



**Dr. M.G.R.**  
**EDUCATIONAL AND RESEARCH INSTITUTE**  
**DEEMED TO BE UNIVERSITY**

University with Graded Autonomy Status

(An ISO 21001 : 2018 Certified Institution)

Periyar E.V.R. High Road, Maduravoyal, Chennai-95, Tamilnadu, India.



# **B. ARCH SYLLABUS**

## **2021**

## Program Outcomes

<b>PO1</b>	Acquire outstanding fundamental knowledge in the field of architecture
<b>PO2</b>	Encompass the ability to work in collaboration with interdisciplinary teams.
<b>PO3</b>	Act and communicate ideas through concepts, speaking, numeracy, writing, drawing, modelling and evaluation.
<b>PO4</b>	Aware of the role of technical documentation and specifications in design realization, and of the processes of construction, cost, planning and control.
<b>PO5</b>	Acting with the innovative technical competence in the use of emerging trends in the building industry
<b>PO6</b>	Understanding the diverse needs of values and systems of society

## Mapping of Course Outcomes (COs) with Program Outcomes (POs)

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1						
	CO2						
	CO3						
	CO4						
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
4	Approval					Meeting of Academic Council, May 2021	

**SEMESTER I**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21001	History of Architecture 1	PC	3	0	0	3
2	BMA21A01	Applied Mathematics	BS&AE	3	0	0	3
3	BEN21A01	English for Professional courses	SE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L01	Material and Construction 1	BS&AE	1	1	3	3
5	BAR21L02	Modelling and drawing 1	PC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L03	Basic Design	PC	0	0	12	12
		<b>Total Hours</b>	<b>31</b>			<b>Total Credits</b>	<b>27</b>

**SEMESTER II**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21002	History of Architecture II	PC	3	0	0	3
2	BAR21003	Theory of Architecture	PC	3	0	0	3
3	BCE21A01	Mechanics of Structures I	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L04	Material and Construction II	BS&AE	1	1	3	3
5	BAR21L05	Modelling and Drawing II	PC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L06	Architectural Design – I	PC	0	0	12	12
		<b>Total Hrs</b>	<b>31</b>			<b>Total Credits</b>	<b>27</b>

**SEMESTER III**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21004	History of Architecture III	PC	3	0	0	3
2	BAR21005	Value & Character Education	SEC	3	0	0	3
3	BCE21A02	Mechanics of Structures II	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L07	Material and Construction III	BS&AE	1	1	3	3
5	BAR21L08	Computer Studio I	SEC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L09	Architectural Design – II	PC	0	0	12	12
		<b>Total Hrs</b>	<b>31</b>			<b>Total Credits</b>	<b>27</b>

**SEMESTER IV**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21006	History of Architecture IV	PC	3	0	0	3
2	BAR21007	Building Services I	BS&AE	3	0	0	3
3	BCE21A03	Design of Structures I	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L10	Material and Construction IV	BS&AE	1	1	3	3
5	BAR21L11	Computer Studio II	SEC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L12	Architectural Design – III	PC	0	0	12	12
		<b>Total Hrs</b>	<b>31</b>			<b>Total Credits</b>	<b>27</b>

**SEMESTER V**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21008	Climatology	BS&AE	3	0	0	3
2	BAR21009	Building Services II	BS&AE	3	0	0	3
3	BCE21A04	Design of Structures II	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L13	Material and Construction V	BS&AE	1	1	3	3
5	BAR21L14	Surveying and Site planning	BS&AE/PC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L15	Architectural Design – IV	PC	0	0	14	14
		<b>Total Hrs</b>	<b>33</b>			<b>Total Credits</b>	<b>29</b>

**SEMESTER VI**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21010	Human settlement and planning	PC	3	0	0	3
2	BAR21011	Housing	PC	3	0	0	3
3	BCE21A05	Design of Structures III	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L16	Material and Construction VI	BS&AE	1	1	3	3
5	BAR21L17	Environmental Lab	BS&AE	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L18	Architectural Design – V	PC	0	0	14	14
		<b>Total Hrs</b>	<b>33</b>			<b>Total Credits</b>	<b>29</b>

**SEMESTER VII**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21012	Interior Design	PE	3	0	0	3
2	BAR21E**	Departmental Elective		3	0	0	3
3		Other Elective*		3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L19	Working Drawing	BS&AE	1	1	3	3
5	BAR21L20	Cost estimation and Scheduling	BS&AE	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L21	Architectural Design – VI	PC	0	0	14	14
		<b>Total Hrs</b>	<b>33</b>			<b>Total Credits</b>	<b>29</b>

\* Students shall choose any course offered by online portals such as Swayam /NPTEL or any other department within our University.

**SEMESTER VIII**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>STUDIO</b>					
1	BAR21L22	Practical Training	PEC	0	0	0	20
		<b>Total Days</b>	<b>90</b>			<b>Total Credits</b>	<b>20</b>

**SEMESTER IX**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21013	Sustainable architecture	PC	3	0	0	3
2	BAR21014	Urban design	PC	3	0	0	3
3	BAR21E	Departmental Elective		3	0	0	3
		<b>THEORY &amp; STUDIO</b>		1	1	3	3
4	BAR21L23	Dissertation	PEC	1	1	3	3
5	BAR21L24	Landscape Design	PC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L25	Architectural Design – VII	PC	0	0	14	14
		<b>Total Hrs</b>	<b>33</b>			<b>Total Credits</b>	<b>29</b>

**SEMESTER X**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21015	Professional Practice	PEC	3	0	0	3
2	BAR21E	Departmental Elective		3	0	0	3
		<b>STUDIO</b>					
3	BAR21L26	Thesis	PC	0	0	20	<b>20</b>
		<b>Total Hrs</b>	<b>26</b>			<b>Total Credits</b>	<b>26</b>

**TOTAL CREDITS - 270**

## ELECTIVES LIST

Sem	Subject Code	Elective list	Category	Lecture	Tutorial	Studio	Credits
	BAR21E01	Acoustics	BS& AE	3	0	0	3
	BAR21E02	Concepts of Traditional Architecture	PE	3	0	0	3
	BAR21E03	Earth Quake Resistant Architecture	PE	3	0	0	3
	BAR21E04	Maintenance, Repair and Rehabilitation of structures	BS& AE	3	0	0	3
	BAR21E05	Conservation	PE	3	0	0	3
	BAR21E06	Construction Technology	PE	3	0	0	3
	BAR21E07	Set Design	PE	3	0	0	3
	BAR21E08	Smart Cities	PE	3	0	0	3
	BAR21E09	Agricultural Infrastructure	BS&AE	3	0	0	3
	BAR21E10	Architectural Journalism	PE	3	0	0	3
	BAR21E11	Entrepreneurship	SE	3	0	0	3
	BAR21E12	Project Management	PEC	3	0	0	3

### Other Departmental Elective :

Students are required to undergo any course offered by other departments within our university or online teaching platforms such as NPTEL , SWAYAM etc. equivalent to 3 credits & 45 hours.



**SEMESTER I**

<b>S. No.</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Category</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Studio</b>	<b>Credits</b>
		<b>THEORY</b>					
1	BAR21001	History of Architecture 1	PC	3	0	0	3
2	BMA21A01	Applied Mathematics	BS&AE	3	0	0	3
3	BEN21A01	English for Professional courses	SE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L01	Material and Construction 1	BS&AE	1	1	3	3
5	BAR21L02	Modelling and drawing 1	PC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L03	Basic Design	PC	0	0	12	12
		<b>Total Hours</b>	<b>31</b>		<b>Total Credits</b>		<b>27</b>

**BAR21001****HISTORY OF ARCHITECTURE I**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To introduce the timeline and geography of evolution of human society in order to set the context for the study of architecture and urbanism across the ages. Knowledge will be imparted on early civilizations and their productions. An understanding of the contributions of Classical Greece and Rome is expected. To enable understanding of the intersecting forces in Europe from the decline of Roman empire to Renaissance and have knowledge about the architecture and urbanism during this period.

**Expected Course Outcomes:**

CO1	The students should be able to understand the evolution of Architecture in its various stylistic modes characterized by technology, ornamentation and planning
CO2	The students should be able to understand architectural character, construction methods, building materials and settlement planning
CO3	The students should be able to understand tangible and intangible aspects of architecture associated with history.
CO4	The students should be able to understand the developments in a chronological manner along the timeline and across different geographies

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	-	H	M	-	H
	CO2	H	-	H	H	-	H
	CO3	H	-	M	M	-	H
	CO4	H	-	M	H	-	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Prehistory to River Valley Civilisations 9**

Introducing concepts of culture and Civilization – Paleolithic and Neolithic culture- art forms and evolution of shelter – megaliths – agricultural revolution and its impact on culture and civilization. Ancient river valley civilizations: Mesopotamia (Tigris/Euphrates) - Ancient river valley civilization – India (river Indus) Indus valley civilization: culture and pattern of settlement, housing pattern. Ancient river valley civilizations: Egypt (Nile) Ancient river valley civilizations: China (yellow river)

### **Unit 2 – Greece and Rome 9**

#### **Greek Architecture**

Hellenic and Hellenistic cultures – Greek character- Greek polis and democracy- Greek city planning – architecture in the archaic and classic periods – Domestic architecture; Public Buildings: Agora, Stoas, Theatres, bouleuterions and stadia’s – Greek Temple: evolution and classification – Parthenon and Erechthion- orders in architecture: Doric, Ionic, Corinthian– Optical illusions in architecture.

#### **Roman Architecture**

Structural forms, materials and techniques of construction - orders in architecture: Tuscan and Composite. Rome: Forum Romanum and other Imperial Forums, Enclosure and manipulation of space pantheon – Public buildings: Colosseum, Circus Maximus, Thermae of Caracalla.

### **Unit 3 – Judaism, Christianity and Islam 9**

Judaism and Christianity- Birth and geographic spread. Transformation of the Roman Empire. Early Christian worship and burial. Church planning- Basilican concept. Byzantine empire. Centralized plan concept in churches. Birth and spread of Islam in the first millennium. Outline of building types of Islam. Commonality in forms and ideas across Southern/ Eastern Europe and Western/CentralAsia.

### **Unit 4 – Medieval Europe 9**

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

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

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

### **Unit 5 – Italian Renaissance, French & English Renaissance 9**

**Italian Renaissance** - 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, e.g., Palazzo Ricardi, Study of life history philosophy, contribution of the following architects; Brunelleschi, Michelangelo, AndreaPalladio.

**French & English Renaissance** - 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, Indigo Jones.

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**References:**

1. Sir Banister Fletcher, A History of Architecture, University of London, The Antholone Press, 1996.
  2. Spiro Kostof – A history of Architecture – Setting and Rituals, Oxford University Press, London, 1985.
  3. Leland M Roth; Understanding Architecture: Its elements, history and meaning; craftsman House;199
  4. Pier Luigi Nervi, General Eido- history of World Architecture- Series, Harry N. Abrams Inc.Pub., New York,1972.
  5. S.LloydandH.W.Muller,HistoryofWorldArchitecture–Series,FaberandFaberLondon,1996
  6. Gosta, E.Samdstrom, Man the Builder, Mc.Graw Hill Book Company, New York,1970.
  7. Webb and schaeffer; Western Civilization Volume I; VNR: NY:1962
  8. Vincent Scully: Architecture – The Natural and the Man made; Harper Collins.1991
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**BMA21A01****APPLIED MATHEMATICS**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** Identifying Eigen value problems obtain solution and acquired the technique of diagnosing a matrix. Analyse characteristics and properties of two-dimensional geometric shapes and develop mathematical arguments about geometric relationships. Solve problems using the sine, cosine, tan, hyperbolic and exponential functions. Carry out calculations involving the areas and volumes of compound shapes. Calculate the mean, median, mode and range for individual discrete and continuous data and distinguish between the purposes for which they are used.

**Expected Course Outcomes:**

CO1	To do Exercises involving eigen values and techniques for diagnosing a matrix
CO2	To Analyse characteristics and properties of two-dimensional geometric shapes
CO3	To obtain the ability to calculate areas and volumes of compound shapes
CO4	To Analyse statistical data samples and infer

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	-	M	-	-	-	M
	CO2	M	-	-	H	M	-
	CO3	H	-	M	H	-	-
	CO4	M	H	H	M	M	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Matrices** ..... 9

Significance of Mathematics in Architecture. Different types of matrices and its operations, Determinants, properties. Matrix: Consistency of systems of equations-Definitions of Roucher's theorem only characteristic equation-Eigen values and its vectors- Cayley Hamilton's theorem only definition

### **Unit 2 – Analytical Geometry** ..... 9

Conics, Parabola, ellipse, hyperbola, rectangular hyperbola- derivation, properties, Tangents- normals. Hand on exercises related to the above for designing building components

### **Unit 3 – Trigonometry** ..... 9

Trigonometric: Sine, Cosine and tan functions, hyperbolic functions, Exponential functions De-Moiver's theorem.

### **Unit 4 – Mensuration** ..... 9

Area of plane figures, Volume of Solid figures, Ratio and proportion, Golden ratio, Fibonacci sequence.

### **Unit 5 – Basic Statistics and Probability** ..... 9

Arithmetic mean, median, mode, standard deviation and variance, regression and correlation, elementary probability theory- Theorems of probability (simple problems)

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## References:

1. Veerarajan, Y., "Engineering Mathematics (for first year)", Second edition, Tata Mc Graw – Hill pub., Co., Ltd., New Delhi 2002.
  2. Venkataraman, M.K., "Engineering Mathematics", Volume I, Fourth Edition. The National Pub, Co., Chennai, 2003.
  3. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001
  4. Kandaswamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics" Volume I, Fourth Revised Edition, S. Chand & Co., New Delhi, 2000.
  5. Kreyszig E., "Advanced Engineering Mathematics", Eight Edition, John Wiley and Sons (Asia) Ltd., Singapore, 2001.
  6. 'Engineering Mathematics', Manikavasagan Pillai – S.V. Publication.
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**BEN21A01****ENGLISH FOR PROFESSIONAL COURSES**

Number of credits	3	Subject Category	SE
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** Introduce basis language skills for oral professional communication that enables effective conversation in the classroom and courteous participation in conferences and seminars, both as audience and for diverse audiences.

**Expected Course Outcomes:**

CO1	To learn basic language skills
CO2	To participate wilfully in debates and conversations
CO3	To understand written English
CO4	To express their ideas through spoken and written English

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	-	H	H	H	-	H
	CO2	M	H	M	-	-	M
	CO3	-	H	H	H	M	-
	CO4	H	M	H	H	-	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
		✓					
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Listening and Writing** 9

Listening – Short Talks, interviews and discussions from various media. Speaking – negotiating meaning, convincing people – describing places. Reading – texts on architecture. Types of professional communication, Letters, E-mail, Short messages, reports, TED Talks

### **Unit 2 – Speaking and Presentation** 9

Descriptions of Places, conversations and answering questions. Speaking – making a presentation on a given topic. Reading – architectural manuals. Writing – report, essays, descriptive essays, etc.

### **Unit 3 – Effective Formatting and Writing** 9

Planning, composing, and writing, Guide to effective writing.

### **Unit 4 – Narrative Writing** 9

Writing narratives. To write on a particular topic related to the course as decided by the subject teacher concerned. This may include reportage of readings, site visits, field trips, conversations with experts and public, etc. Negotiations with Vendors, Clients and all stake holders.

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## References:

1. English for Architects and civil Engineers- Sharon Hendenreich Springer, 2014 ISBN978-3-658-030-63- (e-book)
  2. [www.cambridgescholars.com](http://www.cambridgescholars.com)
  3. [www.robertdwatkins.com/Englishworkbook.pdf](http://www.robertdwatkins.com/Englishworkbook.pdf)
  4. Chris Mounsey: Essays and Dissertation (Oxford University Press) February 2005.
  5. Sidney Greenbaum: The Oxford English Grammar (Oxford University Press) March 2005
  6. Krishna Mohan and Meera Banerji: Developing Communication Skills (Mac Millan India Ltd) [2000]
  7. Krishna Mohan and Meenakshi Raman: Effective English Communication (Tata Mc-Graw)
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**BAR21L01****MATERIAL AND CONSTRUCTION I**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To understand building materials from construction perspective. Focus shall be on the application of each material in different building components, complying with relevant standards and codes. Examples from ancient to modern times shall be discussed to appreciate the flexibility of using the material in different forms and components.

**Expected Course Outcomes:**

CO1	To understand and identify components of a building
CO2	To learn about various structural systems based on requirement cost etc
CO3	To know the application of materials based on availability , necessity etc
CO4	To learn how codes and rules interwine with construction safety

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	H	M
	CO2	H	H	H	H	H	H
	CO3	H	H	H	H	H	M
	CO4	H	H	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 – Introduction to structural components of a building..... 15**

Introduction to structural components and its relation to architectural design. The types of structural components – load bearing and framed structure, and its applications in construction. Basic materials used in building structures, and its effects on the structural and architectural design.

**Unit 2 – Components and materials of Load bearing structure..... 15**

Load bearing structures – components- slabs, walls and foundations; types; applications; advantages and disadvantages; materials- natural and man-made – concrete, brick, wood, stone, mud, strawbales, rammed earth, bamboo, etc.; properties; method of construction; construction details; weathering effects and other environmental conditions; defects.

**Unit 3 – Components and materials of Framed structure..... 15**

Framed structures – components- slabs, beams and columns, and foundations; types; applications; advantages and disadvantages; materials- natural and man-made – concrete, brick, wood, steel, stone, glass, etc.; properties; method of construction; construction details; weathering effects and other environmental conditions; defects.

