mass problems involving building technology</li> <li>• Use computer for drawing and presentation skills using appropriate softwares.</li> </ul>	

## **UNIT I      DESIGN STUDIO**

**180**

Small complexes - concept of multi planning and circulation analysis - massing problems involving building technology, - Design and detailing for movement of physically handicapped and elderly persons within and around buildings.

**Examples:** Shopping centers (Commercial) Home for aged, apartments (residential) Health centers, Nursing homes (institutional) Etc.

**TOTAL : 180**

### **TEXT BOOKS:**

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time – Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed.By.Quentin Pickard RIBA "The Architects' Hand Book", Bladewell Science Ltd., 2002

### **REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K.Ching, John wiley & Sons, Inc. 1997

## WEBSITES

1. <http://wwwtest.library.ucla.edu/libraries/arts/websites/www.des.htm>
2. <http://www.clr.toronto.edu/VIRTUALLIB/ARCH/proj.html>
3. <http://www.thehub.net.au/%7Emorrisqc/architext>
4. <http://www.archinet.co.uk/>
5. <http://archinform.de/start.en.htm>
6. <http://www.plannet.com/>

## SEMESTER VI

<b>CEB323</b>	<b>DESIGN OF STRUCTURES -III</b>	<b>3 Credits</b>	<b>L T P C</b> 3 0 0 3
<b>Goal</b> To impart the students with the knowledge about the design of column, foundation which may be applied in architectural design projects and building construction details.			
<b>Objectives</b>		<b>Outcome</b>	
The course should enable the students to : <ul style="list-style-type: none"> <li>• Understand designing and detailing of short RC column by limit state design.</li> <li>• Know about continuous beams and slabs using IS code coefficients.</li> <li>• Understand design of circular slab and flat slab</li> <li>• Understand detailing of seismic resistant structures</li> <li>• Learn design concepts of raft foundation and pile foundation.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Develop knowledge about limit state design methods for continuous beam.</li> <li>• Use the limit state design methods to design and analyze of bricks masonry.</li> <li>• Use the limit state design methods to design circular slabs.</li> <li>• Gain the knowledge about seismic resistant structures</li> <li>• Gain the knowledge about wind Engineering.</li> </ul>	

### **UNIT I      LIMIT STATE DESIGN OF CONTINUOUS BEAMS      10**

Limit State Design of continuous beams and slabs using code coefficients.

### **UNIT II      MASONRY      10**

Analysis and Design of brick masonry, load bearing walls - codal requirements.

### **UNIT III      CIRCULAR SLABS      10**

Design of RCC Circular slabs - simply supported and fixed slabs with uniformly distributed loads.  
Design concept of flat slabs –code provisions.

### **UNIT IV      DETAILING SEISMIC RESISTANT STRUCTURES      10**

Introduction to detailing of Seismic Resistant Structures – IS 13920:1993 codal provisions - R.C.C. Structures and Masonry Structures

### **UNIT V      INTRODUCTION TO WIND ENGINEERING      5**

Terminology – Wind Data – Gust factor and its determination – wind Speed Variation with height – Shape factor – Aspect Ratio - Drag and Lift

**TOTAL: 45**

### **TEXT BOOKS**

1. Limit State Design of Reinforced Concrete, B.C Punmia, A.K Jain, 2010
2. Pankaj Agarwal, Manish Shrikhande, Earthquake Resistant Design of Structures, 2010

### **REFERENCES**

1. S.Unnikrishnan Pillai & Devados Menon, “ Reinforced Concrete Design”, Tata Mc.GrawHill 2016.
2. N.L. Shinha and S.K. Roy, “Fundamental of Reinforced Concrete”, S.Chand and Company, New Delhi, 2013.
3. P.Dayaratnam, Design of Reinforced Concrete Structures, Oxford and IBH Publishing Co., 2002.
4. Reinforced Concrete Design . N.Krishnaraju & R.N. Pranesh, New Age International Publications 2010

5. IS 13828 (1993) – Indian Standard Guidelines for improving Earthquake  
a. Resistant low strength masonry building.  
b. RCC Structures subjected to seismic forces.
6. IS 13920 (1993) - Indian Standard Code of practice for ductile detailing
7. IS 875-1987(Part3)- Indian Standard code for Wind Loads on Buildings and Structures

<b>CEB324</b>	<b>ESTIMATION , SPECIFICATION AND COSTING</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b> To enable students to understand that economic viability of a project is equally important in design through exposing him/ her to procedures involved in estimating quantities of materials and works, various costs and various financial institutions involved in it. Simple projects will be introduced for preparation of estimates.			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>• Inform the need for estimation, the concept of abstract and detailed estimates based on measurements of materials and works.</li> <li>• Inform the importance of BOQ. Cost control and budgeting, and norms and standards involved.</li> <li>• Make students know about the various financial agencies and institutions involved in land and building development and effecting financial control at various stages of the projects.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Understand the need for estimation, and the concept of abstract and detailed estimates.</li> <li>• Prepare BOQ and know to control cost and budget within the norms and standards.</li> <li>• Acquaint themselves about the various financial agencies and institutions.</li> </ul>	

## **UNIT I INTRODUCTION TO ESTIMATION**

**6**

Types and purpose, approximate estimate, detail estimate of building, bill of quantity and abstract format. - Quantity survey, principle of measurement and billing, elementary billing and measurement of different building items.

## **UNIT II RATE ANALYSIS**

**16**

Output and task done by labors/workers per day. -Rates of building materials, transportation cost. - Wages of labor cost of machinery/equipments and sundries, profit of contractor. - Rate analysis of main building items like excavation for foundation, plain cement concrete (P.C.C) M-8, M-10 grade in foundation and in plinth as base floor, P.C.C M-15 flooring, Reinforced cement concrete ( R.C.C.) for foundation, column, beam/ lintels, chajjas, slabs, stairs, etc., brick masonry in cement mortar, in foundation and super structure, half brick and brick on edge partition wall, cement plastering over brick and concrete surfaces with cement mortar in different ratios, cement pointing over exposed brick masonry, timber doors and windows, different types of tiles and cut stone tiles flooring over cement mortar bed, iron/steel work for grills/jalis and railings, rate analysis of major sanitation and water supply items, painting with different types of paints and coatings from inside and outside over brick and concrete surfaces and over steel and wooden works.

## **UNIT III ESTIMATE OF LOAD BEARING BUILDING**

**10**

Load bearing and framed structures- calculation of quantities of earthwork excavation, foundation, brick work, RCC, PCC, plastering, white washing, color washing and painting for shops, rooms, residential building with flat roof.

## **UNIT IV ESTIMATE OF FRAME STRUCTURE BUILDING**

**4**

Calculation of quantities of R.C.C foundations like column footing, piling or raft, R.C.C columns, beams/ lintels, chajjas, slabs, stairs, etc.,

Note: Other items in a framed structure building will remain same as in case of load bearing building.

## **UNIT V BUSINESS ENVIRONMENT AND FINANCE**

**9**

The business environment and its structure in practice, financial control and management for building construction- role of various financial agencies for building and land development.