**Unit 4 – Introduction to fundamental components of a building..... 15**

Introduction to building construction, understanding relation between architectural designs, building components (Foundation, plinth, wall, sill, lintel, roof, doors, windows, ventilators, staircases, sunshades etc.) along with the building materials – traditional and conventional materials and methods of construction;

**Site study and Report:..... 15**

The student has to visit a site and study the building with respect to the above-discussed topics and give a brief report with sketches and photographs at the end of the semester.

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**References:**

1. S.C. Rangwala – Engineering Materials Charotar Publishing House - Anand 1997
  2. W.B. McKay – Building Construction Vol. 1, 2, 3 – Longmans U.K. 1981.
  3. B.C Punmia – Building Construction 11<sup>th</sup> edition – Laxmi Publications, 2005.
  4. R.J.S. Spence and D.J. Cook, Building Materials in Developing Countries, John Wiley and Sons, 1983.
  5. Don A. Watson Construction Materials and Processes McGraw Hill 1972, WB McKay Building construction, Vol 1,2, Longman UK 1981.
  6. Barry, The Construction of Buildings Affiliated East West press put Ltd New Delhi 1999.
  7. Francis D.K. Ching, Building Construction Illustrated John Wiley & Sons 2000.
  8. HUDCO – All you want to know about soil stabilized mud blocks, HUDCO Pub., New Delhi, 1989.
  9. UNO – Use of bamboo and reeds in construction – UNO Publications.
  10. Rural Construction – NBO, New Delhi
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**BAR21L02****MODELING AND DRAWING I**

Number of credits	3	Subject Category	PC
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To familiarize the students with the various mediums and techniques of art through which artistic expression can be achieved. Involving them in a series of free hand exercises both indoor and outdoor to understand form, proportion, scale, etc & fundamentals of drawing and drafting. To involve students in a number of exercises that will help them to understand the nature of geometrical forms in terms of drawing plane and solid projections. To involve students in a number of exercises that will help to understand the representation of 3D forms through isometric and axonometric drawings. To introduce basic measured drawing of simple objects and building components.

**Expected Course Outcomes:**

CO1	Involving the students in a series of free hand exercises both indoor and outdoor to understand form, proportion, scale, etc& fundamentals of drawing and drafting.
CO2	To involve students in a number of exercises that will help them to understand the nature of geometrical forms in terms of drawing plane and solid projections. .
CO3	To involve students in a number of exercises that will help to understand the representation of 3 Dimensional forms through isometric and axonometric drawings.
CO4	To introduce basic measured drawing of simple objects and building components.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	M	M	H	H
	CO2	M	H	M	H	H	M
	CO3	H	M	M	H	H	M
	CO4	H	M	H	H	M	H
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
				✓			

4	Approval	Meeting of Academic Council, May 2021
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### Course Content:

#### **Unit 1 – Drawing & Drafting ..... 20**

Introduction to fundamentals of drawing/drafting art – Elements and principles of drawing – Types of drawing – Visual effects of drawing – Scale drawing – Composition – Approach to sketching – Study of light, shade and shadow. Exercise involving Indoor and outdoor sketching – Spot sketching – Drawing from imagination – Study of 3D effects through light and shade from nature – Tools and materials – Illustration – Study of human being and mobiles.

#### **Unit 2 – Plane Geometry ..... 15**

Construction of lines, angles - scales and area. Construction of plane - circles, square, rectangle & polygon – construction and development of planar surface – square, rectangle, polygon etc.

#### **Unit 3 – Orthographic Projection of Planar Surfaces & Solids ..... 20**

Isometric, axonometric and multi-view projection of geometric shapes namely square, circle, and polygon etc , projection of solid – cube, prism, combination of solid etc & sections of solids.

#### **Unit 4 – Model & Measured Drawing ..... 20**

Introduction of sculpture – Sculpture using various materials such as clay, plaster of Paris, paper Mache, and wire and fundamentals of measured drawing, line value, lettering, drawing representation, format for presentation methods and technique of measuring buildings and their details. Measured drawing of simple objects like furniture, detailing in terms of construction, ornamentation, measured drawing of building components like column, door, window, cornice, etc.

### References:

1. Webb, Frank, “The Artist guide to Composition”, David & Charles, U.K., 1994.
2. Drawing a Creative process, Ching Francis, Van Nostrand Reinhold, New York, 1990.
3. I.H. Morris, Geometrical Drawing for Art Students - Orient Longman, Madras, 2004.
4. Francis Ching, Architectural Graphics, Van Nostrand Rein Hold Company, New York, 1964.
5. Engineering drawing by N D Bhatt
- 6.
7. George K.Stegman, Harry J.Stegman, Architectural Drafting Printed in USA by American Technical Society, 1966
8. C.Leslie Martin, Architectural Graphics, The Macmillan Company, New York, 1964
9. Interiors: Perspective in Architectural Design Graphic - SMA Publishing Co. Ltd., Japan, 1967.
10. Ernest Norling, Perspective drawing, Walter Foster Art Books, California, 1986.
11. Moivahuntly, “The artist drawing book”, David & Charles, U.K., 1994.
12. Arundell (Jan) Exploring sculpture, Mills and Boon, London/Charles, T. Brand Ford Company, U.S.A.
13. The art of drawing trees, heads, colours, mixing, drawing, landscape and painting, water colour, oil colour, etc.- The Grumbacher Library Books, New York – 1996.
14. Caldwell Peter, “Pen and Ink Sketching”, B.T. Bats ford Ltd., London, 1995.



**BAR21L03****BASIC DESIGN**

Number of credits	12	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	9	End Semester Exam	50
Total period per week	12	Total Marks	100
Total periods	128		

**Subject Objectives:** To understand the elements and principles of Basic Design as the building blocks of creative design through exercises that will develop the originality, expression, skill and creative thinking. To involve students in a number of exercises to understand the grammar of design and visual composition. To enable the understanding of 3D Composition by involving students in a number of exercises which will help generation of a form from a two dimensional / abstract idea. To enable the understanding of the relationship between the grammar of design and architecture by involving the students in seminars/ workshops and simple exercises which will look at building form analytically.

**Expected Course Outcomes:**

CO1	Knowledge on Basic Elements of Design – Point, Line, Plane & Form.
CO2	Thorough understanding of Visual Composition. - Techniques for visual composition
CO3	Understanding of the relationship between the grammar of design and architecture by involving the students in seminars/ workshops and simple exercises which will look at building form analytically
CO4	Knowledge on basic design elements – colour, texture. Plane to form and principles and how these are used to formulate clear compositions.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low								
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	
	CO1	H	H	H	M	H	H	
	CO2	M	H	H	M	M	M	
	CO3	H	H	H	H	M	H	
	CO4	H	H	H	M	H	H	
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)		
				✓				
4	Approval					Meeting of Academic Council, May 2021		

**Course Content:**

Introduction to Architectural Design through Basic Design – Elements of Design:  
Properties, qualities and characteristics of point, line, direction shape, form, colour and texture –  
Principles of Design: Scale, Proportion, Balance, Harmony, Rhythm and Contrast.

The course shall be conducted by giving a number of exercises in the form of design studios, seminars and creative workshops that are aimed at teaching the following:

- i) Elements and Principles of Visual Composition using point, line, shape.
  - ii) Exploring colour schemes and their application in a visual composition and in Architectural forms and spaces.
  - iii) Study of texture and schemes of texture both applied and stimulated and their application
  - iv) Study of linear and Planar forms using simple material like Mount Board, metal foil, box boards, wire string, thermocol etc.
  - v) Study of Solids and voids to evolve sculptural forms and spaces and explore the play of light and shade and application of color.
  - vi) Study of fluid and plastic forms using easily moldable materials like clay, plaster of paris etc.
  - vii) Analytical appraisal of building form in terms of visual character, play of light and shade, solids and voids etc.
  - viii) Application of Basic design through design of simple architectural elements like entrance gates, walls, courtyards, porches, etc.
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**References:**

1. Broadbent, G. (1973). Design in Architecture - Architecture and Human Science. New York: John Wiley and Sons.
  2. Chauhan, P. (2005). Learning Basic Design. Mumbai: Rizvi College of Architecture.
  3. Ching, F. D. K. (1997). Design Drawing. Hoboken: John Wiley & Sons.
  4. Ching, F. D. K. (2012). Architecture: Form, Space and Order. 3rd Ed. Hoboken: John Wiley & Sons.
  5. Roger, K. L. (1998). Architect? A Candid Guide to the Profession. Cambridge: The MIT Press.
  6. Rasmussen, S. (1962). Experiencing Architecture. 2nd Rev. Ed. Cambridge: MIT Press.
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**SEMESTER II**

<b>S. No.</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Category</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Studio</b>	<b>Credits</b>
		<b>THEORY</b>					
1	BAR21002	History of Architecture II	PC	3	0	0	3
2	BAR21003	Theory of Architecture	PC	3	0	0	3
3	BCE21A01	Mechanics of Structures I	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L04	Material and Construction II	BS&AE	1	1	3	3
5	BAR21L05	Modelling and Drawing II	PC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L06	Architectural Design – I	PC	0	0	12	12
		<b>Total Hrs</b>	<b>31</b>			<b>Total Credits</b>	<b>27</b>



**BAR21002****HISTORY OF ARCHITECTURE II**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To provide an insight into the architecture of Classical antiquity & early Medieval period. Social, religious, political and architectural character, construction methods, building materials and settlement planning shall be explained with suitable examples. To provide an understanding of the evolution Indian Architecture in its various stylistic modes characterized by technology, ornamentation and planning practices. The study must enable students to do a comparative evaluation of developments in a chronological manner along the timeline and across different geographies. Also, students must be enabled to appreciate tangible and intangible aspects of heritage associated with history. Evaluate the features of Buddhism and Jainism. Visualize the administration, art and architecture of Maurya

**Expected Course Outcomes:**

CO1	The students should be able to understand the evolution of Architecture in its various stylistic modes characterized by technology, ornamentation and planning
CO2	The students should be able to understand architectural character, construction methods, building materials and settlement planning
CO3	The students should be able to understand tangible and intangible aspects of architecture associated with history.
CO4	The students should be able to understand the developments in a chronological manner along the timeline and across different geographies

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	-	H	M	-	H
	CO2	H	-	H	H	-	H
	CO3	H	-	M	M	-	H
	CO4	H	-	M	H	-	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		

4	Approval	Meeting of Academic Council, May 2021
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## Course Content:

### **Unit 1 – Vedic Villages, Buddhist Architecture**.....9

Aryan civilization – theories and debates of origin – origins of early Hinduism – Vedic culture – Vedic Village and rudimentary form of bamboo and wooden construction.

Evolution of Buddhism, Buddhist thought, art and culture – Hinayana and Mahayana Buddhism – interaction of Hellenic and Indian Ideas in Northern India – evolution of building typologies – the stupa, vihara and the chaitya hall – symbolism of the stupa – architectural production during Ashoka’s rule. Ashoka Pillar, Sarnath– rock cut caves at Barbar – Sanchi stupa rock cut architecture in Ajanta and Ellora–Karli–Viharasat Nasik.

### **Unit 2 – Evolution of Hindu Temple Architecture**.....9

Hindu forms of worship – evolution of temple form – meaning, symbolism, ritual and social importance of temple–categories of temple–elements of temple architecture–early shrines of the Gupta and Chalukya period. Tigawa temple – Ladh Khan and Durga temple, Aihole– Papanatha, Virupaksha temples Pattadakal– Kailasanathar temple, Ellora.

### **Unit 3 – Temple Architecture –Southern India**.....9

Brief history of South India – relation between Bhakti period and temple architecture – of temple towns – Dravidian Order – evolution and form of gopuram. Rock cut productions under Pallavas: shore temple, Mahabalipuram, and Kailasanatha temple Kanchipuram – Chola Architecture: Nartamalai, Brihadeeswara, Gangaikonda Choilapuram and Darasuram temple – temple gateways of Madurai and Chidambaram -Temple towns: Madurai, Srirangam and Kanchipuram. Hoysala architecture: Belur and Halebid.

### **Unit 4 – Temple Architecture –Northern India**.....9

Temple architecture of Gujrat, Orissa, Madhya pradesh and Rajasathan– their salient features Lingaraja Temple, Bhuvaneswar– Sun temple, Konark– Somanatha temple, Gujrat, Surya Kund, Modhera. Khajuraho, Madhya pradesh– Dilwara temple, Mt. Abu.

### **Unit 5 – Architecture of South East Asia**.....9

Shailendra Dynasty- The Stupa Complex at Borobudur in Java, Indonesia, Prambanan, Java, Indonesia -Pagan, Myanmar - Angkor Wat, Cambodia

## References:

1. Percy Brown, Indian Architecture (Buddhist and Hindu Period), Taraporevala and Sons, Bombay, 1983.
2. Satish Grover, the Architecture of India (Buddhist and Hindu Period), Vikas Publishing Housing Pvt. Ltd., New Delhi 2003.
3. Christopher Tadgell, The History of Architecture in India from the Dawn of civilization to the End of the Raj, Longman Group U.K.Ltd., London, 1990.
4. A.Volwahren, Living Architecture – India (Buddhist and Hindu), Oxford and IBM, London, 1969.
5. George Michell, the Hindu Temple, BI Pub., Bombay, 1977.
6. Stella Kramrisch the Hindu Temple, Motilal Banarasidas, Delhi 1976.
7. K.V.Soundarajan, Art and Architecture of South India.
8. George Michell Ed, Temple Towns of Tamil Nadu,

9. History of Indian Philosophy, Dasgupta.

10. A.Thampuram "Study of Architecture Forms in Malabar coast" Wiley and sons In

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**BAR21002****THEORY OF ARCHITECTURE**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To understand & learn the fundamentals of design – Point, Line, Plane and Form. To acquire knowledge in Ordering Principles and Principles of Composition. To learn Spatial Relationships and Organization with case study examples. To learn about the works of modern & post-modern Architects. To understand and learn schematic Architectural Design Process.

**Expected Course Outcomes:**

CO1	Knowledge on conception of elements of design. Analysis of planes, forms, spatial aspects, compositions, and their analysis in buildings.
CO2	Thorough understanding of basic principles of design and principles of space and mass, circulation, and architectural composition. Spatial organization & relationship.
CO3	Understanding of architects and their works – w.r.t case study and style of architecture.
CO4	Understanding the schematic Design process –integration of aesthetics and function.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	M	H	H
	CO2	H	H	H	M	M	M
	CO3	H	M	H	H	M	M
	CO4	H	H	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## **Course Content:**

### **Unit 1 - Elements of Architecture - Form and Space**.....9

Understanding fundamental elements such as point, line, plane, form and space, shape, pattern, light, colour, surface and texture with reference to the evolution of architectural form and space. Understanding perceptual effects of specific geometric forms such as sphere, cube, pyramid, cylinder and cone and its sections as well as their derivatives with respect to the evolution of architectural form and space.

### **Unit 2 - Principles of Architecture & Principles of Composition**.....9

Understanding fundamental principles such as Proportion, Scale, Balance, Symmetry/Asymmetry, Rhythm, Axis, Hierarchy. Building Examples for each principle. Architectural Harmony, Unity and specific qualities of design to include dominance, punctuating effect, dramatic effect, fluidity, climax, accentuation of the path, path space, relationship, form of circulation space with examples.

### **Unit 3 – Organization of Forms and Space**.....9

Articulation of forms spaces types – Edges and corners – Surfaces. Understanding perceptual effects of specific configuration of architectural spaces. Enclosure – Internal and External, Continuous spaces – Spatial relationship and its types. Spatial organisation: Centralized, Linear, Radial Clustered, Grid – built form and open space relationships.

### **Unit 4 - Works of Contemporary Architects**.....9

Works of modern and postmodern architects and their ideologies and philosophies towards architecture – Louis Sullivan, Frank Lloyd Wright, Louis I Khan, Le Corbusier, Philip Johnson, Charles Correa and Michael Graves.

### **Unit 5 - Concepts in Architecture and Design Process**.....9

Conceptualizing architecture, various approaches – Understanding Concepts behind the various architectural manifestations in relevant traditional, historical, vernacular examples. The Architectural Design Process - Pre-Design Process-Understanding Data, Site Study, Analysis & Synthesis, Design Program, Design Process- Concept –Schematic Design- Design development.

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## **References:**

1. V.S. Pramar, Design Fundamentals in Architecture, Samaiya Publications Private Ltd., New Delhi, 1973.
  2. Paul Alan Johnson Theory of Architecture – Concepts and themes, Van Nostrand Reinhold Co., New York, 1994.
  3. Francis D.K. Ching, Architecture – Form, Space and Order, Van Nostrand Reinhold Company, New York, 1979.
  4. Helm Marie Evans and Caria David Dunneshil, An initiation to design, Macmillan Publishing Co. Inc., New York.
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**BCE21A01****MECHANICS OF STRUCTURE I**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To enable a student to understand the effect of action of forces on a body and the concept of equilibrium of the body through exercises. To determine the internal forces induced in truss members due to external loads by working out problems. To calculate the sectional properties (centroid, moment of inertia, section modulus and radius of gyration) for various sections by working out problems. To study the stress – strain behaviours of steel and concrete due to axial loads and to determine the stresses and strains developed in solids due to external action through select problems. To derive the relationship between elastic constants and solving problems.

**Expected Course Outcomes:**

CO1	Apply the concepts of action of forces on a body and should be able to apply the equilibrium concepts.
CO2	Analyse any type of determinate trusses with different end conditions.
CO3	Solve the sectional properties for any geometrical shapes.
CO4	Understand the concepts of elastic constants and its applications for various types of problems with a thorough understanding of stresses and strain.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	-	H	M	-	H
	CO2	H	-	H	H	-	H
	CO3	H	-	M	M	-	H
	CO4	H	-	M	H	-	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 – Forces and Structural Systems**.....**8**

Types of force systems - Resultant of forces-Lami's theorem- principle of moments varignon's theorem - principle of equilibrium (no reaction problems) - simple problems

**Unit 2 – Analysis of Plane Trusses**.....**10**

Introduction to Determinate and Indeterminate plane trusses - Analysis of simply supported and cantilevered trusses by method of joints.

**Unit 3 – Properties of Section**.....**10**

Centroid- Moment of Inertia - Section modules – Radius of gyration - Theorem of perpendicular axis - Theorem of parallel axis –simple problems.

**Unit 4 – Elastic Properties of Solids**.....**10**

Stress strain diagram for mild steel, High tensile steel and concrete - Concept of axial and volumetric stresses and strains. (Excluding composite bar)

**Unit 5 – Elastic Constants**.....**7**

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

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**References:**

1. R.K.Bansal – A text book on Engineering Mechanics, Lakshmi Publications, Delhi, 2005.
  2. R.K.Bansal – A textbook on Strength of Materials, Lakshmi Publications, Delhi 2007.
  3. P.C.Punmia, Strength of Materials and Theory of Structures; Vol. I, Lakshmi Publications, Delhi 1994.
  4. S. Ramamrutham, Strength of Materials – Dhanpatrai & Sons, Delhi, 1990.
  5. W.A.Nash, Strength of Materials – Schaums Series – McGraw Hill Book Company, 1989.
  6. R.K. Rajput – Strength of Materials, S. Chand & Company Ltd. New Delhi 1996.
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**BAR21L04****MATERIALS AND CONSTRUCTION II**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To understand building materials from construction perspective. Focus shall be on the application of each material in different building components, complying with relevant standards and codes. Examples from ancient to modern times shall be discussed to appreciate the flexibility of using the material in different forms and components.

**Expected Course Outcomes:**

CO1	The students should be able to understand building materials from construction perspective
CO2	The students should comprehend the application of each material in different building components
CO3	The students should be able to comply with relevant standards and codes while designing with these components
CO4	The students should comprehend the flexibility of using the material in different forms and components

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	H	M
	CO2	H	H	H	H	H	M
	CO3	H	H	H	H	H	M
	CO4	H	H	H	H	H	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	



## **Course Content:**

### **Unit 1 – Foundations and Plinth**.....15

Definitions, Purpose of foundation, types of foundation, selection criteria for foundation based on soil conditions, physical properties and behaviour of various types of soil, bearing capacity, methods of site exploration and testing of soil, construction methods and construction details. Various materials used in foundations. New materials and methods of construction.

Definitions, Purpose of plinth, types of plinths, materials, construction methods and construction details.

### **Unit 2 – Walls**.....20

Definitions, Purpose, types of walls – half brick wall, cavity wall, parapet wall, curtain wall, etc; selection criteria for application of types of walls, bearing capacity of each type, materials- natural and man-made – concrete, brick, wood, stone, glass, mud, strawbales, rammed earth, bamboo, etc.; advantages and disadvantages; properties; method of construction; types of masonry – English bond, Flemish bond, header bond, stretcher bond, English cross bond, Dutch bond, zig-zag bond, etc.; construction details; weathering effects and other environmental conditions; defects.

### **Unit 3 – Roofs**.....15

Introduction, characteristics of roof, types of roofs -flat- madras terrace roof, RCC slab, classification of roofs by the method of geometry and methods of construction – pitched, lean-to, coupled, couple-closed, collar, scissor, king post and queen post; and by materials – GI sheets, Fibre, Glass, Aluminium, asphaltic, polycarbonate, clay tiles, coir-based corrugated sheets, etc.; Roof fixing details along with gutter.

### **Unit 4 – Sill, Lintel, Sunshades**.....10

Definitions, Purpose, types of Sill, Lintel, Sunshades; applications, materials, design and construction method, construction details. Conventional/ Contemporary methods of design and construction.

### **Site study and Report:**.....15

The student has to visit a site and study the building with respect to the above-discussed topics and give a brief report with sketches and photographs at the end of the semester.

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## **References:**

1. S.C. Rangwala – Engineering Materials Charotar Publishing House - Anand 1997
  2. W.B. McKay – Building Construction Vol. 1, 2, 3 – Longmans U.K. 1981.
  3. B.C Punmia – Building Construction 11<sup>th</sup> edition – Laxmi Publications, 2005.
  4. R.J.S. Spencke and D.J. Cook, Building Materials in Developing Countries, John Wiley and Sons, 1983.
  5. Don A. Watson Construction Materials and Processes McGraw Hill 1972, WB Mckey Building construction, Vol 1,2, Longman UK 1981.
  6. Barry, The Construction of Buildings Affiliated East West press put Ltd New Delhi 1999.
  7. Francis D.K. Ching, Building Construction Illustrated John Wiley & Sons 2000.
  8. HUDCO – All you want to know about soil stabilized mud blocks, HUDCO Pub., New Delhi, 1989.
  9. UNO – Use of bamboo and reeds in construction – UNO Publications.
  10. Rural Construction – NBO, New Delhi
-

**BAR21L05****MODELING AND DRAWING II**

Number of credits	3	Subject Category	PC
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To involve students in a number of exercises that will help them develop the skill of representation in advance drawing techniques involving Rendering, sciography in perspective. To involve students in a number of exercises that will help to understand the measured drawing method to document buildings of architectural interest using simple and advance techniques of representation. To involve students in a series of exercises that will look at graphic and abstract representations of art.

**Expected Course Outcomes:**

CO1	The students should be able to do presentations in advanced drawing techniques
CO2	The students should comprehend the measured drawing method for documentation
CO3	The students should be able to do graphic and abstract representations of art
CO4	The students should have developed skills of representation

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	H	H
	CO2	H	H	H	M	H	H
	CO3	H	M	H	M	H	H
	CO4	H	M	H	M	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Sciography**

**20**

Principles of shade and shadow – construction of shadow of simple geometrical shapes – construction of sciography on building, shadows of architectural elements.

### **Unit 2 – Perspective & Painting** **20**

Characteristic of perspective drawing. Concepts and methods of perspective drawing. One point and two point perspective of simple geometrical shapes like cube, prism, combination of shapes, simple one, two and three-point perspective of building interiors and exteriors. Adding of figures, trees furniture etc., shade and shadows and applying rendering techniques involving water colour, water soluble colour pencils, Temptra, Acrylic, Water soluble oil colour, Pen and ink, Airbrush, mixed mediums. Introduction to short cut perspective method. Adding of figures, trees furniture etc., shade and shadows and applying rendering techniques.

### **Unit 3 – Measured Drawing** **20**

Combined study of historic document along with small building by using simple measuring tools like tapes, photograph etc. Documentation of a complete building of a special interest in terms of history, building construction, architectural excellence or technology.

### **Unit 4 – Applied Art** **15**

Graphic representations – Visual composition and abstraction – Exercises involving Logo design, collage, calligraphy and printing.

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## References:

1. John M.Holmes, Applied Perspective, Sir Isaac, Piotman and Sons Ltd., London 1954.
  2. Robert W.Gill, Basic Perspective, Thames and Hudson, London, 1974.
  3. C.Leslie Martin, Architectural Graphics, The Macmillan Company, New York, 1964.
  4. Francis Ching, Architectural Graphics, Van Nostrand and Reinhold Company, NY 1975
  5. Claude Batley, Indian Architecture, D.B.Taraporevale Sons and Co., Ltd., Bombay
  6. William Kirby Lockard, Drawing as a Means to Architecture, Van Nostrand, Reinhold Company, New York.
  7. George A Dinsmore, Analytical Graphics – D.VanNostrand, Company Inc., Canada.
  8. Interiors: Perspective in Architectural Design Graphic - SMA Publishing Co. Ltd., Japan, 1967.
  9. Ernest Norling, Perspective drawing, Walter Fostor Art Books, California, 1986.
  10. Bernard Alkins - 147, Architectural Rendering, Walter Foster Art Books, 1986.
  11. RoberW.Gill, Advanced Perspective, Thames and Hudson, London, 1974.
  12. The art of drawing trees,heads,colourmixing,drawing landscapes and painting in water colour,oil colour etc.-The Grumbacher Library B00ks,New York-1996
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**BAR21L06****ARCHITECTURAL DESIGN I**

Number of credits	12	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	9	End Semester Exam	50
Total period per week	12	Total Marks	100
Total periods	180		

**Subject Objectives:** To involve students in a design project(s) that will involve simple space planning and the understanding of the functional aspects of good design. To involve students in a small-scale building project(s) which will sensitize them to intelligent planning that is responsive to the environmental context. To involve students in building case study by choosing appropriate examples to enable them to formulate and concretize their concepts and architectural program. To engage in discussion and analytical thinking by the conduct of seminars/ workshops. To enable the presentation of concepts through various modes and techniques that will move constantly between 2D representation and 3D modelling. To enable Students to understand the importance of designing the built environment to suit the human behaviour.

**Expected Course Outcomes:**

CO1	To involve students in anthropometrics' study & analysis.
CO2	Thorough understanding of Visual Composition. - Techniques for visual composition
CO3	Understanding of 3 D Composition by involving students in a number of exercises which will help generation of a form from a two dimensional / abstract
CO4	Knowledge on basic design elements – colour, texture. Plane to form and principles and how these are used to formulate clear compositions.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	M	H	H
	CO2	M	H	H	M	M	M
	CO3	H	H	H	H	M	H
	CO4	H	H	H	M	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

Scale and Complexity: projects involving small span, single space, single use spaces with simple movement, predominantly horizontal, as well as simple function. public buildings of small scale; passive energy. In all the design assignments due cognizance must be given to accessibility to differently abled users.

Areas of focus/ concern:

- architectural form and space
- aesthetic and psychological experience of form and space in terms of scale, colour, light, texture, etc.,
- function and need: user requirements, anthropometrics, space standards, circulation
- image and symbolism

**Typology/ project: Bedroom, bathroom, kitchen, shop, Parks & play area, snack bar, Residence, petrol bunk, fire station and projects of similar size.**

**Students shall be encouraged to participate in design competitions appropriate to their level as one of the class projects.**

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## References:

1. Joseph De Chiara, Michael J Crosbie, Time Saver Standards for Building Types, McGraw Hill Professional 2001.
  2. Julius Panero, Martin Zelnik, Human Dimension and Interior Space, Whitney Library of Design, 1975
  3. Joseph De Chiara, Julius Panero, Martin Zelnik, Time Saver Standards for Interior Design and Space Planning, McGraw Hill 2001.
  4. Ernst Neuferts Architects Data, Blackwell 2002
  5. Ching, F. D. K. (2012). Architecture: Form, Space and Order, 3rd Ed. Hoboken : John Wiley & Sons.
  6. Roth, L. M. (2013). Understanding Architecture: Its Experience History and Meaning, 3rd Ed. Philadelphia : West-view press.
  7. 3.Rudolf, A. (1977). The dynamics of architectural form. Berkeley and Los Angeles: University of California Press.
  8. Prak, N. L. (1968). The Language of Architecture: A contribution to architectural theory. Hague : Mouton & Co.
  9. Paul, A. J. (1994). The Theory of Architecture–Concepts & themes. New York : Van Nostrand Reinhold. New York.
  10. Pandya, Y. (2007). Elements of Space making. Ahmedabad :Mapin.
  11. Peter, V. M. (1998). Elements of architecture – from form to place. 1st Ed. New York : Routledge.
  12. Unwin, S. (2003). Analysing Architecture. London :Routledge.
  13. Hideaki Hareguchi, A Comparative analysis of 20th century houses, Academy Editions, 1988
  14. Robert Powell, Tropical Asian House, Select Books, 1996
  15. Terence Conran, The Essential House Book, Conran Octopus, 1994
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**SEMESTER III**

<b>S. No.</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Category</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Studio</b>	<b>Credits</b>
		<b>THEORY</b>					
1	BAR21004	History of Architecture III	PC	3	0	0	3
2	BAR21005	Value & Character Education	SEC	3	0	0	3
3	BCE21A02	Mechanics of Structures II	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L07	Material and Construction III	BS&AE	1	1	3	3
5	BAR21L08	Computer Studio I	SEC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L09	Architectural Design – II	PC	0	0	12	12
		<b>Total Hrs</b>	<b>31</b>		<b>Total Credits</b>		<b>27</b>

**BAR21004****HISTORY OF ARCHITECTURE III**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To provide an insight into the architecture of High Late Medieval period. Social, religious and political character, building materials, construction methods and how they influenced their built form and settlement pattern shall be explained with examples. To provide an understanding of the Architecture in its various stylistic modes, characterized by technology, ornamentation and settlement planning practices. Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture embedded in place specific context.

**Expected Course Outcomes:**

CO1	The students should be able to understand the evolution of Indian Architecture in its various stylistic modes characterized by technology, ornamentation and planning
CO2	The students should be able to understand architectural character, construction methods, building materials and settlement planning
CO3	The students should be able to understand tangible and intangible aspects of architecture associated with history.
CO4	The students should be able to understand the developments in a chronological manner along the timeline and across different geographies

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	-	H	M	-	H
	CO2	H	-	H	H	-	H
	CO3	H	-	M	M	-	H
	CO4	H	-	M	H	-	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## Course Content

### **Unit 1 - Introduction to Islamic Architecture ..... 9**

Brief History of Islam in terms of birth, spread across countries and principles – influences on Islamic Architecture – Evolution of Building types in terms of forms and functions – the mosque, the tomb and the minaret, the madrasa, the palace, the caravanserai, vernacular architecture, the market – important principles, elements & character of Islamic architecture in decoration, color, geometry, light – important examples to illustrate development of Islamic architecture.

### **Unit 2 - Islamic Architecture in India Architecture of Delhi Sultanate and Provincial Style ..... 9**

Advent of Islam into the Indian subcontinents and its impact. Source of Islamic Architecture in India and influences on them – Brief history of development and classification of Urban, different styles and region. Development of architectural styles during the rule of the Slave, Khalji, Tuqlap, Sayyid and Lodhi Dynasties – important examples of each period.

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 3 - Mughal Style and Cross-Cultural Influences ..... 9**

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.

Cross cultural influences across India and secular architecture of the princely states: Oudh, Rajput, Sikh, Vijayanagar, Mysore, Madurai- important examples

### **Unit 4 - Architecture in Colonial India ..... 9**

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

### **Unit 5 - Contemporary Architecture in India ..... 9**

Socio-economic changes in India from 1990s onwards and its implications for architecture; Rapid urbanisation, Rise of private townships, gated communities and globalised business parks; Availability of new building materials; Land and environmental conflicts; Rise of informality in production of space; Works of contemporary masters - Hafeez Contractor, Dean D'Cruz, Morphogenesis Studio etc.

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## References:

1. Brown Percy, Indian Architecture (Islamic Period) Taraporevala and Sons, Bombay, 1983.
2. Christopher Tadgell – The History of Architecture in India – Penguin Books (India) Ltd., New Delhi 1990.
3. Architecture of the Islamic World – George Michel – its history and social meaning. Thames and Hudson, London, 1978.
4. Islamic Architecture, Form, Function and Meaning, Robert Hillenbrand, Edinburgh University Press, 1994.
5. Satish Grover. The Architecture of India (Islamic) Vikas Publishing House Pvt. Ltd., New Delhi, 1981.
6. R.Nath – History of Mughal Architecture – Abhinav Publications – New Delhi, 1985
7. <http://www.islamicart.com/pages/archcrea/index.html>
8. <http://libraries.mit.edu/rvc/aka/agakhan/index.html>
9. <http://www.greatbuildings.com/types/styles/Islamic.html>



**BAR21005****VALUE AND CHARACTER EDUCATION**

Number of credits	3	Subject Category	SEC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To make the students understand and realize values required in their life. Personal as well as Professional values are the spontaneous and natural manifestation of good characters which is built on round principles of moral life. To make the students to develop their life skills. To stress the need to acquire certain values of good manners that are essential for a respectable and successful life, in society. To cultivate a set of principles or standards of behavior; that are regarded desirable, important and held in high esteem by our society. To incorporate values in their daily life to evolve meaning of their life, this adds joy, satisfaction and peace to life, and to exploit the skills hidden in their mind.

**Expected Course Outcomes:**

CO1	To make the students understand and realize values required in their life
CO2	To make the students to develop their life skills
CO3	To stress the need to acquire certain values of good manners that are essential for a respectable and successful life, in society
CO4	To incorporate values in their daily life to evolve meaning of their life, this adds joy, satisfaction and peace to life, and to exploit the skills hidden in their mind.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	M	M	-	-	M	H
	CO2	H	H	M	M	M	M
	CO3	M	H	-	-	M	H
	CO4	M	H	M	M	M	H
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
		✓					

4	Approval	Meeting of Academic Council, May 2021
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## Course Content:

### Unit 1 - Concept of Human Values and Personal Development ..... 6

**Concept of Human Values, Value Education Towards Personal Development:** Aim of education and value education; Evolution of value-oriented education; Concept of Human values; types of values; Components of value education.

**Personal Development:**Self-analysis and introspection; sensitization towards gender equality, physically challenged, intellectually challenged. Respect to - age, experience, maturity, family members, neighbours, co-workers.

**Character Formation towards Positive Personality:**Truthfulness, constructivism, Sacrifice, Sincerity, Self-Control, Altruism, Tolerance, Scientific Vision.

### Unit 2 - National and International Values ..... 6

Value Education towards National and Global Development; National and International Values:**Constitutional or national values** - Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity; **Social Values** - Pity and probity, self-control, universal brotherhood; **Professional Values** - Knowledge thirst, sincerity in profession, regularity, punctuality and faith; **Religious Values** - Tolerance, wisdom, character; **Aesthetic values** - Love and appreciation of literature and fine arts and respect for the same; National Integration and international understanding.