**TOTAL 45**

### **TEXT BOOKS:**

1. Dutta B.N., Estimation and Costing in Civil Engg., UBS publishers and distributors,Pvt. Ltd 2003.
- 2 S.C. Rangwala, “Elements of Estimating and Costing”, Charoter Publishing House, India.
3. “Estimating Costing Specification & Valuation in Civil Engineering”, M. Chakrabarti.
4. Kohli D.D. & Kohli R.C, “ A Text book of estimating & costing(civil) S.Chand & Company Ltd.2004

### **REFERENCES**

1. W.H. King and D.M.R. Esson, “Specification and Quantities for Civil Engineers”, The English University Press Ltd.
2. “Tamil Nadu Building Practice”, Vol.1, Civil, Govt. Publication.
3. “P.W.D. Standard specifications”, G ovt. Publication.

### **WEBSITES:**

10. <http://www.builderdata.com/>
11. <http://www.building.ca/>

<b>ARB314</b>	<b>INTERIOR DESIGN AND FURNITURE</b>	<b>3 Credits</b>	<b>L T P C 3 0 0 3</b>
<b>Goal</b> To establish the understanding that interior design and its depending on furniture is a resultant of various factors and influences that are based on technology, Social and human aspects.			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Understand pieces of furniture both aesthetically and functionally.</li> <li>• Acquire knowledge of materials and manufacturing processes.</li> <li>• Use ergonomic data for understanding human comfort.</li> <li>• Understand the impact of furniture in interior design of a space</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Design a piece of furniture successfully for a defined user.</li> <li>• Create technical drawing complete with material specs ready to be issued to manufacturer.</li> <li>• Student should be able to make a presentation drawing with respect to human dimensions.</li> <li>• Present the interior design scheme complete with coordinated colour, texture board.</li> </ul>	

### **UNIT I INTRODUCTION**

**12**

Human lifestyles, activities and Interactions : Understanding need for types of furniture, Understanding materials and technologies Importantly Wood and metal, Color / Finish / Material

### **UNIT II DESIGN**

**12**

Form and Aesthetics, Applying principles and elements of design . Visual theory : Study of gestalt theory of design , law of closure, law of proximity, law of continuity etc., types of furniture with respect to different states.

### **UNIT III HUMAN COMFORT**

**8**

Brief History of furniture, Ergonomics, human factors, Engineering and Ergonomic considerations, principles of Universal Design and their application in furniture design.

### **UNIT IV FURNITURE BASED ON USAGE AND MANUFACTURING**

**5**

Built in Furniture, Custom Furniture, Modular Furniture, Packing and transportation, Impact of each kind on interior design , Various materials , combination of materials, their hardware and applications. Cost criteria of furniture design.

### **UNIT V PRESENTATION**

**8**

Design Presentation, Coordination Furnishing, furniture and accessories in an interior space. Technical Drawings, Documentation and representation of final product.

**TOTAL : 45**

### **TEXT BOOKS**

1. Sam Booth & Drew Plumkett “Furniture for interior Design” Lawrence king Publishing March 18, 2014.
2. Stuart Lawson “Furniture Design – An introduction to Development, Materials and Manufacturing” Lawrence king Publishing, London 2013.

## **REFERENCES**

1. Christopher Nataled – “Furniture design and construction for interior designer” – 2009
2. Sophie Lovel, Robert Klanten, Birga Meyer “Furnish : Furniture and interior Design for the 21st century – 2007

## **WEB SITES**

[www.iispares.com](http://www.iispares.com)

[www.northernarchitecture.us](http://www.northernarchitecture.us)

[www.housebeautiful.com](http://www.housebeautiful.com)

ARB315	MATERIAL AND CONSTRUCTION VI	3 Credits	L T P C 2 0 2 3
<b>Goal</b> To educate students on various types of Construction chemicals and Admixtures used with cement-concrete, Shallow and Deep foundations, measures to make buildings resistant to earth quake, different methods of shoring, under pinning, scaffolding and form work and Tools, Equipments and Machinery used in construction sites.			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to <ul style="list-style-type: none"> <li>Understand uses application of various types of Construction Chemicals and Admixtures.</li> <li>Understand material and method of constructing different types of shallow and deep foundations in different situations and soil conditions.</li> <li>Understand methods of designing and constructing Earthquake resistant buildings.</li> <li>Understand different methods of Shoring, Under pinning, Scaffolding and Formwork and their applications .</li> <li>Understand to know usages of different types of Tools, Equipments and Machinery used on construction sites.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>Select and use appropriate Construction Chemicals and Admixtures to get desired results.</li> <li>Select and provide appropriate foundations for different type of buildings in different situations.</li> <li>Design and construct buildings to resist Earth quakes of at least moderate intensity without risking loss of lives and property of the occupants.</li> <li>Select and provide proper Under pinning, Scaffolding and Formwork as par their functional role,</li> <li>Select and use right type of Tools, Equipments and Machinery in construction sites and projects.</li> </ul>	

## UNIT I CONSTRUCTION CHEMICALS AND ADMIXTURES

10

Introduction to construction Chemicals and Admixtures and usages. Types of construction Chemicals and Admixtures like water proofing compounds in different forms, retarders, binders plasticizers etc. and methods to use.

## UNIT II SHALLOW AND DEEP FOUNDATIONS

15

Introduction to Shallow and Deep foundations. R.C.C. combined and trapezoidal, Strap and Cantilever footings, Arch foundation, Under rimmed RCC Pile foundation and Raft foundations. Different types of RCC, steel and timber piles, Cast in situ and Pre cast piles, Sheet piles, Pile caps, Cofferdams, Cassion or Well foundations. Machine foundations.

## UNIT III EARTHQUAKE RESISTANT DESIGN AND CONSTRUCTION

20

Introduction to Earthquake and Terminology used. Intensity and magnitude of earth quake and its measurement. Seismic map of India. Earthquake resistant measures, effect on buildings, selection of site, site planning, structural systems and building materials, shape and form of the building, Behaviour of different building elements, Load bearing wall construction, RCC and steel frame construction, foundation, openings, cantilever projections, detailing, isolators and dampers, study of I.S. code 4326-1993 and provisions in National Building Code.

## UNIT IV SHORING UNDERPINNING SCAFFOLDING AND FORMWORKS

15

Introduction, Racking, flying, dead or vertical shores. Different methods of Pinning, types of Scaffoldings, steel scaffolding, patented scaffolding. Introduction to Form work. Materials for Form works, IS code 456-2000, requirements for good form work. Shuttering and Form work for building elements like footings, columns, beams, stairs, lintels, chajjas, arches, lofts, slab, balcony fins, louvres, shells and domes etc.

## **UNIT V CONSTRUCTION TOOLS, EQUIPMENTS AND MACHINERY 15**

Various tools including power driven tools used by labours, masons, carpenters, Bar binders etc. Earth movers, motorized dozer, shovel, bucket trencher, excavator, pumps, compacter, welding machines, drills. Concrete mixer, vibrators, chain-pulleys, cranes, material lifts etc.

### **STUDIO PRACTICALS / SESSIONAL WORKS AND ASSIGNMENTS**

- Manual drafting of Construction drawing sheets/plates, of selected topics in standard format
- Periodic visits to the construction sites.
- Notes /sketches and Site visit reports.

Note: Drawing sheets/plates will be evaluated continuously.