### Unit 3- Character: An Initiative with Far-Reaching Consequences ..... 12

The effects of an unstable homes, neighbourhoods, and learning environments on students' ability to achieve in school - The importance of positive adult role models for students- The role that alternative education plays in providing a different educational environment for "at risk" kids; Character Focus: The impact of parenting on student performance • The critical role that character plays in preparing children for productive citizenship • The causes and effects of changes in Indian society that directly influence student success • The elements of good character that students must learn in order for teachers to create a "classroom community" that benefits all participants.

### Unit 4- The Cultural Shift: Impact upon the Classroom ..... 9

The character traits necessary for the well-being of the individual, institution, community, and society• Historical models of programs that have been successful in introducing character education to the classroom. The contributions of major theorists and practitioners in the field of character education. From 8th Century Cicero to 21st Century Lickona: The Character Journey

*Design ways to develop character through conflict and problem solving • Identify strategies for establishing discipline without humiliation • Communicate to students the importance of classroom relationships*

### Unit 5:Character quality frameworks Mindfulness ..... 12

Self-awareness, self-esteem, self-actualization, growth, vision, insight, observation, consciousness, compassion, listening, presence, sharing, interconnectedness, empathy, sensibility, patience, acceptance, appreciation, tranquillity, balance, spirituality, existentiality, oneness, beauty, gratitude, interdependency, happiness, **Curiosity:** Open-mindedness, exploration, passion, self-direction, motivation, initiative, innovation, enthusiasm, spontaneity, etc.; **Courage:** Bravery, determination, fortitude, confidence, risk taking, persistence, toughness, zest, optimism, inspiration, energy, vigor, zeal, cheerfulness, humour, stability, etc.; **Resilience:** Perseverance, resourcefulness, tenacity, grit, spunk, charisma, confidence, adaptability, dealing with ambiguity, flexibility, self-discipline, commitment, self-control, feedback, effort, diligence, etc.; **Ethics:** Humaneness, kindness, respect,

justice, equity, fairness, compassion, tolerance, inclusiveness, integrity, loyalty, honesty, truthfulness, trustworthiness, decency, authenticity, genuineness, consideration, forgiveness, virtue, love, care, helpfulness, generosity, charity, devotion, belonging, etc.; **Leadership:** Responsibility, heroism, abnegation, accountability, selflessness, humbleness, inspiration, integrity, organization, delegation, teamwork, mentorship, commitment, engagement, leading by example, goal-orientation, consistency, self-reflection, social awareness, cross-cultural awareness, dependability, reliability, conscientiousness, efficiency, productivity, results orientation, focus, precision, project management, execution, socialization, negotiation, diversity, decorum, etc.

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## References

1. McCown, D., Reibel, D., & Micozzi, S. (2010). *Teaching Mindfulness: A Practical Guide for Clinicians and Educators*. New York: Springer.
  2. Berlyne, D. (1960). *Conflict, arousal and curiosity*. New York: McGraw-Hill.
  3. Brown, B. (2012). *Daring greatly: How the courage to be vulnerable transforms the way we live, love, parent, and lead*. Penguin.
  4. Garmezy, N. & Rutter, M. (1983). *Stress, Coping and Development in Children*. New York: McGraw-Hill.
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**BCE21A02****MECHANICS OF STRUCTURE II**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To understand the various forces and stresses acting on beams & columns. To learn how various end conditions affect the design. To prepare the students for design of structural elements using steel and concrete in the next semesters.

**Expected Course Outcomes:**

CO1	Apply the concepts of determining the techniques of finding the stresses.
CO2	Use the theory of simple bending theory to find the deflection in beams.
CO3	Analyze and solve the different types of columns.
CO4	Analyze the different types of indeterminate beams.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	M	H	H	M	M	-
	CO2	M	H	H	H	M	-
	CO3	M	H	H	H	H	-
	CO4	M	H	H	H	H	-
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval						Meeting of Academic Council, May 2021

**Course Content:**

**Unit 1- Shear Force and Bending Moment 9**

Concept 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 2 - Stresses In Beams 9**

Theories of simple bending – bending stresses in beams, shear stresses in beams – examples on simple sections. Stress distribution diagrams

**Unit 3 - Deflection Of Beams 9**

Slopes and Deflections at a section – Double Integration and Macaulay’s method for simply supported and cantilever beams

**Unit 4 - Theory Of Columns 9**

Short and long columns – Euler’s method and its limitations – Derivations of Euler’s formula (for different end conditions) – Rankine’s formula for columns, examples, effect of eccentric loading.

**Unit 5 - Introduction to Indeterminate Structures 9**

Determination of degree of static indeterminacy for beams and frames – Concept of Analysis (No Problems).

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**References:**

1. R.K.Bansal” A text book on “STRENGTH OF MATERIAL” Laxmi publications, New Delhi 2006.
  2. M.M.Ratwani, &V.N.Vazirani, Analysis, Vol.I, Khanna Publishers-Delhi, 1987.
  3. Timoshenko, S.P., and D.H.Young, Elements of Strength of Materials, Fifth edition, East West Press, 1993.
  4. A.R.Jain and B.K.Jain, Theory and analysis of Structures, Vol.I, Nemachand and Bros, Roorkee,1987
  5. B.C.Punmia,’Strength of Materials and Theory of structures’, Vol.I,Laxmi Publications, New Delhi 1994
  6. R.K.Rajput “Strength of Materials”, S.Chand& Company Ltd., New Delhi 1996.
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**BAR21L07****MATERIALS AND CONSTRUCTION III**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To understand building materials from construction perspective. Focus shall be on the application of each material in different building components, complying with relevant standards and codes. Examples from ancient to modern times shall be discussed to appreciate the flexibility of using the material in different forms and components.

**Expected Course Outcomes:**

CO1	To learn about opening as a component of a building and design and the wide variety of materials used for the same
CO2	To know about the vertical & horizontal movement systems such stairs, lifts and conveyors
CO3	To acquire knowledge on water & damp proofing systems, materials used and application techniques.
CO4	To understand the various types of basements- their suitability based on requirements and other criteria

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	H	H
	CO2	M	H	H	H	H	M
	CO3	M	H	H	M	H	M
	CO4	H	H	H	H	H	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Doors, Windows and Ventilators**.....15

Types of doors based on the make- battened, ledged, braced, flush, panelled, framed and etc.; usage- pivoted, single leaf, double leaf, revolving, swing, rolling shutter, safety doors, collapsible, etc.; hardware fixtures, joinery, door-fixing details, and types of materials used in doors - wood, metal, glass, aluminium, & PVC.

Types of windows and ventilators based on the make- sliding, pivot, casement, louvered, fixed, bay window, etc.; and material - wood, steel, glass and aluminium; hardware fixtures, joinery, window-fixing details.

### **Unit 2 – Staircases, Escalators, Lifts and Horizontal Conveys**.....15

Definitions- Tread, riser, stringer, nosing, flight, landing, head room, handrail, balusters, newel post etc.; Types of staircases- straight, dog-legged, open-well, geometrical, circular, spiral, bifurcated, etc.; Construction details & types of finishes of wooden, metal stairs and R.C.C. stairs. Emphasis should also be given on details related to differently-abled people. Method of construction, joinery and fixing details.

Escalators, Lifts and Horizontal Convey – methods of construction, design criteria, construction details

### **Unit 3 – Waterproofing, Damp-proofing and Swimming Pools**.....15

Causes and defects of dampness, methods adopted for waterproofing and damp proofing at different levels of a building, admixtures and different materials (rigid, flexible) used in the process. Details of application of Damp Proof Course and Water Proofing.

Types of swimming pools, method of construction, construction details, leakage prevention methods, water treatment plant for pools, criteria for motor room location and area, materials, etc.

### **Unit 4 – basements**.....15

Types of basement – Refurbishment, new basement, retrofit, deep basements, etc.; methods of construction - Open cut, Cut and cover, Top-down method; waterproofing and damp-proofing of basements; materials – stone, brick, concrete, etc.; design based on use – basement parking, etc.,

### **Site study and Report:** 15

The student has to visit a site and study the building with respect to the above-discussed topics and give a brief report with sketches and photographs at the end of the semester.

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## References:

1. S.C. Rangwala – Engineering Materials Charotar Publishing House - Anand 1997
  2. W.B. McKay – Building Construction Vol. 1, 2, 3 – Longmans U.K. 1981.
  3. B.C Punmia – Building Construction 11<sup>th</sup> edition – Laxmi Publications, 2005.
  4. R.J.S. Spence and D.J. Cook, Building Materials in Developing Countries, John Wiley and Sons, 1983.
  5. Don A. Watson Construction Materials and Processes McGraw Hill 1972, WB Mckey Building construction, Vol 1,2, Longman UK 1981.
  6. Barry, The Construction of Buildings Affiliated East West press put Ltd New Delhi 1999.
  7. Francis D.K. Ching, Building Construction Illustrated John Wiley & Sons 2000.
  8. HUDCO – All you want to know about soil stabilized mud blocks, HUDCO Pub., New Delhi, 1989.
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**BAR21L08****COMPUTER STUDIO I**

Number of credits	3	Subject Category	SEC
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To introduce the technology of computer system, operation principles, use of other related hardware with a thrust on advanced 2D drafting techniques involving complex building drawings. To enhance them with rendering techniques for architectural presentations. To inform the student, basics of operation system,) application software. To make students understand the basic tools of 2D drafting software and making of building drawings. To create rendered plans, sections, elevations, Introduction to post processing of rendered images. Introduction to sheet compositions and to use presentation software to compose architectural portfolios.

**Expected Course Outcomes:**

CO1	The students should have learnt the use of 2d drafting techniques involving complex building drawings
CO2	The students should be able to use rendering techniques for architectural presentations
CO3	The students should be able to create rendered plans, sections, elevations, and post processing of rendered images
CO4	The students should be able to compose presentation sheets and architectural portfolios

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	M	H	-
	CO2	M	M	H	M	H	-
	CO3	H	H	H	H	H	-
	CO4	H	M	H	M	H	-
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	



## Course Content:

### **Unit 1 – Effective Use of Data Management Software for Business Administration 10**

Professional documents and User Inputs with data management software – Data Processing & Analysis – Business Presentations – Template – Organizing and Protecting Documents – Business management – Communication

### **Unit 2 – Introduction to Computer Aided 2D Drafting 20**

Understanding the use of drawing tools, object editing, drawing objects, filing and setting drawing units, scales, limits that size and dimensioning, texting. Setting up of drawings of various simple architectural objects with complete text dimensioning.

### **Unit 3 – Advance Computer Aided 2D Drafting 25**

Advance command programming - transparent overlays hatching utilities, assigned color and line type, use of multiline, style, block, symbol library manipulation for accurate drawing. Advance exercise in 2D drafting of various complex building drawing, incorporating the above said utilities. Layout setting up, detailed drawings, scale, xref

### **Unit 4 – Presentation Drawings - Introduction to Presentation software 20**

Getting started with layers, introduction to tools, colour correction, special effects, related exercises. Basic image editing, cropping, resizing, correcting, saving with Different File Formats. Exporting PDF file from drafting software to presentation software. Material rendering of plans and elevation for architectural presentation.

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## References

1. Sham Tickoo, Advance Technique in AutoCAD 2010
  2. MS OFFICE word – Turban Lage frandsen
  3. Ms office 2007: Advance concepts and techniques – Shelly Cashman Series
  4. V. Rajaraman, Principles of Computer Programming – Prentice Hall of India.
  5. Auto CAD reference manual – Autodesk UNC, 1998.
  6. AutoCAD architectural users guide – Autodesk Inc. 1998.
  7. Sham Tickoo, Understanding AutoCAD – 14 (Windows) – 1997.
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**BAR21L09****ARCHITECTURAL DESIGN II**

Number of credits	12	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	9	End Semester Exam	50
Total period per week	12	Total Marks	100
Total periods	180		

**Subject Objectives:** To enable Students to understand the importance of designing the built environment to suit the human behaviour. To understand the characteristics of site and the importance of site planning which includes built form and open space. To understand the relationship between form and spaces and the importance of aesthetics. To ascertain the response of user group through case studies. To enable the presentation of concepts through 2D drawings, sketches and model.

**Expected Course Outcomes:**

CO1	The students should be able to understand the importance of designing the built environment to suit the human behaviour.
CO2	The students should comprehend the characteristics of site and the importance of site planning which includes built form and open space.
CO3	The students should be able to understand the relationship between form and spaces and the importance of aesthetics.
CO4	The students should be able to ascertain the response of user group and present concepts through 2D drawings, sketches and model.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	H	H
	CO2	H	M	H	M	H	H
	CO3	H	M	H	M	H	H
	CO4	H	H	H	M	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

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 –

**Residential buildings, Institutional buildings like government offices, nursery or primary schools, primary health center, banks, school for children with learning disabilities, neighborhood market and projects of similar size.**

**Students shall be encouraged to participate in design competitions appropriate to their level as one of the class projects.**

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**References:**

1. De Chiara and Callendar, Time saver Standards Building Types, McGraw Hill co., 2<sup>nd</sup> Edition, 1980.
  2. Edward D.Mills, Planning – The Architects Handbook – 10<sup>th</sup> Edition, British Library Cataloguing in Publication Data, 1985.
  3. Wakita Linde, The Professional practice of Architectural working, drawing John Wiley & Sons, 1984.
  4. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGraw Hill Book Co., 1982.
  5. Julius Panero & Martin Zelnik, Human Dimension and Interior Space, Whitney Library of Design Publication, 1979.
  6. Neufet Architect's Data, Rudolf Herg, Crosby Lockwood and Sons Ltd., 1970.
  7. <http://www.hampton.com/freshair>
  8. <http://www.columbiamedical.com>
  9. <http://www.mgarchitects.com>
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**SEMESTER IV**

<b>S. No.</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Category</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Studio</b>	<b>Credits</b>
		<b>THEORY</b>					
1	BAR21006	History of Architecture IV	PC	3	0	0	3
2	BAR21007	Building Services I	BS&AE	3	0	0	3
3	BCE21A03	Design of Structures I	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L10	Material and Construction IV	BS&AE	1	1	3	3
5	BAR21L11	Computer Studio II	SEC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L12	Architectural Design – III	PC	0	0	12	12
		<b>Total Hrs</b>	<b>31</b>		<b>Total Credits</b>		<b>27</b>

**BAR21006****HISTORY OF ARCHITECTURE IV**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To introduce the condition of modernity and bring out its impact in the realm of architecture. To study modern architecture as evolving from specific aspects of modernity: industrialization, urbanization, material development, modern art as well as society's reaction to them. To study the further trajectories of modern architecture in the post WWII period to develop a critical understanding about the changing developmental trajectories. To create an overall understanding of the architectural developments.

**Expected Course Outcomes:**

CO1	The students should be able to understand the evolution of World Architecture in its various stylistic modes characterized by technology, ornamentation and planning
CO2	The students should be able to understand architectural character, construction methods, building materials and settlement planning
CO3	The students should be able to understand tangible and intangible aspects of architecture associated with history.
CO4	The students should be able to understand the developments in a chronological manner along the timeline and across different geographies

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	-	H	M	-	H
	CO2	H	-	H	H	-	H
	CO3	H	-	M	M	-	H
	CO4	H	-	M	H	-	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Leading to a New Architecture & Reviewing Industrialization**.....9

Historical overview - Origins of Neo-Classicism: Enlightenment Architects - Boullée and Ledoux: Beginning of New era - Industrial Revolution & its impact: Materials & Technology - History of Steel, concrete and glass. Architecture in Industrial Exhibition: Arts and Crafts Movement in Europe and America - Art Nouveau and the works of Gaudí, Horta, Guimard, Macintosh: Early works of F.L. Wright.

### **Unit 2 – Issues Of Ornamentation And Aesthetics & Institutions**.....9

Adolf Loos and the Arguments on Ornamentation - Futurist Movement Manifestos and the works of Sant'Elia - Expressionism and the works of Mendelsohn, Taut, Polzeig - Cubism and Constructivism and its influence on Architecture - De Stijl: Ideas and works. Werkbund and Bauhaus, Works of Behrens and Gropius - Canonising Modernism- International Style - CIAM Congresses and Declarations. Works and Ideas – Le Corbusier- Mies Van der Rohe - Later Works of Wright – Alvar Aalto

### **Unit 3 – Critiquing Modernism**.....9

Challenging CIAM declarations: Team X and Brutalism. Conditions of Post Modernity - Tools of New Architecture: Collage, Technology and New Science - Canonization of Post Modernist Architecture - Historic Revivalism - Pop Architecture - Critical Regionalism -Deconstructivist Theory and Practice.

### **Unit 4 – Post and Late Modern Architecture**.....9

Writings of Venturi- Jane Jacobs- Aldo Rossi - Christopher Alexander. Works of James Sterling Philip Johnson, Michael Graves etc. Counter-reaction and industrial aesthetics of Richard Rogers, Norman Foster; Works of Zaha Hadid, Rem Koolhaas, Renzo Piano and Daniel Libeskind.

### **Unit 5 – Alternative Practice**.....9

Rising environmental consciousness, Theory of New Urbanism and Sustainable Urban Development. Ideas and Works of Fathy- Baker - Ando -Soleri- Bawa.