**TOTAL 75**

### **TEXT BOOKS:**

1. S.C.Rangwala , “Engineering Materials”, Charotar Publishing House, India, 2007.
2. Dr.B.C.Punmia, “Building Construction”, Laxmi Publications Pvt. Ltd., New Delhi, 2005.
3. Francis.D.K. Ching , “A Visual Dictionary of Architecture”, Van Nostrand Reinhold- 2004
4. Arora S.P. and Bindara S.P., Building Construction Planning Techniques and method of construction, Dhanpat Rai Sons, 2003.

### **REFERENCES**

1. W.B.Mckay, “Building Construction”, Vol. 1, 2, 3- Longmans U.K 2010.
2. Jack M. Launders, “Construction Materials, Methods”, Careers pub, J.Holland, Illinois Wileox CO.,Inc.1983
3. Arthur R.Llons, “Materials for architects and builders An introduction,” Holder Headline group, Great Britain, 1997.
4. Don A. Watson, Construction Materials and processes, McGraw Hill Co., 2003
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### **WEBSITES**

<http://www.bwpda.co.uk>  
<http://www.spectrumpaints.com>  
<http://www.soundesigns.net>  
<http://www.bmtpc.com>

<b>ARB332</b>	<b>ARCHITECTURAL DESIGN VI</b>	<b>7 Credits</b>	<b>L T P C</b> <b>0 0 14 7</b>
<b>Goal</b> To prepare student to confidently design large complex buildings and campuses, which involves structural synthesis, effective movement systems, within and around buildings, complying with all rules and regulations demonstrated in at least two large projects.			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• To train the student to gather knowledge on the given design project based on books/ literature and websites.</li> <li>• The students are to be exposed to expert lecture from expert architect, for each project or design.</li> <li>• To make the student understand the complexity, functioning and salient features of the design project through organizing field visit, train them to document and present the findings.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Design multi use multi span and multi level buildings involving technology and service</li> <li>• Use computer for drawing and presentation skills using appropriate softwares.</li> </ul>	

## **UNIT I DESIGN STUDIO**

**180**

Design of large structures - Multiuse, multispans, multilevel (six to eight floors) - building types involving technology and services – Design and detailing for movement and use by physically handicapped people within and around building.

**Examples:** College office buildings (Institutional) Large Commercial Complex (Commercial) Resorts (Recreational) - Mixed Residential Developments (Residential) etc. Working drawings for any one design Using Computer for presentation Skills.

**TOTAL : 180**

### **TEXT BOOKS:**

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time – Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed.By.Quentin Pickard RIBA "The Architects' Hand Book", Bladewell Science Ltd., 2002

### **REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K.Ching, John wiley & Sons, Inc. 1997

## **WEBSITES**

<http://wwwtest.library.ucla.edu/libraries/arts/websites/wwwdes.htm>

<http://www.clr.toronto.edu/VIRTUALLIB/ARCH/proj.html>

<http://www.thehub.net.au/%7Emorrisqc/architext>

<http://www.archinet.co.uk/>

<http://archinform.de/start.en.htm>

<http://www.plannet.com/>

## SEMESTER VII

<b>ARB405</b>	<b>LANDSCAPE AND ECOLOGY</b>	<b>3 CREDITS</b>	<b>L T P C</b> 3 0 0 3
<b>GOAL</b>	To understand basics of ecology, planting design, site planning and landscaping of functional areas.		
<b>Objectives</b>		<b>outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Acquire knowledge on ecology and conservation</li> <li>• Know about common plants and the use in landscape design</li> <li>• Evolution of garden design during different periods and countries.</li> <li>• Acquire knowledge to do a comprehensive landscape development plan for various landscape functional areas.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Learn about basics about ecology and conservation and reclamation of derelict areas.</li> <li>• Learn to identify common and popular plants, contextual to the region and to work with guidelines.</li> <li>• Learn about historical landscapes, planning styles and elements used in landscapes</li> <li>• Learn to do landscape plan for recreational spaces, housing development, water front areas and urban centers considering the planning aspects and elements that has to be used in design.</li> </ul>	

### UNIT I INTRODUCTION

6

Introduction to ecology, landscape conservation, reclamation and landscaping of derelict areas.

### UNIT II PLANT MATERIALS

6

Notes on basic plant data for plant selection and planting design, in the Indian context.

### UNIT III GARDEN DESIGN

8

A brief description of Mughal gardens of India, Japanese gardens and Italian gardens. Basic principles of landscape design and the visual aspects of plant forms.

### UNIT IV SITE PLANNING

10

Site investigation appraisal and site planning neighborhood parts, Children's parks toilets and sports area.

### UNIT V LANDSCAPING OF FUNCTIONAL AREAS

15

Landscaping for various types of housing areas. Landscape design for waterfront areas and functional areas in urban centers. Principles of urban landscape, urban design and architectural control.

**TOTAL : 45**

### TEXT BOOKS

1. "Landscape Ecology", Jim Sanderson & Larry D Harris by CRC press LLC, 2000.
2. "Landscape Architect's Portable Handbook", Nicholas T Dines & Kyle D Brown, 2001 by Mc Graw Hill Companies, Inc.
3. The Living Landscape – An Ecological approach to Landscape Planning", Frederick Steiner by the Mc Graw Hill Companies, Inc, 2000.

### REFERENCES

1. "Tropical Garden Plants", William Warren, Thames & Hudson Ltd, London, 1997.
2. "the Landscape of Man", Geoffrey & Susan Jellicoe, Thames & Hudson Ltd, London, 1995.
3. "The Practical Encyclopedia of Garden Planning Design & Decoration", Peter Mc Hoy & Tessa Eveleigh, Anness Publishing Ltd., 1999.
4. "Time – Saver Standards for Landscape Architecture", Charles W Harris & Nicholas T Vines by Mc Graw Hill, Inc, 1998
5. "Contemporary Trends in Landscape Architecture", Steven L. Cartor by John Wiley & Sons, Inc, 1997.

<b>ARB406</b>	<b>HUMAN SETTLEMENT PLANNING</b>	<b>3 Credits</b>	<b>L T P C</b> 3 0 0 3
<b>Goal</b>	To understand the evolution and application of the planning concepts for the improvement of environment through which the betterment of human living and welfare is achieved.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Understand the evolution and growth of human settlements in the nature and its elements.</li> <li>• Understand about the various planning principles and theories followed by various town planners through the history.</li> <li>• Know about the urban and rural housing conditions in India, and the road geometries which will influence the built environment.</li> <li>• Understand how planning activities are regulated in the state at various levels.</li> <li>• Know about the futuristic ideas of modern proposed cities and its development.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Have a comprehensive knowledge about the history of human settlements</li> <li>• Have a complete knowledge about the various planning thoughts proposed by the scholars and its successful effects</li> <li>• Understand and analysis the various housing conditions of the people and the road geometries of our cities.</li> <li>• Look at the role and activities of the various nodal agencies who regulate the city growth in our state.</li> <li>• Examine the various futuristic models proposed by the scholars at present.</li> </ul>	

#### **UNIT - I INTRODUCTION TO HUMAN SETTLEMENTS 9**

Introduction to human settlements - elements of human settlement - context and examples - major aspects in spatial planning. Classification of human settlements - Growth and decay of human settlements: Factors influencing the growth and decay, growth pattern of urban settlements during the last one-century in our country. Structure and form of human settlements - physical and functional

#### **UNIT - II PLANNING THEORIES 9**

Planning Theories enunciated by Ebenezer Howard, Patrick Geddes, Doxiadis, Le-Corbusier & Clarence Arthur Perry, their relevance to Indian Planning.

#### **UNIT - III PLANNING ACTIVITIES 9**

Urban and Rural Housing: Assessment of housing need and demand, Meaning of housing units – built units and plots – approved, unapproved – developed, undeveloped and serviced. Roads – Classification, cross – section elements – their geometry and functions, Intersection – conflicting points and channelisers.

#### **UNIT - IV URBAN, REGIONAL PLANNING AND LOCAL GOVERNANCE 9**

Aim, Objective, Scope and content of Regional Plan, Master Plan, Zonal Plan and Urban renewal plan. Objectives, Functions, Responsibilities and Organizational structure of Village Panchayats, Municipalities, Corporations and Urban Development Authorities.

#### **UNIT - V SETTLEMENT SYSTEM IN A CHANGING WORLD 9**

Human settlement in space. Regionalism and regional approach to human settlements growth. Global city, Information Technology & Communication – the city of the future and future of the cities. Utopian concepts.

**TOTAL: 45**

#### **TEXT BOOKS:**

1. Gallion Arthur B & Eisna Simon, “The Urban Pattern: City Planning and Housing”, Cbs, 2005.
2. L. R. Kadiyali, “Traffic Engineering and Transport Planning”, Khanna Publishers, New Delhi, 2000.
3. Peter Geoffrey Hall, “Urban and Regional Planning”, Fourth Edition, Routledge, 2002.

**REFERENCES:**

1. De witt Douglas Kilgore, “Astrofuturism: science, race, and vision of utopia in space”, University of Pennsylvania Press, 2003.
2. Frederic P. Miller etall, “Ekistics: Ekistics, Konstantinos ApostolosDoxiadis, Human Settlement, Urban Planning, Architectural Theory, Settlement Hierarchy, Arcology, Conurbation, Consolidated City-county, Global City”, Alphascript Publication, 2010.
3. Government of India, “Report of the National Commission on Urbanisation”, 1988.
4. Scott Campbell and Susan S. Fainstein, “Readings in Planning theory”, Wiley Blackwell, 2003.
5. Thodupuzha M. Jospeh, “Local Governance in India: Ideas, Challenges and Strategies”, Concept Publishing Company. 2009.

<b>ARB 407</b>	<b>APPROPRIATE TECHNOLOGY</b>	<b>3 Credits</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>Goal</b>	To make the students aware of the fact that new technologies and buildings have made living unsustainable. Rapid development has resulted in scarcity and high prices of energy and environmental degradation. The combinations of new technologies have benign social applications and they combine to undermine sustainability.		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the students : <ul style="list-style-type: none"> <li>● To understand the definition and scope of appropriate technology</li> <li>● To understand the relevance of Mud and its construction techniques.</li> <li>● To understand the types and usage of Alternative building materials</li> <li>● To understand various alternative and low cost construction technology</li> <li>● To understand the Research initiatives and innovation in India and around the world</li> </ul>		The students should be able : <ul style="list-style-type: none"> <li>● To evaluate the need and importance of using appropriate technology</li> <li>● To analyze and differentiate between different alternative building techniques.</li> <li>● To apply various appropriate construction technology</li> <li>● To evaluate the development and application of research initiatives in architectural projects.</li> </ul>	

#### **UNIT I INTRODUCTION**

**6**

Definition of Appropriate technology, Need, Scope, Sustainability, Cost Effectiveness, Limitations, Culture, Importance of local materials and types of construction

#### **UNIT II MUD ARCHITECTURE**

**12**

Adobe Construction, Cob, Wattle and Daub walls, Rammed Earth, Stabilized Earth blocks, Earthen finishes, Earth Floor, Architects working on Earth Construction, Burnt clay tile roofing Architects Work- Hassan Fathy, Laurie Baker etc. Workshop to be conducted

#### **UNIT III ALTERNATIVE CONSTRUCTION TECHNIQUES**

**8**

Bamboo, Applications of bamboo in building construction-flooring-roofing-ceiling-Trusses, Straw bale technology, Fly Ash, GFRC, Lime as a building material, Other alternative materials like Sand bag, Construction waste. Study visits to be organized

#### **UNIT IV APPROPRIATE CONSTRUCTION TECHNOLOGY**

**12**

Ferro-cement and its applications, Thermal Insulation techniques - Rat Trap bond, Hollow blocks, Cavity walls, Filler slabs, Pre Fab - Modular Construction, Works of architects involved in Appropriate building technology – Auroville, Habitat etc.

#### **UNIT V RESEARCH INITIATIVES**

**7**

Disaster Relief shelters, Research agencies in Alternative building Technology, Role of building centres in India, SERC, CBRI, BMPTC, Case study of buildings constructed by experts with improved/ appropriate techniques and their analysis. Study visits to be organized.

**TOTAL: 45**

#### **TEXT BOOK**

1. K.S. Jagadish, Alternative Building Materials and Technologies, New Age International Private Limited; Second Edition edition, 2017

#### **REFERENCES**

1. Lynne Elizabeth and Cassandra Adams; Alternative Construction: Contemporary Natural Building Methods
2. Hugo Houben, Earth Construction: A Comprehensive Guide, Intermediate Technology Publications, 1994
3. Mohan Rai and M.P Jaisingh: Advances in building materials and construction, CBRI Roorkee Publications

<b>ARB 408</b>	<b>VALUATION</b>	<b>3 Credits</b>	<b>L T P C</b> <b>3 0 0 3</b>
<b>Goal</b>	To get the knowledge on valuation of properties, rent fixation, Public works department accounts, and measurement books		
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the students to : <ul style="list-style-type: none"> <li>• Understand the principles and methods of valuation of properties.</li> <li>• Understand free hold and lease hold properties and different types of values along with and about mortgaging</li> <li>• Valuation of properties using different methods</li> <li>• Understand the valuation of properties for Income Tax Purpose.</li> <li>• Understand about valuation of properties for Bank loan purpose</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Identify various methods of property valuation and the duties of the valuer</li> <li>• Identify and classify the properties, sinking fund, depreciation, years of purchase and to fix the rent of various properties.</li> <li>• Fix the value of built up properties using different methods of valuation</li> <li>• To value properties for different tax purposes.</li> <li>• Prepare valuation reports and assess value for bank loan purposes.</li> </ul>	

#### **UNIT 1 INTRODUCTION**

**9**

Real estate – Cost, Price, Value - Principles & Purpose of valuation – Factors affecting market value - Various types of valuations – Valuation methods, Forms of Value, Fair rent – purpose – methods, Problems on fair rent calculation.

#### **UNIT 2 PROPERTY AND ITS FINANCE**

**8**

Classification of Property, Freehold and Leasehold interest and difference between them, Mortgage, Easement and its effect on valuation, Valuation of special buildings like Cinema hall and Hotels.

#### **UNIT 3 METHODS OF VALUATION**

**10**

Methods of Land Valuation – Sale instances – Collection of data, Methods of Valuation of land and Buildings – Depreciation – methods of depreciation Calculation of Standard rent -Accommodation Land and Accommodation Works, Annuity, Rent fixation.