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## References:

1. Kenneth Frampton, "Modern Architecture": A Critical History, Thames and Hudson, London, 1994
  2. Leonardo Benevolo, "History of Modern Architecture", 2 Vols., Routledge & Kegan Paul, London, 1971.
  3. Manfredo Tafel/ Francesodolco, "Modern Architecture", Faber and Faber/ Electa, 1980.
  4. Sigfried Giedion, "Space Time and Architecture": The Growth of a New Tradition, Harvard University Press, 1978.
  5. Thomas Metcalf, "An Imperial Vision", Faber and Faber, London.1989.
  6. Aldo Rossi, the Architecture of the City, MIT Press, Massachusetts, 1982.
  7. Charles Jencks, the Language of Post-Modern Architecture, 1984.
  8. Christopher Alexander, Pattern Language, Oxford University Press, Oxford.
  9. D. Ghirardo, Architecture after Modernism, Thames and Hudson, London, 1990.
  10. Kenneth Frampton, Modern Architecture: A Critical History, Thames and Hudson, London, 1994.
  11. Miki Desai et.al, Architecture and Independence, Oxford University Press, New Delhi, 1998.
  12. Robert Venturi, Complexity and Contradiction in Architecture, The Architectural Press, London, 1977
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**BAR21006****BUILDING SERVICES I**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** This course will give understanding about the services used in building – Plumbing, Lighting, Electricals and Lifts. It will help students to applying prediction methods to assess the functional requirements of buildings. By learning this course students can provide optimum plumbing, lighting, electrical and vertical transportation solutions through simulations and design models. Further this course will expose students to perform basic design layout of these services.

**Expected Course Outcomes:**

CO1	To learn the basic principles behind the design of services such as plumbing, electrical, lighting and lifts.
CO2	To apply prediction methods to assess the functional requirements of buildings
CO3	To expose students to understand the options available for the services mentioned and also to perform basic design layout of these services
CO4	To arrive at most appropriate and optimized solutions through simulations and design models

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	M	H	M
	CO2	H	H	H	H	M	H
	CO3	H	H	H	M	M	H
	CO4	H	H	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

<b>A</b>	<b>PLUMBING - SUPPLY and SANITATION</b>	<b>18</b>
<b>Exercise</b>	<b>Description</b>	<b>Hrs</b>
1	Basic principles of Plumbing, need, terminology. types of sources, yield & spacing of wells, intakes, pumping and transportation of water. Domestic water distribution system, reservoirs, supply system layouts	4
2	Layout of domestic water piping systems, joints, fittings and valves. Cold & hot water lines in buildings, Water supply to high rise buildings: problems encountered & systems adopted.	3
3	Specifications and installation of sanitary fittings like wash basins, water closets, sinks, etc in buildings. Uses of different types of valves, taps, faucets, 'P', 'Q', 'S', floor/bottle traps used in buildings.	3
4	Principles of sanitation, collection and disposal of various kinds of refuse from buildings. Methods of carrying refuse, systems of refuse disposal, their principles. Treatment of water, qualities of potable water	3
5	Design considerations on drainage scheme. Planning of bathrooms, lavatory blocks and kitchen in domestic and multi-storeyed buildings. Preparation of plumbing drawings, symbols commonly used in these drawings.	3
6	Indian standards and byelaws for sanitary conveyance. Disposal of sewage from isolated building, Gradients used in laying of drains and sewers for various sizes. Septic tank details & capacity calculation. Sewage treatment. Use of pumps in sanitation, biogas, soil disposal without water carriage, rural sanitation	4
<b>B</b>	<b>LIGHTING</b>	<b>12</b>
<b>Exercise</b>	<b>Description</b>	<b>Hrs</b>
1	Natural and Artificial Lighting. Recommended illuminances, Glare, Daylight illuminance, Luminance distribution. Types of lighting fixtures and devices - Lamps, cove lighting, ,cornice lighting, track lighting, light strip, troffer, wall washer, flood light, down light, spot light,- power factor and types of lens, area coverage	4
2	Design methods, Total flux method, Daylight factor method, BIS method, Pepper-pot diagram, Models and computer tools. Planning for daylight, day light utilization factor, Point method, lumen method, IES glare Index system.	4
3	Layout of lighting system	3
4	Cost estimate for the exercise 3 and submission	1
<b>C</b>	<b>ELECTRICALS</b>	<b>12</b>
<b>Exercise</b>	<b>Description</b>	<b>Hrs</b>
1	Types of power sources, supply from main stations and substations, metered supply	5
2	Fundamental principles of electricity, voltage, amperage, wattage. Generation & distribution of power, LT&HT lines, electricity conductors, Indian Electricity Act.	5
3	Electricity distribution in buildings, Service wires, meter boards, circuits, switch boards, electrical safety devices in buildings, MCBs, Earthing.	5
4	Introduction to Electric layouts- 5A, 15A switches, fans, lighting, electrical devices, etc.	5
5	Cost estimate for the exercise 4 and submission	2



<b>D</b>	<b>LIFTS</b>	<b>6</b>
<b>Exercise</b>	<b>Description</b>	<b>Hrs</b>
1	Types of lifts - passenger freights, service elevators, etc. connection to power supply, generators, popularity, use based on capacity	3
2	Design considerations and bye laws for elevators in buildings Introduction to lifts layout- lift well, headroom spacing, etc	2
3	Cost estimate for the exercise 2 and submission	1

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**References:**

1. Fred Hall and Roger Greeno, Building Services Handbook, Routledge, 9<sup>th</sup> Edition, May 2017
  2. Mittal, Electrical And Mechanical Services In High Rise Buildings, CBS Publishers & Distributors, 2007
  3. Gary Steffi, Architectural Lighting Design, Wiley 3rd Edition.
  4. Watson Guptill, Lighting by Design, Archiworld Publishers.
  5. O'Reilly, Building Services Handbook, 7th Edition.  
([https://www.oreilly.com/library/view/building-serviceshandbook/9780415631402/13\\_Part12.html](https://www.oreilly.com/library/view/building-serviceshandbook/9780415631402/13_Part12.html))
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**BAR21006****DESIGN OF STRUCTURES I**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To introduce the condition of modernity and bring out its impact in the realm of architecture. To study modern architecture as evolving from specific aspects of modernity: industrialization, urbanization, material development, modern art as well as society's reaction to them. To study the further trajectories of modern architecture in the post WWII period to develop a critical understanding about the changing developmental trajectories. To create an overall understanding of the architectural developments.

**Expected Course Outcomes:**

CO1	Understand the Properties of rolled steel sections
CO2	Able to design the steel joints for maximum efficiency and strength.
CO3	Tension members and compression members are designed for various conditions by applying the codal provisions
CO4	Different types of laterally supported beams to be designed for various conditions

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	M	M	-
	CO2	M	H	H	H	H	-
	CO3	M	H	H	H	H	-
	CO4	M	H	H	H	H	-
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 - Introduction to Steel Sections** ..... **5**

Properties of rolled steel sections, Understanding the applicability

**Unit 2 - Riveted Joints** ..... **10**

Riveted joints, Analysis and Design of riveted joints (Excluding eccentric connections)

**Unit 3 - Welded Joints** ..... **10**

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

**Unit 4 - Steel Beams** ..... **10**

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

**Unit 5 - Steel Columns** ..... **10**

Allowable stresses, various shapes, built-up sections, Design of columns (excluding lacing, battening and other connections).

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**References:**

1. N. Subramaniam” Design of steel Structures” OUP India, 04 Sep 2008 – Technology & Engineering.
  2. S.S Bhavikatti “Design of steel structures” I.K International Publishing Housing Pvt Ltd Delhi.
  3. Ramachandra S., Design of Steel Structures, Standard Book House, Delhi, 1984.
  4. A.S. Arya, Structural Design in Steel, Masonry and Timber, Nemchand and Bros, Roorkee, 1971.
  5. National Building Code of India, 1983, Part VI, Structural Design.
  6. Gurucharan Singh, Design of Steel structures, Standard Publishers, New Delhi, 1982.
  7. Negi “Design of steel Structures” – Tata McGraw Hill Book Company, Delhi 1997.
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**BAR21L10****MATERIALS AND CONSTRUCTION IV**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To learn tasks and work concerned with preparation of site and provision of site level services. To learn basics of landscape design to incorporate those elements into the building design. To acquire knowledge of various materials used for interior finishes, their costs and application techniques. To understand the interior components to create spaces and false ceiling and floors considering the other services involved in those spaces.

**Expected Course Outcomes:**

CO1	To learn tasks and work concerned with preparation of site and provision of site level services.
CO2	To learn basics of landscape design to incorporate those elements into the building design
CO3	To acquire knowledge of various materials used for interior finishes, their costs and application techniques.
CO4	To understand the interior components to create spaces and false ceiling and floors considering the other services involved in those spaces

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	H	H
	CO2	M	H	H	H	H	M
	CO3	M	H	H	M	H	M
	CO4	H	H	H	H	H	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 Site Level Finishes 15**

Levelling of Ground and Laying of required service lines. Placement of Fire hydrants and other necessary services based on code. Various surface finishes for parking, Hard and landscaping , Playing and walking.

### **Unit 2 Landscape features 15**

Construction of fountains, ponds, planting of small to large plants/trees, pavers , terrace level gardens.

### **Unit 3 Interior Finishes 15**

Floor finishes – Tiles, wooden, marble and Granite floors. Wall cladding using veneers, Laminates, wall papers, fabrics& paints- techniques to create various textures.

### **Unit 4 Interior Finishes 15**

False ceilings – panelling to hide electrical and AC lines, Ward robes /storage units, Room dividers, Work counters in kitchen- sink fixing, Lofts. False floors.

### **Site Study and Report 15**

The student has to visit a site and study the components mentioned in the above discussed topics and give a brief report with sketches and photographs at the end of semester. Students shall be encouraged to submit detailed drawing using AutoCAD.

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## References

1. Site Planning and Design Handbook
  2. Cole, Site design., Rcockport
  3. Catherine collin, Landscape design : urban furniture, Page one publishers
  4. Alex Compello, Landscape design : Water, Page one publishers
  5. Construction encyclopedia 4 : stairways parkings and garages - special assemblies
  6. Construction encyclopedia 5 : finishes and decoration - swimming-pool and barbecues
  7. Dr.B.C. Punmia (1993)“ A text book of Building construction” , 2<sup>nd</sup> Ed, Laxmi Publications
  8. McKay. W.B (2005), Building construction Vol. I-IV , Orient longman
  9. Ching F.D.K (2005),“Building construction illustrated 4th Edition” , Wiley
  10. Banz H ,Building Construction Details Practical Drawings, CBS
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**BAR21L11****COMPUTER STUDIO II**

Number of credits	3	Subject Category	SEC
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To make use of more advanced features that will make 2D Architectural drawing to a 3D VIEW so that we can visualize our design and to enhance them with rendering techniques for architectural presentations. Introduce basic tools and create an understanding of working with levels. Apply this knowledge to create 3 dimensional views, and massing of building. Introduction to post processing of 3d rendered building views. Introduction to sheet compositions and to use BIM software to compose architectural design panels and site views, perspective views of the buildings.

**Expected Course Outcomes:**

CO1	Student will learn to develop higher-quality, more accurate architectural designs; use tools specifically built to support Building Information Modelling workflows
CO2	Students will learn to capture and analyse concepts, and maintain their vision through design, documentation, and construction
CO3	Students will be able to design a structure and its components in 3D then annotate the model with 2D drafting elements followed by accessing the structure information from the building models database.
CO4	Students will be able manage the construction documentation in a much efficient manner. Students can access information from the building design database at any point in time and keep a tab on the documentation process related to the construction of the building structure as per the designs.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	M	H	H	H	H	M
	CO2	M	H	H	H	H	M
	CO3	H	M	M	H	H	M
	CO4	H	H	H	H	H	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
		✓					
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 – Introduction to BIM software ..... 20**

Introduction, Building Information Modelling, Projects, Project Templates. File Types, Exploring the User Interface, Elements and Families, study of Levels, study of Wall Properties and its application.

**Unit 2 – BIM software Editing Commands, Components, Dimensions ..... 25**

Editing and modifying Commands, study of Components, Introduction to Modern Medium Library. Managing Views - Floor Plan View, Ceiling Plan View, Cutting a Plan View, Plan Region, Elevation View, Section View, 3D Views, Cropping a View, Visibility and Graphics Display, View Templates Dimensions -Constraints.

**Unit 3 – Creating Floor, Roof and Openings in BIM software ..... 15**

Floors - Creating Floors, Placing Elements on a Sloped Floor, Ceilings, Creating Ceilings. Roofs - Roof by Footprint, Roof by Extrusion, Join/ unjoin roofs, Roof Ridges. Openings - On Face, Vertical Opening, Shaft opening, Dormer opening, Wall opening

**Unit 4 – Creating & Modifying Curtain Walls & Stairs in BIM software ..... 15**

Getting started with layers, introduction to tools, colour correction, special effects, related exercises. Basic image editing, cropping, resizing, correcting, saving with Different File Formats. Exporting PDF file from BIM software to post production software and material rendering of plans and elevation for architectural presentation.

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**References**

1. Autodesk Revit 2017for Architecture
  2. Mastering Autodesk Revit Architecture 2011.
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**BAR21L12****ARCHITECTURAL DESIGN III**

Number of credits	12	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	9	End Semester Exam	50
Total period per week	12	Total Marks	100
Total periods	180		

**Subject Objectives:** To make a comprehensive study of a rural settlement that is an exemplar of collective design evolved organically over a period of time. To expose the students on the methodology of conducting various surveys covering, physical, visual characteristics and demographic aspects.

To understand the vernacular / traditional architecture involving local materials and construction techniques. To emphasize on the importance of designing built form and open spaces that meet the aspirations of the community. To enable the presentation of concepts through 2D and 3D presentation including sketches and model.

**Expected Course Outcomes:**

CO1	Knowledge on various types of documenting methodologies and various building typologies that makes a community socially and economically content
CO2	Better understanding of the materials and construction techniques of the rural community
CO3	Importance of designing built form and open spaces that meet the aspirations of the community
CO4	Presentation of design through 2D and 3D including drafting, sketching and modelling.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	H	H
	CO2	H	M	H	M	H	H
	CO3	H	M	H	M	H	H
	CO4	H	H	H	M	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	



## **Course Content:**

**Design 1:** Problem related to multi room, single use, small span – multi story, Horizontal and vertical movement, active cum passive energy, masonry and framed type buildings. 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, Exhibition Pavilion & Market and projects of similar size.

**Design 2:** Problems related to rural housing – visits to selected village – surveys on socio - economic, physical, and housing and surveys, etc. to study existing conditions – analysis of survey data – preparation of report and presentation in a seminar – preparation of design brief solutions for housing and community facilities.

**Students shall be encouraged to participate in design competitions appropriate to their level instead of design 1**

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## **References:**

1. De Chiara and Calendar, Time Saver Standard for Building Types, McGraw Hill Co., 2<sup>nd</sup> Edition, 1980.
  2. Edward D.Mills, Planning – The Architects Handbook – 10<sup>th</sup> Edition, British Library Cataloguing in Publication Data, 1985.
  3. Wakita\Linde, The Professional Practice of Architectural Working, Drawing John Wiley & Sons, 1984.
  4. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGraw Hill Book Co., 1982.
  5. Julius Panero & Martin Zelnik, Human Dimension and Interior Space, Whitney Library of Design Publication, 1979.
  6. Neufert Architect's Data, Rudolf Herg, Crosby Lockwood and Sons Ltd., 1970.
  7. <http://www.focusnet.co.uk/cib/library/physdishous94.htm>
  8. <http://www.ourvirtualmall.com/cloth.htm>
  9. <http://www.ddimagezine.com/>
  10. <http://www.atlasmagazine.com/photo/lande6/>
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**SEMESTER V**

<b>S. No.</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Category</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Studio</b>	<b>Credits</b>
		<b>THEORY</b>					
1	BAR21008	Climatology	BS&AE	3	0	0	3
2	BAR21009	Building Services II	BS&AE	3	0	0	3
3	BCE21A04	Design of Structures II	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L13	Material and Construction V	BS&AE	1	1	3	3
5	BAR21L14	Surveying and Site planning	PC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L15	Architectural Design – IV	PC	0	0	14	14
		<b>Total Hrs</b>	<b>33</b>		<b>Total Credits</b>		<b>29</b>

**BAR21008****CLIMATOLOGY**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** Equip the students with scientific background required to design climate responsive buildings, by offering a clear understanding of the various climatic zones and its climate responsive considerations in architectural design of building and built-up areas.

**Expected Course Outcomes:**

CO1	Knowledge on science required for designing climate responsive building
CO2	Better understanding of various climatic zones
CO3	Knowledge on considerations for climate responsive design
CO4	Designing with effective climate responsive architecture and bio-climatic architecture

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	M	M
	CO2	H	M	H	H	M	M
	CO3	H	M	H	H	H	M
	CO4	M	M	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
				✓			
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

<b>Module: 1</b>	Introduction to climate variables; Graphical representation of weather data; Manual methods and using software tools	<b>4 hours</b>
<b>Module: 2</b>	Understanding sun-path diagram; Solar Shading, Design for shading of windows using shading protractor & heliodon.	<b>4 hours</b>
<b>Module: 3</b>	Quantifying the daylight levels in a space using Daylight Factor (DF) method using models and field study, Glare analysis using HDR photography & photo-sphere, LEED daylight credits.	<b>12 hours</b>
<b>Module: 4</b>	Human thermal comfort, assessing of comfort in an indoor environment using measured data & Olgay Bioclimatic chart psychrometric, ET / CET nomogram charts.	<b>8 hours</b>
<b>Module: 5</b>	Design recommendation using Givoni–Milne Bioclimatic Chart, Mehoney tables.	<b>6 hours</b>
<b>Module: 6</b>	Design recommendation using Givoni–Milne Bioclimatic Chart, Mehoney tables.	<b>6 hours</b>
<b>Module: 7</b>	Heating and Cooling load calculations and selection of Appropriate materials. Study of Heat loss and gain of building using thermal imaging.	<b>6 hours</b>
<b>Module: 8</b>	Analysis of a building in terms of, Solar shading, daylighting, thermal comfort, Heat loss and heat gain. (A group project / exercise)	<b>5 hours</b>

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**References**

1. Koenigsberger O.H., Ingersol T.G., Mayhew A. and Szokolay S.V., Manual of Tropical Building and Housing, Orient Longman Pvt. Ltd, 2004
  2. Arvind Krishan, Nick Baker, Simons Yannas, Szokolay S.V., Climatic Responsive Architecture - A Design Handbook for Energy Efficient Buildings, Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 2001
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**BAR21009****BUILDING SERVICES II**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** This course will give understanding about the services used in building – Heating and Ventilation and Fire Safety system. It will help students to applying prediction methods to assess the functional requirements of buildings. By learning this course students can provide optimum heating and ventilation solutions, along with fire safety system, through simulations and design models. Further this course will expose students to perform basic design layout of these services.