#### **UNIT 4 VALUATION PROCEDURE**

**8**

Rental method of valuation – Outgoings – Sinking fund – Collection charges – Repairs and maintenance – Capitalized value, Perpetuity, Reversionary value of land, Problems on rent capitalization method.

#### **UNIT 5 ACCOUNTS AND REPORTING METHODS**

**10**

Valuation Cell of IT Department, its power and duties, Types of Income tax cases for which valuation is required, Valuing property for each types, Problems, Valuation for obtaining bank loans, Procedure, and format. Approved valuers for Banks, Income Tax Department, Miscellaneous valuers other than real estate.

**Total 45**

#### **Text Books**

1. Rangwala S. C., “Valuation of Real Properties”, Charotar Publishing House P Ltd., 2015
2. Dutta, B.N., “Estimating and Costing in Civil Engineering”, UBS Publishers & Distributors Pvt. Ltd., 2003

#### **References:**

1. Namavati Roshan, “Theory & Practice of Valuation”, Published by Lakhani Book Depot, 2010,
2. Practical Information for Quantity Surveyors, Property valuers, Architects Engineers and Builders, P.T.Joglekar, Pune VidyarthiGrihaPrakashan, 2008 reprint.
3. SyamalesDatta, “Valuation of Real Property: Principles And Practices”, Eastern Law House P Ltd., 2004
4. D.N. Banerjee, ‘Principles and Practices of Valuation’, V Edition, Eastern Law House, 1998.

<b>ARB409</b>	<b>HIGHRISE BUILDINGS</b>	3 Credits	<b>L T P C</b> 30 0 3
<b>GOAL</b>	To enable the students to have knowledge and expertise in design and construction of highrise buildings.		
<b>Objectives</b>		<b>Outcomes</b>	
<ul style="list-style-type: none"> <li>To introduce the concept of High rise buildings</li> <li>To impart knowledge on the planning and designing aspects of high rise buildings</li> <li>To expose the students to various types of structural systems that are employed for high rise buildings.</li> <li>To impart knowledge about the special service requirements of high rise buildings</li> <li>To create awareness about the high rise buildings</li> </ul>		<ul style="list-style-type: none"> <li>By the end of the course, student should be able to sufficiently design a high rise building</li> <li>The student should be able to have sufficient knowledge to suggest appropriate structural systems for high rise buildings.</li> <li>The student should be able to design vertical transportation systems, Water supply systems, Electrical and Communication systems and Fire protection systems.</li> <li>To enable student to apply aspects of sustainability in high rise building design</li> </ul>	

### **INTRODUCTION**

**5**

Definition of High rise in different contexts – need – scope – advantages and disadvantages – History of high rise structures – 5 types of high rise structures - Current tall buildings and their salient features

### **DESIGN OF HIGH RISE BUILDINGS**

**8**

High rise building design approach – planning strategies – Building form – Plan shape efficiencies – Core Planning – Types, Components – Planning strategy for shafts and ducts – Parking strategies

### **STRUCTURE**

**12**

Aerodynamics – Structural systems – height vs footprint - Wind load issues – Seismic issues – Materials – foundation

### **SERVICES**

**12**

Vertical transportation – HVAC systems - Water supply transmission & distribution – waste disposal – Firefighting regulations & Strategies - Service Floor – relevant regulations in Indian Context

### **SUSTAINABILITY**

**8**

Building Automation – Green Elements – Passive and Active design – Works of Architects like Ken Yeang, Norman Foster

**TOTAL : 45**

### **TEXT BOOKS**

1. Designing Tall Buildings: Structure as Architecture By Mark Sarkisian
2. Bryan Stafford and Alex Coull, *Tall Building Structures, Analysis and Design* John Wiley & Sons, New York, 1991
3. Stein Reynolds Mc Guinness – *Mechanical and Electrical equipment for buildings – vol 1 & 2* – John Wiley & sons
4. Tall building design: steel, concrete, and composite systems. by Bungalies. Taranath. -CRC press.

### **REFERENCE:**

1. Krishna Raju .N, *Pre Stressed Concrete*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1988
2. Taranath .B.S, *Structural Analysis and Design of Tall Buildings*, McGraw Hill, New York, 1988.
3. Bennetts Ian & others – *Tall building structural systems*.
4. Proceedings of the Council for Tall buildings – Vol 1 to 10 Books – 1997.
5. Handbook on building fire codes by G.B.Menon.
6. National building code (NBC) Part 4-directorate of fire service. annex c.

**ELECTIVE I**

<b>ELECTIVE I ARC361</b>	<b>VISUAL COMMUNICATION AND ARCHITECTURE</b>	<b>2 Credits</b>	<b>L T P C 2 0 0 2</b>
<b>Goal</b> To make students understand that visual communication was simultaneous developing with architecture and it is a source of inspiration to application to Architecture.			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Learn the need and importance of visual communication and theories and philosophies related to it.</li> <li>• Learn the elements of design, materials, techniques and tools of graphic design.</li> <li>• Learn the way finding in built environment and outdoor using advanced computer applications.</li> <li>• Learn Digital sculpture and installation</li> <li>• Learn various techniques behind architectural photography.</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Understand the basic relationship between visual communication and architecture.</li> <li>• Understand the basic concept behind graphic design.</li> <li>• Familiarize with mobile augmental reality and use of GPRS &amp; GPS.</li> <li>• Understand about installation art and architecture.</li> <li>• Perception and visual documentation of architectural projects.</li> </ul>	

**UNIT I INTRODUCTION TO VISUAL COMMUNICATION****4**

Need for and the Importance of Human and Visual Communication. Communication an expression, skill and process. Relation between visual communication and architecture. Theories and Philosophies of Visual Communication.

**UNIT II GRAPHIC DESIGN****6**

Basics of Graphic Design. Definition, Elements of GD, Design process-research, a source of concept, the process of developing ideas-verbal, visual, combination & thematic, visual thinking. Problem associated with editing and manipulation of image/pictures using PhotoShop/Corel Draw. Associative techniques, materials, tools (precision instruments etc.) design execution, and presentation.

**UNIT III WAY FINDING IN ARCHITECTURE****8**

Basics of Way finding in complex built environments. Study of semiotic theory. Study of signs and signages and their application in built environment. Use of advanced computer applications such as mobile augmented reality and RFID tagging in process of way finding in indoor environment. Use of GPRS and GPS for way finding in outdoor environment.

**UNIT IV INSTALLATION ART AND ARCHITECTURE****5**

Introduction to Digital sculpture and installation art and their association to architecture. Integration of Open spaces and public spaces with installations. Study of works of Contemporary Installation artist. Conceptual design of Installation for place architecture.

**UNIT V ARCHITECTURAL PHOTOGRAPHY****7**

Human Eye and Camera. Basics of Camera and its operations. Types of Camera. Visual Perception. Perception of Colour, depth, lighting, foreground, mid ground, and background in architectural photography. Visual Documentation of Architectural projects. Image processing, Editing/Post production. Preparation of port folio.

**TOTAL: 30**

## **TEXT BOOKS**

1. Overlooking the Visual: Demystifying the Art of Design Paperback – Import (2009) by Kathryn Moore
2. Louis Smith, Kenneth (2005) Handbook of Visual Communication: Theory, Methods and Media, Lawrence Erlbaum Associates.