**Expected Course Outcomes:**

CO1	To learn the basic principles behind the design of services such as Heating and Ventilation and Fire Safety system.
CO2	To apply prediction methods to assess the functional requirements of buildings
CO3	To expose students to understand the options available for the services mentioned and also to perform basic design layout of these services
CO4	To arrive at most appropriate and optimized solutions through simulations and design models

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low								
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	
	CO1	H	H	H	M	H	M	
	CO2	H	H	H	H	M	H	
	CO3	H	H	H	M	M	H	
	CO4	H	H	H	H	H	H	
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
					✓			
4	Approval					Meeting of Academic Council, May 2021		

**Course Content:**

<b>A</b>	<b>Heating &amp; Ventilation Systems</b>	<b>22</b>
<b>Exercise</b>	<b>Description</b>	<b>Hrs</b>
1	Documenting the air conditioning unit installed in any of the rooms in the institution, submit a report on room size, no. of units etc.	3
2	Introduction to theory of air conditioning- how to arrive of heating/cooling loads	3
3	Types of systems and their suitability -application	3
4	Designing a cooling /heating system for a residential space - submitting a detailed proposal including a cost estimate	3
5	Case study of large space with central air conditioning - ex: offices, shopping complex - submission in the form of a report	3
6	Discussion of reports on the systems, layout of in/out vents- comparing them with theoretical calculations	4
7	study on Sustainable practices and advanced researches on heating and cooling systems using journals	3
<b>B</b>	<b>Fire Fighting Systems</b>	<b>23</b>
<b>Exercise</b>	<b>Description</b>	<b>Hrs</b>
1	site visits and documenting the type of firefighting systems in office, shopping complexes, Cinema theatres, Multistorey apartments, institutions, etc.	4
2	Presentation of the reports - identifying similarities/dissimilarities between them	3
3	study on NBC on the type of building documented in exercise 1 & 2 (Class can be divided into as many building typologies for better learning)	6
4	Comparative study of requirements and provisions from exercise 1,2 & 3	3
5	Firefighting system proposal for the Architectural design the class is currently working on	3
6	Cost estimate for the exercise 5 and submission	4

**References**

1. Kreider, Handbook Of Heating, Ventilation, & Air Conditioning, Routledge, 1<sup>st</sup> Edition, 2019
2. Faber & Kell's, Heating & Air-Conditioning of Buildings, 10 Ed, Elsevier.
3. Construction Encyclopedia 3 : Sanitation And Electrical Installations - Air Conditioning And Heating
4. Prakash, Manual Of Fire Safety, Cbs Publishers & Distributors
5. Promat, Fire Protection Guide In Modern Building Construction

**BCE21A04****DESIGN OF STRUCTURES II**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To inform about structural design through working stress and limit state methods. To enable use of the above two methods for the design of concrete beams and slabs under different conditions. To enable use of limit state method for design of a concrete staircase.

**Expected Course Outcomes:**

CO1	Understand the different concepts of Working stress methods using the codal provisions.
CO2	Understand the different concepts of Limit state Design methods using the codal provisions
CO3	Reinforced Concrete beams and slabs to be designed by applying the above concepts
CO4	Dog legged staircase design using Limit state design

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	M	H	H	M	M	-
	CO2	M	H	H	H	H	-
	CO3	M	H	H	H	H	-
	CO4	M	H	H	H	H	-
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
				✓			
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 – Design of Concrete Members and Working Stress Design of Concrete Beams..... 5**

Concept of elastic method, Ultimate load method and limit state method. Advantages of limit state method over other methods.

**Unit 2 – Limit State Design of Concrete Beams ..... 10**

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

**Unit 3 – Limit State Design of Concrete Slabs ..... 10**

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

**Unit 4 – Design of Concrete Circular Slabs ..... 10**

Design of simply supported and fixed circular slabs subjected to uniformly distributed loads.

**Unit 5 – Design of Concrete Staircase by Limit State Method ..... 10**

Types of staircases. Design of dog legged staircase.

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**References:**

1. S.N. Sinha, "Reinforced Concrete Design", Tata McGraw Hill, 2002.
  2. Shah H.J, 'Reinforced Concrete', Charotar, Vol. 1 2016, Vol.2 2014.
  3. P. Dayaratnam, 'Design of Reinforced Concrete Structures', Oxford and IBH Publishing Co.,1983.
  4. C. Sinha and S.K. Roy, 'Fundamentals of Reinforced Concrete', S. Chand & Co., New Delhi,1983.
  5. Dr. B.C. Punmia, 'Reinforced Concrete Structures' Vol, 1 & 2', Laxmi publication, Delhi, 2004.
  6. IS 456 'Indian Standard, Plain and Reinforced Concrete, Code of Practice', Bureau of Indian Standards, 2000.
  7. S. Unnikrishnan Pillai and Devados Menon, 'Reinforced Concrete Design', Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1999.
  8. N. Krishna Raju "Design of Reinforced Concrete Structures (15:456-2000).
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**BAR21L13****MATERIALS AND CONSTRUCTION V**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To understand various systems necessary for good functioning of a building. Focus shall be on emerging needs of the society (life style changes), complying with relevant standards and codes. Examples from various building types shall be discussed to understand the realm of services. This M & C focuses on MEP.

**Expected Course Outcomes:**

CO1	Understanding of various systems necessary for good functioning of a building
CO2	Knowledge on the emerging needs of the society (life style changes)
CO3	Complying with relevant standards and codes
CO4	Knowledge on advanced systems in the realm of services

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	M	M
	CO2	H	H	H	H	H	H
	CO3	H	H	H	H	M	M
	CO4	H	H	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 Plumbing Layout** ..... 15

Designing of spaces catering to basic to luxury fixtures, marking fixtures and plumbing lines considering water supply and sullage/sewage disposal points, Ledge walls, various wall & floor finishes, *Detailed drawing for a kitchen and toilet.*

### **Unit 2 Lighting Layout** ..... 15

Importance of lighting layout, design based on requirement and relevant codes its impact on energy consumption, *Detailed drawing for any space that requires special lighting ex: shops, factories etc.*

### **Unit 3 Electrical Layout** ..... 15

Designing an electrical layout for a residence/ commercial/industrial space used in the previous unit. Beginning with Distribution and ending in fixtures. Understanding the relationship between structural members and fixture location. Knowledge about twoways controlled and UPS backed fixtures. Adding other requirements to the already worked out lighting layout ex: Fans, Air conditioners. *Detailed layout for a space from the previous/current semester design.*

### **Unit 4 HVAC systems** ..... 15

Introduction to Various systems of heating and cooling systems in practice. Design of HVAC layout for a small office/conference space, understanding the load calculation, location of AHU units, and supply and return vents- for maximum efficiency. *Layout drawing for the selected space.*

### **Site Study and Report** ..... 15

The student has to visit a site and study the components mentioned in the above discussed topics and give a brief report with sketches and photographs at the end of semester. Students shall be encouraged to submit detailed drawing using AutoCAD

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## References

1. Construction encyclopedia 3 : sanitation and electrical installations - air conditioning and heating
  2. Mittal, Electrical And Mechanical Services In High Rise Buildings, CBS
  3. SanthoshKumar, Water supply Engineering, Khanna.
  4. Dodge Woodson, Builders guide to wells and septic systems, Mcgraw
  5. S.kGarg, Sewage disposal and pollution engineering
  6. Lang V. P, Air Conditioning : Procedures & Installation, CBS
  7. Khurmi, A Text Book Of Refgeration And Air Conditioning, S.Chand
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**BAR21L14****SURVEYING AND SITE PLANNING**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To teach the importance of site and its content in architectural creations. To orient the students towards several influencing factors which govern the siting of a building or group of buildings in a given site. To teach various techniques of site analysis through exercises and case studies. To teach the students the methodology of preparing a site analysis diagram. This will serve as a prelude to any architectural creation through exercises.

**Expected Course Outcomes:**

CO1	Importance of site and its contents in architectural designing
CO2	Understanding of the influencing factor of siting of a building in any given site
CO3	Knowledge on various techniques of site analysing and surveying
CO4	Methodology of preparing site analysis diagrams

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	M	M	H	H
	CO2	M	H	M	H	H	M
	CO3	H	M	M	H	H	M
	CO4	H	M	H	H	M	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 - Introduction** ..... **9**

Definition of plot, site, land and region, units of measurements. Introduction to survey, methods of surveying, where they are used, Surveying Instruments and their application. Need for surveying. Measuring and drawing out a site plan from the measurements

**Unit 2 - Site Drawings** ..... **9**

Computation of area by geometrical figures and other methods. Drawing marking out plan, layout plan and centerline plan – Importance, procedure for making these drawings and dimensioning. Setting out the building plan on site – Procedure and Precautions. Exercises on the above.

**Unit 3 - Site Analysis** ..... **12**

Actors – topography, hydrology, soils, vegetation, climate, surface drainage, accessibility, size and shape, infrastructures available - sources of water supply and means of disposal system, visual aspects; Preparation of site analysis diagram. Study of microclimate: - vegetation, landforms and water as modifiers of microclimate. Study of land form; - contours, slope analysis, grading process, grading criteria, functional and aesthetic considerations – Case studies and exercises on the above.

**Unit 4 - Site Context** ..... **9**

Context of the site. Introduction to existing master plans land use for cities, development control Rules. Preparation of maps of matrix analysis & composite analysis. Site selection criteria for housing development, commercial and institutional projects - Case studies.

**Unit 5 - Site Planning And Site Layout Principles** ..... **6**

Organization of vehicular and pedestrian circulation, types of roads, hierarchy of roads, networks, road widths and parking, regulations. Turning radii & street intersections

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**References:**

1. Kevin Lynch, "Site planning", MIT Press, Cambridge, MA, 1984.
  2. Edward. T. Q., "Site Analysis", Architectural Media, 1983.
  3. B.C.Punmia, Ashok K. Jain, Ashok Kr. Jain, Arun Kr. Jain, "Surveying", Vol.I, Firewall Media, 2005.
  4. P.B.Shahani, "Text of surveying", Vol. I, Oxford and IBH Publishing Co, 1980
  5. Joseph De.Chiarra and Lee Copleman, " Urban Planning Design Criteria", Van Nostrand Reinhold Co., 1982
  6. Storm Steven, "Site engineering for landscape Architects", John wiley& Sons Inc, 2004.
  7. Second Master Plan – Development Regulations – CMDA, 2008 AR6513 BUILDING CONSTRUCTION
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**BAR21L12****ARCHITECTURAL DESIGN III**

Number of credits	12	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	9	End Semester Exam	50
Total period per week	12	Total Marks	100
Total periods	180		

**Subject Objectives:** To enable the students to understand the importance of spatial planning within the constraints of Development Regulations in force for urban areas. To enable the students to design for large groups of people in a socially and culturally sensitive manner, taking into account aspects such as user perception, crowd behaviour, large scale movement of people and identity of buildings. To emphasize on the importance of understanding the relationship between open space and built form, built form to built form and site planning principles involving landscaping circulation network and parking. To explore computer aided presentation techniques involving 2D and 3D drawings and models as required.

**Expected Course Outcomes:**

CO1	The students should be able to understand the importance of designing the built environment to suit the human behaviour.
CO2	The students should comprehend the characteristics of site and the importance of site planning which includes built form and open space.
CO3	The students should be able to understand the relationship between form and spaces and the importance of aesthetics.
CO4	The students should be able to ascertain the response of user group and present concepts through 2D drawings, sketches and model.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	H	H
	CO2	H	M	H	M	H	H
	CO3	H	M	H	M	H	H
	CO4	H	H	H	M	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		✓
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

Small complexes - multi planning circulation analysis - massing problems involving building technology - Design and detailing for movement of physically handicapped and elderly persons within and around buildings, examples, shopping centre (Commercial) apartments (Residential) Hospital Nursing home(40 bedded) (Institutional) home for aged. Introduction to three dimensional modeling of spaces using computer, Construction and manipulation of three dimensional building data bases, Rendering 3D images, Presentation techniques. and projects of similar size.

**Students shall be encouraged to participate in design competitions appropriate to their level as one of the class projects.**

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**References:**

1. Edward D. Mills, "Planning, 4 volumes", Newnes, Butterworths, London, 1976.
  2. E and O.E. "Planning". Liffie Books Ltd., London, 1973.
  3. "National Building Code" 1ST
  4. De Chiara Callender, "Time Saver Standard for Building Types", McGraw Hills Co., 1973.
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**SEMESTER VI**

<b>S. No.</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Category</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Studio</b>	<b>Credits</b>
		<b>THEORY</b>					
1	BAR21010	Human settlement and planning	PC	3	0	0	3
2	BAR21011	Housing	PC	3	0	0	3
3	BCE21A04	Design of Structures II	BS&AE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L16	Material and Construction VI	BS&AE	1	1	3	3
5	BAR21L17	Environmental Lab	BS&AE	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L18	Architectural Design – V	PC	0	0	14	14
		<b>Total Hrs</b>	<b>33</b>		<b>Total Credits</b>		<b>29</b>

**BAR21010****HUMAN SETTLEMENT AND PLANNING**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To familiarize with the evolution, pattern of human settlements & the process for the improvement of human living environment and also its relevance in architecture. To enable the students to comprehend the evolution of settlements, its elements & classifications. To understand the various levels of planning, planning principles & the process over a period of time. To outline the scope and content of Urban planning, Urban renewal and regional planning and the various plans to be prepared. To enable students to understand how planning activities are regulated in the state at various levels.

**Expected Course Outcomes:**

CO1	Understanding of evolution, pattern of human settlements & the process for the improvement of human living environment and also its relevance in architecture.
CO2	Knowledge on various levels of planning, planning principles & the process over a period of time.
CO3	Knowledge on scope and content of Urban planning.
CO4	Understanding of Urban renewal and regional planning and the various plans to be prepared and planning activities are regulated in the state at various levels.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	H	H
	CO2	H	M	H	M	M	M
	CO3	H	H	H	H	M	M
	CO4	H	M	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
				✓			
4	Approval					Meeting of Academic Council, May 2021	



## Course Content:

### **Unit 1 – Introduction to the Concept of Human Settlements 9**

Elements of human settlements context and contain - Meaning and Examples - Nature, Man, Society, shells and Network: Their sub elements, characteristics, functionalities / potentials, major aspects in spatial planning. Classification of human settlements: Classification based on population, functions, locations, Municipal status.

### **Unit 2 – Forms of Human Settlements 9**

Growth and decay of human settlements: Factors influencing the growth and decay, History of settlement studies (Ancient Classical, medieval, Renaissance industrial) Structure and Form of Human settlements - Linear, Non-linear & circular, examples and their functional characteristics of Indian and European towns and cities. Reasons for development, Advantages and disadvantages. Case studies. Factors influencing the growth and decay of human settlements.

### **Unit 3 – Rural and Regional Development In India 9**

Rural development plans, programmes and policies from case studies. Regional Plan. Area delineation, land utilisation plan, hierarchical system of settlements, their sizes and functions.

### **Unit 4 – Urban Planning and Urban Renewal 9**

Introduction to urban planning in India. Scope, content and limitations of master plan. Structure plan, DDP/ZDP, planned unit development. Development control rules. Urban renewal, redevelopment, rehabilitation and conservation. Urban development projects – case studies.

### **Unit 5 – Aspects in Contemporary Urban Planning In India 9**

Globalisation and its impact on cities. Sustainable planning concepts. New forms of developments, to include self-sustained communities, SEZ, transit-oriented development (TOD), integrated townships, smart cities. Case studies

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## References:

1. C.L. Doxiadis, Ekistics, 'An Introduction to the Science of Human Settlements', Hutchinson.
  2. Ministry of Urban affairs and Employment, Government of India, New Delhi.
  3. Thooyavan K R, 'Human Settlements- A Planning guide to Beginners', M.A. Publications, 2005. London, 1968.
  4. Andrew D Thomas, 'Housing and Urban Renewal', Harper Collins, 1986.
  5. 'UrbanDevelopment Plans: Formulation and Implementation-Guidelines', 1996.
  6. S. B. Golahit, 'Rural Development Programmes In India', Neha Publishers and Distributors,
  7. 'CMDA Second Master Plan for Chennai Metropolitan Area 2026: Vision, Strategies and Action2010.
  8. Hansen N., 'Regional Policy and Regional Integration', Edward Elgar, UK, 1996
  9. Government of India, 'Report of the National Commission on Urbanisation', 1988.
  10. V. Nath, 'Regional Development And Planning In India', Concept Publishing Company, 2011.
  11. Plans (Vol.I, II and III)', Chennai, India, 2008.
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**BAR21011****HOUSING**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To introduce housing in the Indian context and the various agencies involved in the production. To inform about the various housing design typologies and the processes involved in housing. To outline factors, aspects and standards related to housing. To inform about current issues and aspects in housing and project development.