## **REFERENCES**

1. Good Charts: The HBR Guide to Making Smarter, More Persuasive Data Visualizations 2016 by Scott Berinato
2. Picture this: Media Representation of Visual Arts and artists. University of Luton Press
3. Lester, Paul Martin, (2010) Visual Communication: Images with Messages, Thompson Wadsworth, USA
4. O Huck, Fedrick, Fales.L.Carl and Rahman, Zia-Ur (2010) Visual communication: an information theory approach, Kluwer Academic Publishers.
5. Edited by Anna Bentkowska-Kafel, Trish Cashen and Hazel Gardiner. (2009) Digital visual culture : theory and practice, Intellect :Bristol,UK
6. Hembree, Ryan (2008) The complete graphic designer : a guide to understanding graphics and visual communication, Beverly, Mass. : Rockport Publishers

## **WEBSITES**

1. [https://www.ripublication.com/irph/ijert\\_spl17/ijertv10n1spl\\_20.pdf](https://www.ripublication.com/irph/ijert_spl17/ijertv10n1spl_20.pdf)
2. <https://arch.usc.edu/courses/420>
3. <https://archinect.com/umsoa>

Elective I <b>ARC362</b>	<b>BUILDING AUTOMATION</b>	<b>2 Credits</b>	<b>L T P C 2 0 0 2</b>
<b>Goal</b> Security of the building and safety of personal are becoming important aspects now a day and in near future, it will be in a great demand. Complex infrastructure requires a variety of building automation and control Systems. Building Management System is computer-based control system installed in building that controls and monitors the total MEP (Mechanical –Electrical –Plumbing) and security Structure .BMS consist of both Hardware and software. This subject will help the students to understand the various aspects of different systems seen in well-structured building.			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>To understand the importance of building automation</li> <li>To integrate these systems with architecture</li> <li>Able to understand how BMS effects functional efficiency of he building</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>Analyze current philosophy, technology, terminology, and practices used in building automation</li> <li>Evaluate different fire standards, FAS Components, FAS loops, Architectures.</li> <li>select hardware and software for HVAC system.</li> <li>Evaluate energy management system</li> </ul>	

#### **UNIT I INTRODUCTION**

**4**

Concept and application of Building Automation and Management system.

Design issues related to building automation and its effect on functional efficiency; Concept and application of Building Management System (BMS) and Automation, requirements and design considerations and its effect on functional efficiency of building automation system, architecture and components of BMS

#### **UNIT II FIRE SYSTEMS**

**6**

Fundamentals: What is Fire? Fire modes, History, Components, and Principles of Operation.FAS Components:Different fire sensors, smoke detectors and their types,Fire control panels, design considerations for the FA system.Field Components, Panel Components, Applications.FAS Architectures: Types of Architectures, Examples.

FAS loops: Classification of loops, Examples.

Fire Standards: FAS Design procedure in brief, NFPA 72A, BS 5839,

IS Concept of IP enabled fire &alarm system, design aspects and components of PA system.

#### **UNIT III ACCESS CONTROL SYSTEMS1**

**4**

Access Control System: Access Components, Access control system Design. CCTV:Camera:Operation& types, Camera Selection Criteria, Camera Applications, DVR Based system, DVM, Network design, Storage design.Components of CCTV system like cameras, types of lenses, typical types of cables, controlling system

#### **UNIT IV HVAC**

**8**

Introduction to HVAC, HVAC Fundamentals, Basic Processes (Heating ,Cooling etc) Basic Science: Air Properties, Psychometric Chart, Heat Transfer mechanisms, Examples. Human Comfort: Human comfort zones, Effect of Heat, Humidity, Heat loss .Processes: Heating Process & Applications (I.e. Boiler, Heater), Cooling Process &Applications (I.e. Chiller), Ventilation Process & Applications (I.e. Central Fan System, AHU, Exhaust Fans), Unitary Systems (VAV, FCU etc).Control Theory: Instrumentation Basics, Field components & use, DDC & applications. Control Panel: HVAC Control Panel, MCC Basics, Panel Components Communication: Communication Basics, Networks, BAC Net, Modbus, LON

## **UNIT V BUILDING MANAGEMENT SYSTEMS**

**8**

IBMS (HVAC, Fire & Security) project cycle, Project steps BMS.Verticals: Advantages & Applications of BMS, Examples Integration: IBMS Architecture, Normal & Emergency operation. Advantages of BMs

**TOTAL : 30**

### **TEXT BOOK**

- 1.Smart Buildings by Jim Sinopoli, Butterworth-Heinemann imprint of Elsevier,2nd ed., 2010.
- 2.Understanding Building Automation Systems (Direct Digital Control, Energy Management, Life Safety, Security, Access Control, Lighting, Building Management Programs) by Reinhold A. Carlson, Robert A. Di Giandomenico, pub. by R.S. Means Company, 1991.
- 3.Intelligent Building Systems By Albert Ting-Pat So, WaiLok Chan, Kluwer Academic publisher,3rd ed., 2012.

### **REFERENCES**

- 1.Design of Special Hazards and Fire Alarm Systems by Robert Gagnon, Thomson Delmar Learning; 2nd edition, 2007.
- 2.HVAC Controls and Systems by Levenhagen, John I.Spethmann, Donald H., McGraw-Hill Pub.
- 3.HVAC Control in the New Millennium by Hordeski, Michael F, Fairmont press, 2001.
- 4.Process Control-Instrument Engineers Handbook by Bela G. Liptak, Chilton book co.

### **WEBSITES:**

1. <http://nptel.ac.in/video.php>
2. <https://buildingsolutions.honeywell.com/en-US/Pages/default.aspx>
3. <http://www.isa.org>
4. <http://www.controleng.com/>
5. <http://www.schneider-electric.com/b2b/en/solutions/system/s1/buildings-systems.jsp>
6. <http://www.automation.siemens.com/>
7. <http://coep.vlab.co.in/?sub=33&brch=97>

Elective I <b>ARC363</b>	<b>VERNACULAR ARCHITECTURE</b>	<b>2 Credits</b>	<b>L T P C 2 0 0 2</b>
<b>GOAL</b> This course examines the history, characteristics, technology and meaning of Vernacular architecture of India.			
<b>Objectives</b>		<b>outcomes</b>	
The course should enable the student to : <ul style="list-style-type: none"> <li>• To provide an overview of the various approaches and concepts to the study of vernacular architecture.</li> <li>• To develop a broader sense of understanding of the relationship between architecture, environment and culture</li> <li>• To Identify and interpret specific local, regional, and national vernacular traditions from India.</li> <li>• To introduce the study of vernacular architecture as a sustainable design solution</li> </ul>		The course should enable the student to : <ul style="list-style-type: none"> <li>• Understand and appreciate the uniqueness of Indian vernacular architecture</li> <li>• Acquire knowledge about the traditional building techniques and materials.</li> <li>• Master the skills of visual literacy: how to think critically, to analyze creatively, and to write clearly about the vernacular built environment.</li> </ul>	

### **UNIT I INTRODUCTION TO VERNACULAR ARCHITECTURE**

**4**

- a. Definition and classification of Vernacular architecture
- b. Vernacular architecture as a process – Survey and study of vernacular architecture: methodology- Cultural and contextual responsiveness of vernacular architecture: an overview
- c. Approaches and concepts to the study of vernacular architecture: an over view – Aesthetic, Architectural and anthropological studies in detail