**Expected Course Outcomes:**

CO1	Knowledge on housing in Indian context and the production process involved.
CO2	Better understanding of housing typologies and the processes involved in housing.
CO3	Understanding of factors, aspects and standards related to housing
CO4	Current issues and aspects in housing and project development

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	H	M	H
	CO2	H	H	H	H	M	M
	CO3	H	H	H	H	M	H
	CO4	H	H	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Introduction to Housing and Housing Issues in India** ..... 9

Housing and its importance in architecture, its relationship with neighborhood and city planning. Housing demand and supply. National Housing Policy. Housing agencies and their role in housing development. Impact of life style. Rural Housing. Public and private sector housing.

### **Unit 2 – Socio-Economic Aspects** ..... 9

Economics of housing. Social economic factors influencing housing affordability. Formal and informal sector. Equity in housing development. Sites and services. Slum housing, up gradation and redevelopment. Low Cost Housing. Health principles in housing. Legislation for housing development. Cost-effective materials and technologies for housing. Case studies in India and developing countries.

### **Unit 3 – Housing Standards** ..... 8

UDPI guide lines, standard and regulations. DCR. Performance standards for housing.

### **Unit 4 – Site Planning and Housing Design** ..... 11

Site Planning for housing. Selection of site for housing, consideration of physical characteristics of site, location factors, orientation, climate, topography, landscaping. Integration of services and parking. Housing design relating to Indian situations – traditional housing, row housing, cluster housing, apartments, high-rise housing. Case studies in India of the various types.

### **Unit 5 – Current Aspects and Issues in Housing** ..... 8

Green building and sustainable practices. Disaster resistance and mitigation. Prefabrication  
Community participation.

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## References:

1. S.K.Sharma, 'Mane A New Initiative in Public Housing', Housing and Urban Development Corporation, 1991.
  2. Leuris S, 'Front to Back: A Design Agenda for Urban Housing', Architectural Press, 2006.
  3. Christopher Alexander, 'A Pattern Language', Oxford University Press, New York 1977.
  4. Richard Kintermann and Robert Small, 'Site Planning for Cluster Housing', Van Nostrand
  5. Joseph de Chiara et al, 'Time Saver Standards for Housing and Residential Development', Reinhold Company, London/New York, 1982.
  6. Forbes Davidson and Geoff Payne, 'Urban Projects Manual', Liverpool University Press,
  7. McGraw Hill Co, New York, 2011. Liverpool 1983.
  8. A.K.Lal, 'Handbook of Low Cost Housing', New Age International Private Limited, 2011
  9. Sustainable Building Design Manual: Vol 1 and 2', The Energy Research Institute, 2015.
  10. HUDCO Publications, 'Housing for Low Income, Sector Model'.
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**BCE21A05****DESIGN OF STRUCTURES III**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To use limit state design for the analysis and design of columns. To enable the learning of design of structural elements like footings, flat slabs and masonry walls. To give understanding of the principle, methods, advantages and disadvantages of pre stressed concrete.

**Expected Course Outcomes:**

CO1	Understand the different concepts in designing footings using Limit state design methods.
CO2	Reinforced concrete columns to be designed by applying the Limit state design methods.
CO3	Able to design the Masonry walls using Limit state design methods.
CO4	Concepts of Prestressed concrete and applying them in real case.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	M	H	H	H	H	-
	CO2	M	H	H	H	H	-
	CO3	M	H	H	H	H	-
	CO4	M	H	H	H	H	-
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 – Limit State Design of Columns** ..... **10**

Types of columns. Analysis and design of short columns for axial, uniaxial and biaxial bending. Use of design aids.

**Unit 2 – Design of Footings** ..... **10**

Types of footings. Design of wall footings. Design of axially loaded square & rectangular footings (pad and sloped).

**Unit 3 – Flat Slabs** ..... **10**

Design principles of flat slabs. Code provision. Simple design problems.

**Unit 4 – Design of Masonry Walls** ..... **8**

Analysis and design of masonry walls. Use of nomograms. Code requirements.

**Unit 5 – Introduction to Prestressed Concrete** ..... **7**

Principle of prestressing. Methods of prestressing, advantages and disadvantages.

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**References:**

1. B.C. Punmia, Reinforced Concrete Structures, Vol. 1 & 2, - Laxmi Publications, Delhi, 2004.
  2. 'IS 456, Indian Standard, Plain and Reinforced Concrete, Code of Practice', Bureau of Indian Standards, 2000.
  3. 'SP – 16, Design Aids for Reinforced Concrete to IS 456 National Building Code of India', 1983
  4. 'National Building Code of India', 2016
  5. 'IS 1905, Code of Practice for Structural Safety of Buildings', 1987.
  6. N.Krishna Raju "Design of Reinforced Concrete Structures (15:456-2000).
  7. P.Dayaratnam , Design of Reinforced Concrete Structures, Oxford and IBH Publishing CO., 1983.
  8. N.C.Sinha and S.K.Roy, Fundamentals of Reinforced Concrete, S.Chand and Co., New Delhi, 1983.
  9. Ashok K.Jain Reinforced Concrete (Limit State Design) - Nemchand, Bros Roorkee 1983.
  10. Krishna Raj, Prestressed Concrete Structures, 3rd Edition, Tata McGraw Hill, 2005
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**BAR21L13****MATERIALS AND CONSTRUCTION VI**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To learn about, new construction systems using advanced composite materials, highlighting their performance attributes of superior strength with less weight, enhanced durability, ease of manufacture and rapid construction, energy efficiency and environmental compatibilities.

**Expected Course Outcomes:**

CO1	To learn about structural design of arches using different materials
CO2	To learn design and application of timber and steel trusses, PEB structures
CO3	To study about surface members such as shells & folded plates
CO4	To acquire knowledge on advanced systems such as cable structure, kinetic facades, parametric design etc.,

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	M	M
	CO2	H	H	H	H	M	H
	CO3	H	H	H	H	H	M
	CO4	H	H	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1** ..... **Arches** ..... **10**

Arches constructed of different materials like, stone, brick, steel etc , understanding the structural system and its application in modern times. *Detail for an archway or arched façade using brick, stone & steel*

### **Unit 2** ..... **Trusses** ..... **10**

Application of trusses in construction of large spans, timber and steel trusses and their limitations and applicability, PEB structures and construction details. *Drawing detailing a small PEB structure*

### **Unit 3** ..... **Surface members** ..... **10**

Introduction to surface Structural systems such as shells, folded plates and tensile structures. Understanding through designing porches, memorials etc.

### **Unit 4** ..... **Cable structures** ..... **15**

Components, design and application

### **Unit 5** ..... **Parametric Designs** ..... **15**

Parametric design solutions – process of designing and construction, kinetic facades – climate responsive facades. Case studies and live studies to understand the concepts and execution. *Detailed wall sections*

### **Site Study and Report** ..... **15**

The student has to visit a site and study the components mentioned in the above discussed topics and give a brief report with sketches and photographs at the end of semester. Students shall be encouraged to submit detailed drawing using AutoCAD.

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## References

1. Dr. B.C. Punmia (1993) “A text book of Building construction”, 2<sup>nd</sup> Ed, Laxmi Publications
  2. McKay. W.B (2005), Building construction Vol. I-IV, Orient Longman
  3. Ching F.D.K (2005), “Building construction illustrated 4th Edition”, Wiley
  4. Banz H, Building Construction Details Practical Drawings, CBS
  5. Ramaswamy G.S., Design and Construction of Concrete Shell Roofs, CBS
  6. Vazirani, Steel structures, Khanna
  7. Myers, 3 steel houses, Images
  8. Emmitt S, Barrys Advanced Construction of Buildings, John Willey
  9. [http://www.szt.bme.hu/phocadownload/english%20courses/6\\_special\\_loadbearing\\_structures/lectures/07-lecture%20-%20cable%20structures.pdf](http://www.szt.bme.hu/phocadownload/english%20courses/6_special_loadbearing_structures/lectures/07-lecture%20-%20cable%20structures.pdf)
  10. <https://www.yumpu.com/en/document/read/64030786/pdf-mobi-epub-parametric-design-for-architecture-txtpdfpub>
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**BAR21L13****ENVIRONMENTAL LAB**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** The course aims to teach students a wide variety of building energy simulation to develop, enhance and use throughout the building energy researches, through the use of energy analysis software. The students will learn to analyse the whole building that will give the results of energy consumption such as water usage and costs, natural ventilation potential, carbon emissions based on an actual model, local energy sources and weather data..

**Expected Course Outcomes:**

CO1	The students should be able to develop, enhance and use energy models through simulation
CO2	The students should be able to analyse the whole building that will give the results of energy consumption
CO3	The students should be able to do energy analysis research of any given model with required data
CO4	The students should be able to do calculate energy cost, ventilation potential, carbon footprint, etc.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	H	-
	CO2	H	H	H	H	M	-
	CO3	H	H	H	H	M	-
	CO4	H	H	H	H	M	-
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
				✓			
4	Approval					Meeting of Academic Council, May 2021	



## Course Content:

### **Unit 1 – Load Calculations and Controls:.....20**

**Heat And Cooling Load Calculations:** Hourly load calculation; Automatic design day calculation; Solar gain and daylighting calculation with effect of neighbouring buildings; Weather data available with program.

**HVAC Loads and Performance Analysis:** User-configured HVAC system; Natural ventilation

**Controls:** Thermal comfort estimation; Dimming electric lighting controls

### **Unit 2 – Analysis, Evaluation and Capabilities:.....20**

**Retrofit Analysis; Economic Evaluation:** Life cycle cost analysis; Payback analysis; Renewable energy calculation; **Calculation Capability:** Room heat balance calculation; Heat comfort calculation; Sunlight analysis

### **Unit 3 – Annual Energy Cost.....20**

Lifecycle energy costs (30 year); Annual energy consumption (electric and gas); Peak electric demand (kW); Lifecycle energy consumption (electric and gas); CO2 emissions are based on the on-site fuel use and the fuel sources for the electricity in the region; An equivalency using an SUV (driven 15,000 miles/year) is given to put the building's CO2 emissions into perspective.

### **Unit 4 – Exercises and Submissions:.....15**

Detailed Model Simulation; Whole Building Analysis; Predictive Analytical Reporting; Energy Star and LEED Support; Estimated Energy and Cost Summary; Photovoltaic Potential; LEED Glazing Score; Wind Energy Potential

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## References

1. Autodesk Revit 2021 for Architecture
  2. Mastering Autodesk Revit Architecture 2021
  3. Autodesk@BuildingPerformance Analysis Help manual.  
[http://help.autodesk.com/view/BUILDING\\_PERFORMANCE\\_ANALYSIS/ENU/](http://help.autodesk.com/view/BUILDING_PERFORMANCE_ANALYSIS/ENU/)
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**BAR21L12****ARCHITECTURAL DESIGN V**

Number of credits	12	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	9	End Semester Exam	50
Total period per week	12	Total Marks	100
Total periods	180		

**Subject Objectives:** To create an awareness with regard to the design of green buildings and sustainable architecture. To inculcate the importance of services integration and construction in spatial planning in the context of design of High-rise buildings and service intensive buildings. To highlight on the importance of High-rise buildings as elements of identity in urban areas and urban design principles that govern their design. To enable Students to understand the importance of designing the built environment to suit the human behavior. To explore computer aided presentation techniques involving 2D and 3D drawings, walk through and models as required.

**Expected Course Outcomes:**

CO1	The students should be able to understand the importance of designing the built environment to suit the human behaviour.
CO2	The students should comprehend the characteristics of site and the importance of site planning which includes built form and open space.
CO3	The students should be able to understand the relationship between form and spaces and the importance of aesthetics.
CO4	The students should be able to ascertain the response of user group and present concepts through 2D drawings, sketches and model.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	H	H
	CO2	H	M	H	M	H	H
	CO3	H	M	H	M	H	H
	CO4	H	H	H	M	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		✓
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

Design of large structures - Multiuse multi span - non masonry building types involving buildings – Design and detailing for movement and use by physically handicapped people within and around-building technology and services.

Examples: College (Institutional), office buildings, Resorts, museums- etc. Working drawings for any one design using computers and projects of similar size.

**Students shall be encouraged to participate in design competitions appropriate to their level as one of the class projects.**

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**References:**

1. Edward D mills, planning, 4 volumes, Newnes Butterworths, London 1976
  2. E and OE planning 11ffe Books Ltd., London, 1973
  3. National Building Code 151
  4. De Chara and Callendar, Tune, saver standards for building types. McGraw Hall Col. 1983.
  5. <http://wwwtest.library.ucla.edu/libraries/arts/websites/wwwdes.htm>
  6. <http://www.clr.toronto.edu/VIRTUALLIB/ARCH/proj.html>
  7. <http://www.thehub.net.au/%7Emorrisqc/architext>
  8. <http://www.archinet.co.uk/>
  9. <http://www.plannet.com/>
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**SEMESTER VII**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21012	Interior Design	PE	3	0	0	3
2	BAR21E	Departmental Elective		3	0	0	3
3		Other Elective*		3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L19	Working Drawing	BS&AE	1	1	3	3
5	BAR21L20	Cost estimation and Scheduling	BS&AE	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L21	Architectural Design – VI	PC	0	0	14	14
		<b>Total Hrs</b>	<b>33</b>			<b>Total Credits</b>	<b>29</b>

\* Students shall choose any course offered by online portals such as Swayam /NPTEL or any other department within our University.

**Elective list**

Sem	Subject Code	Elective list	Category	Lecture	Tutorial	Studio	Credits
	BAR21E01	Acoustics	BS& AE	3	0	0	3
	BAR21E02	Concepts of Traditional Architecture	PE	3	0	0	3
	BAR21E03	Earth Quake Resistant Architecture	PE	3	0	0	3
	BAR21E04	Maintenance, Repair and Rehabilitation of structures	BS& AE	3	0	0	3

**BAR21012****INTERIOR DESIGN**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To study the Interior Design principles and their applications in interiors, and to foster creative ability and inculcate skills to understand and conceive architectural design. To familiarize the students with an overview of interior and furniture design and design movements through history, the various components of interior space and treatment and finishes for the same and lighting, landscaping and furniture.

**Expected Course Outcomes:**

CO1	Students will be able Demonstrate competency in the use of design fundamentals as principal tools in establishing design criteria and developing the overall design process in interior architecture
CO2	Students will successfully use critical thinking in applying colour and design theory to a space. Students will successfully apply the knowledge of colour to a space accurately based on key concepts in the elements of interior design
CO3	Students will be able Identify the contributions from antiquity to present that have created historical influences on the decorative arts, furniture and interior architecture Students will successfully use critical thinking to complete a written analysis on various historic design styles
CO4	Students Using critical thinking strategies generate an appropriate furniture, fixture and materials selection considering applicable codes and sustainability (social responsibility)

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	M	H	H	M
	CO2	M	H	M	H	M	M
	CO3	H	M	H	H	M	H
	CO4	H	M	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Introduction to Interior Design**..... 5

Definition of interior design, Interior design process, vocabulary of design in terms of principles and elements, Introduction to the design of interior spaces as related to typologies and functions, themes and concepts - *Study and design relating to the interior space in the current architectural design project.*

### **Unit 2 – History of Interior Design**..... 10

Brief study of the history of interior design through the ages relating to historical context, design movements and ideas etc. Brief study of folk arts and crafts. Vernacular design in India with reference to interior design and decoration. *Conceptual design using any of the historical or vernacular design relating to the interior space in the current architectural design project.*

### **Unit 3 - Elements of Interior Design - Enclosing Elements**..... 10

Introduction to various elements of interiors like floors, ceilings, walls, staircases, openings, interior service elements, incidental elements etc., and various methods of their treatment involving use of materials and methods of construction in order to obtain certain specific functional, aesthetic and psychological effects. *Defining the functional, aesthetical and psychological effects of the above conceptual design.*

### **Unit 4 – Elements of Interior Design – Lighting, Accessories & Interior Landscaping**..... 10

Study of interior lighting, different types of lighting their effects types of lighting fixtures. Other elements of interiors like accessories used for enhancement of interiors, paintings, objects-de-art, etc. Interior landscaping, elements like rocks, plants, water, flowers, fountains, paving, artifacts, etc. their physical properties, effects on spaces and design values. *Conceptual design of lighting, accessories and interior landscaping in the interior space of the current architectural design project.*

### **Unit 5 – Elements of Interior Design - Space Programming**..... 10

Study of the relationship between furniture and spaces, human movements & furniture design as related to human comfort. Function, materials and methods of construction, changing trends and lifestyles, innovations and design ideas. Study on furniture for specific types of interiors like office furniture, children's furniture, residential furniture, display systems, etc. *Design Projects on Residential, Commercial and Office Interiors.*

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## References:

1. Ching, F. D. K. (1987). Interior Design Illustrated. New York: V.N.R. Publications.
  2. Doshi, S. (Ed.) (1982). The Impulse to adorn - Studies in traditional Indian Architecture. Marg Publications.
  3. Kathryn, B. H. and Marcus, G. H. (1993). Landmarks of twentieth Century Design. Abbey Ville Press.
  4. Pendero, J. and Zelnik, M. (1979). Human Dimension and Interior space: A Source Book of Design Reference Standards. New York: Whitney Library of Design.
  5. Slesin, S. and Ceiff, S. (1990). Indian Style. New York: Clarkson N. Potter.
  6. Dorothy, S-D., Kness, D. M., Logan, K. C. and Laura, S. (1983). Introduction to Interior Design. Michigan: Macmillan Publishing
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**BAR21L19****WORKING DRAWINGS**

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** Students should be exposed to the art and science of making construction drawings before the start of practical training. Previous/current semester design can be selected for these purposes and the following list of good for construction shall be prepared by the student.