### **UNIT II TRADITIONAL BUILDING MATERIALS**

**4**

- a. History of use of traditional building materials- Earth, stone, lime, timber and bamboo
- b. Advantages and disadvantages of natural building materials: sustainable approach

### **UNIT III VERNACULAR ARCHITECTURE OF WEST, NORTH & NE INDIA**

**8**

- Forms spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction technique of the vernacular architecture of -
- Deserts of Kutch and Rajasthan; Havelis of Rajasthan
  - Rural and urban Gujarat; wooden mansions (havelis); Havelis of the Bohra Muslims
  - Geographical regions of Kashmir; house boats
  - Houses of Assam and Mizoram

### **UNIT IV VERNACULAR ARCHITECTURE OF SOUTH INDIA**

**8**

- Forms, spatial planning, cultural aspects, symbolism, art, colour, materials of construction and construction technique, proportioning systems, religious beliefs and practices in the vernacular architecture of:
- Kerala: Houses of the Nair & Namboothri community: Koothambalam, Padmanabhapuram palace.
  - Tamil Nadu: Houses and palaces of the Chettinad region; Agraharams.
  - Franco-Tamil Housing of Pondicherry.

### **UNIT V CASE STUDY**

**6**

- Detailed Study of a vernacular building – analyse various factors – cultural, social-economic, technological, climatic, materials, current status, etc. Documentation of floor plans, sections, elevations, ornamental detailing and vernacular aspects

**TOTAL 30**

## **TEXTBOOKS:**

1. House ,form and culture - Amas Rapport, 1969.
2. Paul Oliver, Dwellings: the vernacular house worldwide, Phaidon -2007
3. Marcel Vellinga, Paul Oliver, Alexander Bridge, Atlas of vernacular architecture of the world, Routledge New York, NY 2007

## **REFERENCES:**

1. Vernacular architecture in the 21st century - Theory, Education and Practice - Lindsay Asquith, Marcel Vellinga (2006)
2. V.S. Praman, Havali – Wooden Houses & Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad, 1990.
3. Bharat Dave ,Jay Thakkar , Mansi Shah Prathaa: Kath-khuni Architecture of Himachal Pradesh, 2013
4. Rene Kolkman & Stuart Blackburn Tribal Architecture in Northeast India, 2014
5. Miki Desai Wooden Architecture of Kerala, Mapin publishing, 2017
6. Thomas Carter, Elizabeth Cromley - Invitation to Vernacular Architecture: A Guide to the Study of Ordinary Buildings and Landscapes (Vernacular Architecture Studies) (Perspectives in Vernacular Architecture) 2005
7. Chapter 2, Manual for Restoration and Retrofitting of Rural Structures in Kashmir.
8. Sharath Sunder Rajeev “Agraharams: the origin and evolution of a unique housing pattern in kerala”
9. INTACH Publication, Architectural Heritage of Pondicherry.

## **ONLINE REFERENCES:**

Chettinad Egg Lime Plaster, M.RM.RM Foundation.  
Athangudi Tiles, Winning documentary at 55th Annual NASA Convention.

**ELECTIVE II (VI SEMESTER)**

<b>Elective II ARC364</b>	<b>ARCHITECTURAL JOURNALISM AND PHOTOGRAPHY</b>	<b>2 Credits</b>	<b>L T P C 2 0 0 2</b>
<b>GOAL</b> This course enables students to understand the philosophies and concepts behind an architectural work and critic it. All architecture students can prosper by learning to see light and how light alters the visual impact of architectural forms. Just as drawing allows students to refine their vision and perspective teaches how we see, the camera allows for yet another discipline to organically create with architecture and light.			
<b>Objectives</b>		<b>Outcomes</b>	
Enables the students to: <ul style="list-style-type: none"> <li>• Understand the philosophies and styles of a building more deeply.</li> <li>• Enables them with the tools to write about their understanding of the building.</li> <li>• Understand the impact of literary works on the actual built environment</li> <li>• Understanding of architectural lighting.</li> <li>• Heightened sensitivity to light and how it strengthens architectural design</li> </ul>		Enable student to: <ul style="list-style-type: none"> <li>• Understand the influences of criticism towards architecture.</li> <li>• Intermediate ability to photograph architectural models and small products, including a studio set up with studio lighting and possibly strobe lighting.</li> <li>• Creation of exceptional images with light and architecture, including dusk imagery.</li> </ul>	

**UNIT I INTRODUCTION TO ARCHITECTURAL JOURNALISM****6**

What does architectural journalism really mean? How is it more than just written articles on architecture? What is the crux of the course?

**UNIT II NEEDS –RELEVANCE AND IMPACT****4**

Studying how writing architecture has made a difference to the built scenario. Understanding the relevant growth of the subject from where it started till now. How can writing change the way buildings are built and transformed! Perspectives

**UNIT III ANALYSIS OF WORKS****4**

Works of Indian and international writers and critics will be presented and discussed. Seminars on Indian architectural writers, journalists and critics Analysis of recent historical and contemporary examples of written and journalistic criticism of architecture, including selected writings by Indian and overseas critics; discursive techniques, analysis of major critical themes, thematic categories in architectural writing over the past three centuries.

**UNIT IV PRESENT TRENDS IN ARCHITECTURE****4**

Converting theory into practice. The social media boon. Different criticism or appreciation for the same building by architects or star architects. Assignment on Pritzker and the winners till today and the writer behind. Examples of Architecture Journalist

**UNIT V INTRODUCTION TO PHOTOGRAPHY****6**

General introduction to the art of photography; concept of color; concepts of lighting, distance, visual angle, frames; media; Exercise on integrating photography in architectural journalism. The interior perspectives, the ambient snapshots, highlighting the product design.

**UNIT VI PHOTOGRAPHIC TECHNIQUES****6**

Types of camera, properties and priorities; Exposure, Aperture, Speed; Photographic films, Film processing color, black and white, printing techniques, developing. Imparting the different Photoshop tutorials like double exposure, paper effect,

**TOTAL 30**

### **TEXT BOOKS**

1. Dave Sounders, *Professional Advertising Photography*, Merchurst, London 1988
2. Roger Hicks, *Practical photography*, Cassell, London 1996

### **REFERENCE BOOKS**

1. Julian Calder and John Garrett, *The 35mm Photographer's Handbook*, Pan Books, London 1999
2. Julie Adair King, *Digital Photography for Dummies*, COMDEX, New Delhi 1998

### **WEBSITES**

<https://digital-photography-school.com/architectural-photography/>  
<https://photography.tutsplus.com/articles/a-brilliant-beginners-guide-to-architectural-photography--photo-7883>  
<https://googleweblight.com/i?u=https://www.arch2o.com/principles-architectural-criticism/&hl=en-IN>

<b>ARC366</b>	<b>SITE PLANNING AND LANDSCAPE</b>	<b>2 Credits</b>	<b>L T P C</b> <b>2 0 0 2</b>
<b>Goal</b> To enable students to understand elements involved in landscape and learn the principles of site planning			
<b>Objectives</b>		<b>Outcomes</b>	
The course should enable the student to: <ul style="list-style-type: none"> <li>• Learn the approach towards planning open spaces</li> <li>• Learn Natural site design by preserving and protecting flora and fauna</li> <li>• Learn land and site utilization in an existing terrain</li> <li>• Understand the hydrology and surface drainage of the site</li> <li>• Learn the planning principles of Landscape planning</li> </ul>		The students should be able to: <ul style="list-style-type: none"> <li>• Understand the factors in and around a site influencing space design</li> <li>• Able to engage with natural features and terrain and hydrology of the site</li> <li>• Understand the principles through which effective site planning and landscape can be undertaken.</li> </ul>	

### **UNIT I INTRODUCTION :- SITE INTERPRETATION**

**7**

Approach towards planning open spaces – Typology of open spaces - open spaces with respect to buildings - roads, play areas, water bodies, etc. – factors at site and around site influencing open space design – Neighbourhood factors influencing site – Vegetation – Soil study – Slope study – Hydrology

### **UNIT II PRESERVATION & PROTECTION**

**6**

Natural Site Design - Preservation of Natural Vegetation - Riparian Buffer Zones -Wetlands - Floodplains - Steep Slopes - Vegetation mapping – Understanding the different strata of vegetation – ground cover, shrubs, trees, vines and climbers – Fauna of region - appreciating their unique and intrinsic characteristics of site and its surroundings and learning to decide nature of engaging with each.

### **UNIT III LAND AND SITE UTILIZATION**

**4**

Soil Properties - Reduce Limits of Clearing & Grading - Fit the Design to the Existing Terrain - Utilize Undisturbed Areas & Natural Buffers – Erosion due to run off

### **UNIT IV SURFACE DRAINAGE / HYDROLOGY**

**5**

Natural Drainageways vs. Storm Sewers - The carrying capacity - the watershed study - surface hydrology – Swales – Vegetated waterways – Erosion – sedimentation in reservoirs – check dams, dykes

### **UNIT V PLANNING PRINCIPLES**

**8**

Creative Development Design -Roadway Design -Building Footprints -Parking Lot -footprints -Setbacks & Frontages – Comprehensive study of all factors – Erosion control – Retention ponds

**TOTAL: 30**

### **TEXT BOOKS :**

1. “Landscape Architect’s Portable Handbook”, Nicholas T Dines& Kyle D Brown, 2001 by McGraw Hill Companies, Inc.
2. Site planning – Kelvin Lynch
3. The Living Landscape –An Ecological approach to Landscape Planning”, Frederick Steiner, 2001, by McGraw Hill Companies, Inc.
4. Landscape Architecture Theory: An Ecological Approach, 2016 by Michael Murphy, Island Press

### **REFERENCES :**

1. The Watershed: Landscape Architecture and Hydrology of Place by Andrew Schrauth, Cornell University
2. Site Engineering for Landscape Architects, 2013 By Steven Strom, Kurt Nathan, Jake Woland, John Wiley & Sons; 6th Revised edition

3. Landscape Site Grading Principles: Grading with Design in Mind, 2014 1st Edition by Bruce G. Sharky, John Wiley & Sons
4. T.S.S. for Landscape Architecture
5. Landscape Construction and detailing – Alan Blanc

**WEBSITES :**

<https://www.wbdg.org> › design-disciplines

<https://www.buildinggreen.com> › feature

[www.rri.wvu.edu](http://www.rri.wvu.edu) › mcbride › section3

<https://pubs.usgs.gov> › circ1139 › htdocs

ARC 360	GLASS ARCHITECTURE AND DESIGN	2 Credits	L T P C 2 0 0 2
<b>Goal</b> This is an Industry based elective course offered to students of Architecture to provide them with concepts on modern concepts on Glass Architecture, Role of Glass in Green design and concepts on considerations for improving the building performance using glass.			
Objectives		Outcomes	
<ul style="list-style-type: none"> <li>● To understand the different types of glass and it's applications.</li> <li>● To understand the factors affecting energy efficiency of glass.</li> <li>● To understand the features of energy codes and rating systems.</li> <li>● To understand the usage of special glasses</li> <li>● To understand the safety compliance in execution of glasses in buildings</li> <li>● To evaluate the energy performance of glass through passive and active methods.</li> <li>● To analyze usage and performance of glass.</li> </ul>		<ul style="list-style-type: none"> <li>● Usage Glass as a building material in various contexts.</li> <li>● An understanding of the parameters affecting performance of glass</li> <li>● Use glass in the contemporary context of energy codes and rating systems.</li> <li>● Working knowledge of performance evaluation softwares.</li> </ul>	

**UNIT I GLASS – AS A BUILDING MATERIAL**

4

Glass a building material, Float glass manufacturing technology, Types of glasses, Value addition : Mechanical Properties – Glass Processing - Pre processing, Tempering / Heat Strengthening – Process & Applications, Insulated Glass Units / Double Glazing – Process & Applications, Laminated Glass – process & Applications, Ceramic Frit.

**UNIT II BUILDING PHYSICS & CODES**

5

Building Physics : Theory of electromagnetic radiation. Factors defining performance & Selection of Glass : ( VLT, SF, UV, SHGC). Need for Green Buildings : Energy efficient buildings. Achieving energy efficiency using glass. Factors of energy efficient material selection: Performance parameters. Energy codes and Green ratings : ECBC, IGBC, GRIHA

**UNIT III USAGE & SAFETY OF GLASSES**

5

Human Safety Compliances, Fire Resistant Glazing : Types & Applications, Understanding Acoustic Glazing : Principle & Applications, Interior Glazing : Types & Applications, Optical Properties – Coating Technology, Glass for segments – Hospitals, Green Homes, Airports, Offices, Educational Institutions.

**UNIT IV ENERGY PERFORMANCE OF GLASS**

8

Approaches of energy efficiency: prescriptive method, trade off method – accommodating passive architecture, whole building simulation. Calculations involving basic factors in glass design, software analysis and case studies, create your building: interactive modeling, find when it's hot: sun path analysis, feel the weather : solar exposure analysis, know the angles : building orientation analysis

## **UNIT V ANALYSIS OF PERFORMANCE OF GLASS USING SOFTWARE 8**

Optimization Of Glass : For Wastage Reduction & Standardization Of Design, Software Analysis And Case Studies, Accommodate Comfort: Daylight Analysis And Acoustic Analysis, Check For Safety: Thickness Analysis, Foresee How Things Look: Colour And Aesthetics, Money Matters: Wastage Optimization, Ac Load Calculations And Payback Analysis – A Comparative Case Study, Creative Use And Solutions Of Glass

**TOTAL 30**

### **REFERENCES**

1. Structural Glass Facades and Enclosures, Mic Patterson; ISBN : 978-0-470-93185-1
2. Glass in Architecture ISBN 0714829226 by Micheal Wigginton
3. Joseph.S.Amstock's Glass in Construction (McGraw-Hill, 1997)
4. Envelop Design for buildings ISBN 0750628545 by William Allen
5. Thomas Herzog, Façade Construction Manual; Birkhauser, 2004.
6. FOSG Architectural Guide
7. Glass Academy Foundation Manual Volume-I
8. Glass Academy Foundation Manual Volume-II
9. Glass Academy Foundation Manual Volume-III