**Expected Course Outcomes:**

CO1	To learn and make good for construction drawings
CO2	To understand how selection of materials and fixtures determine the construction and accordingly provide instruction through drawings with high accuracy and clarity
CO3	Learn to convert a conceptual design into a buildable one
CO4	Learn to understand and identify the needs and prepare drawings accordingly

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	M	M
	CO2	H	H	H	H	H	H
	CO3	H	H	H	H	M	M
	CO4	H	H	H	M	M	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	



**Course Content:**

1.Site plans & Marking drawings	10
2. Floor plans	10
3. Sections and Elevations	10
4. Plumbing and Electrical drawings	10
5. Floor & Wall Finishes	10
6. Storage units and False ceilings	10

**Site Study and Report**.....**5**

The student has to visit a site and study the components mentioned in the above discussed topics and give a brief report with sketches and photographs at the end of semester. Students shall be encouraged to submit detailed drawing using AutoCAD.

**References**

1. McKay. W.B (2005), Building construction series , Orient Longman
2. Ching F.D.K (2005),“Building construction illustrated 4th Edition” , Wiley
3. Construction encyclopedia 3 : sanitation and electrical installations - air conditioning and heating

Number of credits	3	Subject Category	BS+AE
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** Building Estimation and Costing is a vital part of Architecture. This course has been designed so that the student is able to prepare estimate and cost of a project. The student will be given understanding of how the entire cost of construction and the infrastructure used for the purpose of construction is estimated and the final costing is done on the basis of which a certain percentage of the project cost is paid to the Engineer, the Architect and other consultants involved in the project. The student should be able to understand how Valuation is done after the project is complete on the latest trends of the land prices in the market.

#### Expected Course Outcomes:

CO1	To enable the students to prepare time and cost estimate for a project
CO2	To understand the components of a project cost and learn to identify their percentage-based ion typology of building
CO3	To know the various estimation methods and their relevance and application
CO4	Learn how Valuation is done after the project is complete on the latest trends of the land prices in the market

#### Mapping of Course Outcomes (COs) with Program Outcomes (POs):

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	M	M
	CO2	M	H	H	H	M	M
	CO3	M	H	H	H	M	M
	CO4	H	H	H	H	M	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
			✓				
4	Approval					Meeting of Academic Council, May 2021	



## Course Content:

### **Unit 1 – Estimation and Modes of Measurement**.....9

Types of estimate and Data required, Overhead charges, contingencies, water charges, provisional sum, prime cost, provisional quantities, spot items, day work. General rules for the measurements and its units of different items of civil engineering work. Describe various terms used in estimation work

### **Unit 2 – Specifications of Civil Works**.....9

Importance specification, Types of specification, Principle of writing specification, Estimate the various types of civil engineering works, Specification of Earthwork in Excavation, cement concrete, Brick masonry, R.C.C. Work, Plastering Work, Painting, Flooring

### **Unit 3 – Rate Analysis of Civil Works**.....9

Task Work and Factors affecting it, Labour required for different works and Labour rates , Market rates of construction materials , Schedule of Rates (SOR), Rate analysis and factors affecting it rate analysis, Rate analysis for earthwork in excavation, C.C. Work, Brick masonry Work, R.C.C. Work, Plastering, flooring work.

### **Unit 4 – Estimation of Civil Works**.....9

Methods of detailed estimation, One/ two room building, two storied buildings (RCC footings, Column, beams, slab), RCC retaining wall/ Culverts, Methods of calculating earthwork quantities for roads and canals

### **Unit 5 – Valuation of Civil Engineering projects**.....9

Cost, Price and Value, Types of property and Objects of valuation Depreciation and Obsolescence, Different forms of Value, Valuation tables and Valuation methods for property and land, Types of rents and fixing standard rents

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## References:

1. Dutta, Estimating and Costing, S.Dutta and Co., Lucknow
  2. S.C.Rangwala, Elements of Estimating and Costing, Charoter Publishing House, India.
  3. W.H.King and D.M.R.Esson, Specification and Quantities for Civil Engineers, The English University Press Ltd.
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**BAR21L21****ARCHITECTURAL DESIGN VI**

Number of credits	12	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	9	End Semester Exam	50
Total period per week	12	Total Marks	100
Total periods	180		

**Subject Objectives:** To introduce the design of multifunctional multistoried buildings/complex layouts. To enable Students to understand the importance of designing the built environment to suit the human behavior. Projects shall have enough emphasis on technology and the application of various building services and circulation systems. To understand the structure of dwelling community and neighborhood. To understand the design requirements with respect to services [HVAC, STP, WTP], fire and safety aspects etc. To study vertical transportation requirements and design considerations for high rise buildings.

**Expected Course Outcomes:**

CO1	To introduce the design of multifunctional multi-storeyed buildings/complex layouts.
CO2	To enable Students to understand the importance of designing the built environment to suit the human behaviour.
CO3	To understand the design requirements with respect to services [HVAC, STP, WTP], fire and safety aspects etc.
CO4	To emphasize on technology and the application of various building services and circulation systems

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	H	M
	CO2	H	H	H	M	M	H
	CO3	H	H	H	H	H	H
	CO4	H	H	H	H	H	M
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
				✓			
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

The students shall have acquired knowledge of designing multifunctional, multi-storeyed buildings based on project brief, site and cultural context of the design problem. They shall be able to analyse the function, building services and circulation systems in public buildings and develop suitable designs. It helps the students to conceive larger projects with emphasis on market standards and requirements. This should also introduce the students to fire and safety aspects, earthquake resistant design methods. In all the design assignments due cognizance must be given to accessibility to differently abled users.

**Gated community/Integrated Township/Group housing/Traditional settlement/ Hill area housing/ Transport Interchanges/ Transport Terminals/ Sports Stadium. and projects of similar size.**

**Students shall be encouraged to participate in design competitions appropriate to their level as one of the class projects.**

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**References:**

1. Time saver standards for building types, DeChiara and Callender, Mc Graw hill company
  2. Neufert Architect's data, Bousmaha Baiche & Nicholas Walliman, Blackwell science ltd
  3. National Building Code – ISI
  4. New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press
  5. Mills E. D., Planning: Architect's Handbook, 10/e, Butterworths, 1985.
  6. Ramsey C. G., H. R. Sleeper, Architectural Graphic Standards, 11/e, Wiley, 2008
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**ELECTIVES:****BAR21E01****ARCHITECTURAL ACOUSTICS**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** This course will give basic understanding about the science behind building acoustics. It will help students for applying prediction methods to assess the functional requirements of buildings. To provide students with knowledge on acoustical solutions through simulations and design models. Further this course will expose students to perform basic room acoustics.

**Expected Course Outcomes:**

CO1	Knowledge on the science behind building acoustics
CO2	Application of prediction methods to assess the functional requirements of buildings
CO3	Knowledge on acoustical solutions through simulations and design models
CO4	Exposure to different materials and methods to achieve room acoustics

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	M	H	H	M
	CO2	M	H	M	H	M	M
	CO3	H	M	H	H	M	H
	CO4	H	M	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## **Course Content:**

### **Unit 1 – Fundamentals of architectural acoustics**..... 9

Acoustical / Sonic Environment and acoustical comfort. Sound, Nature of sound. Behavior of sound in enclosed spaces. Concept of Geometric Acoustics. Reflection of sound and their applications. Absorption of sound. Sound absorption coefficient. Reverberation & Reverberation Time Calculation.

### **Unit 2 – Acoustical materials**..... 12

Material property: Absorption, reflection, scattering, diffusion, transmission, absorption coefficient, NRC, sound transmission class (STC), impact insulation class (IIC). Sound absorbing materials -Porous materials, Panel/ Membrane absorbers & Cavity/ Helmholtz Resonators. Absorption coefficients of indigenous acoustical materials. Space/ Functional absorbers. Mounting conditions and its impact on sound absorption

### **Unit 3 – Acoustics of Architectural Spaces**..... 9

Acoustical defects of architectural space & Measures to Solve; Variable Acoustics; Acoustical Design criteria of spaces for speech, music and open-air auditorium; Methods adopted in designing acoustics for architectural spaces.

### **Unit 4 – Noise Control and Sound Reinforcement**..... 12

Types of Noise and its sources in buildings: Rating system of Noise; Noise Rating System of Building components; Noise control methods in buildings for different noise types. Mechanical Systems Noise & control; HVAC lining materials- difference between thermal and acoustical insulation. Vibration Isolation and Control; Active sound and Noise cancelation; Environmental Acoustics; Traffic noise; Planning to mitigate environmental / outdoor noise; Sound barriers; Principles of sound barrier attenuation, shadow zone, distance from receiver etc.

### **Unit 5 – Acoustical Rating System**..... 3

Acoustic compliance, NIHL, OSHA and NIOSH guidelines for acceptable ambient noise exposure levels in different places.

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## **References:**

1. Architectural Acoustics Illustrated; Michael Ermann; John Wiley & Sons, 2015
  2. Master Handbook of Acoustics, Sixth Edition,
  3. Architectural Acoustics, M.David Egan, J.Ross Publication, 2007.
  4. Noise Control in Buildings: Fundamental and Application, Mahavir Singh, Narosa Publishing House, 2014
  5. Noise Control Management, Howard K. Pelton, Van Nostrand Reinhold, 1994
  6. Vigran, T. E. (2008). Building Acoustics. 1st Ed. Taylor & Francis.
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**BAR21E02****CONCEPT OF TRADITIONAL ARCHITECTURE**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** The objective is to instil sensitivity towards the less explored field that is concerned with Architectural building traditions/practices that are culturally relevant. Students acquire a working vocabulary that can help them describe traditional architecture in meaningful ways. The course covers comparison of different traditional practices across geographical regions; and cases studies of adaptations of traditional architecture in contemporary buildings.

**Expected Course Outcomes:**

CO1	Knowledge on architectural building traditions/practices that are culturally relevant
CO2	Vocabulary of traditional architecture in a meaningful way
CO3	Knowledge on different traditional practices across geographical regions
CO4	Application of Traditional practices in contemporary architecture

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	-	M	-	-	H
	CO2	H	-	M	-	M	M
	CO3	H	-	H	M	H	H
	CO4	M	M	H	M	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Introduction**.....6

Traditional definition - Feng shui in Architecture - achievements in India - Meaning of Vaastu and Vaastu - its classification - Relationship to earth.

### **Unit 2 – Space Theory in Vaastu**.....6

Features of good building site - good building shapes - macro, micro, enclosed and material spaces - relationship between built space, living organism and universe - impact of built space on human psyche.

Flow of energy within built space and outside - zoning of functional areas - fitting of components in the building - significance of water bodies and energy - The cube as the basic structure.

### **Unit 3 – Cosmogram & Settlement Concepts**.....12

Orientation of building, site, layout and settlement - positive and negative energies -importance of cardinal and ordinal directions - The celestial grid or-mandala and its type.

The Vaastu Purusha Mandala and its significance in creation of patterns, and lay-outs, extension of this to aural and visual fields - Types of Jay-Outs.

### **Unit 4 – Principle of Architecture in Feng Shui**.....6

introduction to feng shui- chi (energy)- yin and yang - eight yin-yang energies - bagua map - five elements- element colours and shapes - bagua sectors

### **Unit 5 – Adaptations in Contemporary Architecture**.....15

Exercises involving use of various elements in design of exterior and interior spaces, courtyards etc. of different functional buildings adopting Vaastu and feng shui principles.

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## References:

1. Dr.Prasanna Kumar Acharya - Manasara - Ox ford University Press - 1927 -(English version) -
  2. K.S.SubramanyaSastri - Maya Matam - Thanjavur Maharaja Sarjojisaraswathil Mahal Library -Thanjavur-1966.
  3. Stella Kramresh - The Hindu Temple Vol.1 & II MotilalBanarsidass Publishers Pvt. Ltd., Delhi -1994.
  4. Bruno Dagens - Mayamatam, Vol.1 & IIIGNCA and Motilal Bamarsidars, .Publishers Pvt. Ltd-s Delhi -1994.
  5. George Birdsall - Feng Shui: The Key Concepts - January 2011
  6. Stapatya Veda, Ganapathi Sthapati.
  7. Introduction to Vastu-Sasikala Anand
  8. Essay on Hindu Architecture-Ramraz.
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**BAR21E03****EARTHQUAKE RESISTANT ARCHITECTURE**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To understand the fundamentals of earthquake and the basic terminology. To inform the performance of ground and buildings. To familiarize the students with design codes and building configuration. To understand the various types of construction details to be adopted in a seismic prone area. To apply the knowledge gained in an architectural design assignment.

**Expected Course Outcomes:**

CO1	Ability to collaborate the seismic design in Architectural design
CO2	Acquire fundamental knowledge of seismic structural design
CO3	Application of seismic design concepts in software
CO4	Applying innovating concepts and ideas in seismic structural design

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	M	
	CO2		H	H		M	M
	CO3		M	M	H	H	
	CO4	H	H	M	M	H	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	



## Course Content:

### **Unit 1 – Fundamentals of Earthquake**..... 7

Fundamentals of earthquakes, Earth's structure, seismic waves, plate tectonics theory, origin of continents, seismic zones in India. Predictability, intensity and measurement of earthquake, Basic terms-fault line, focus, epicenter, focal depth etc.

### **Unit 2 – Site Selection and Building Behavior**..... 8

Site planning, performance of ground and buildings - Historical experience, site selection and development - Earthquake effects on ground, soil rupture, liquefaction, landslides. Behavior of various types of buildings structures, equipment, lifelines, collapse patterns. Behavior of non-structural elements like services, fixtures in earthquake-prone zones

### **Unit 3 - Seismic design codes**..... 10

Seismic design codes and building configuration - Seismic design code provisions – Introduction to Indian codes; Building configuration- scale of building, size and horizontal and vertical plane, building proportions, symmetry of building- torsion, re-entrant corners, irregularities in buildings-like short stories, short columns etc.

### **Unit 4 – Design of Seismic Structures**..... 10

Various type of construction details; Seismic design and detailing of non-engineered construction-masonry structures, wood structure, earthen structures. Seismic design and detailing of RC and steel buildings. Design of non-structural elements- Architectural elements, water supply, drainage electrical and mechanical components

### **Unit 5 - Urban planning and design**..... 10

Vulnerability of existing buildings, facilities planning, fire after earthquake, socio-economic impact after earthquakes. - Architectural design assignment – Institutional masonry building with horizontal spread and height restriction, multi-storied, R.C.C framed apartment or commercial building.

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## References:

1. Guidelines for earthquake resistant non-engineered construction, National Information Centre of earthquake engineering (NICEE, IIT Kanpur, India)
  2. C.V.R. Murthy, Andrew Charison. "Earthquake design concepts", NICEE, IIT Kanpur India.
  3. Lan Davis (1998) "Safe shelter within unsafe cities" Disaster vulnerability and rapid urbanization, Open House International, UK
  4. Socio-economic developmental record- Vol.12, No.1, Jan-Feb 2005
  5. Learning from Practice- A review of Architectural design and construction experience after recent earthquakes- Joint USA-Italy workshop, Oct. 18-23, 1992, Orvieto, Italy.
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**BAR21E04 MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** This subject aims to improve the understanding of maintenance, repair and rehabilitation of structures in students. The students will learn about the various types of maintenance and repair strategies, techniques and protection/ preservation methods.

**Expected Course Outcomes:**

CO1	Understanding the importance of maintenance of structures and to learn various distress and damages to concrete structures.
CO2	Knowledge of various types and properties of repair materials and to assess the damage to structures using various tests.
CO3	Knowledge of evaluation and repair/retrofitting methods for extending the service life of concrete structures.
CO4	Knowledge of preventive maintenance practices (instead of corrective maintenance practices) and various repair techniques of damaged structures, corroded structures.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H				H	H
	CO2	H		H	H	M	M
	CO3	H	M	H	M	H	H
	CO4	H				H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 - Maintenance and Repair Strategies** ..... **9**

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

**Unit 2 - Strength and Durability of Concrete** ..... **9**

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness.

**Unit 3 - Special Concretes** ..... **9**

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self-compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

**Unit 4 - Techniques for Repair and Protection Methods** ..... **9**

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

**Unit 5 - Repair, Rehabilitation and Retrofitting of Structures** ..... **9**

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake – Demolition Techniques - Engineered demolition methods - Case studies

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**References:**

1. Gahlot P.S., Building Repair and Maintenance Management, CBS
  2. Chanter B, Building Maintenance Management 2<sup>nd</sup> Edition, 2013; Wiley
  3. Bishnoi, Maintenance and Safety and Aging Infrastructure, Random Publishing House
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**SEMESTER VIII**

<b>S. No.</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Category</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Studio</b>	<b>Credits</b>
		<b>STUDIO</b>					
1	BAR21L22	Practical Training	PEC	0	0	0	20
		<b>Total Days</b>	<b>90</b>		<b>Total Credits</b>		<b>20</b>



**BAR21L22****PRACTICAL TRAINING**

Number of credits	20	Subject Category	PC
Lecture periods per week	-	Internal Assessment	-
Studio/Lab/Workshop /site visit per week	-	End Semester Exam	100
Total period per week	-	Total Marks	100
Total day	90		

**Subject Objectives:** To facilitate an understanding of the evolution of an architectural project from design to execution. To enable an orientation that would include the process of development of conceptual ideas, presentation skills, involvement in office discussions, client meetings, development of the concepts into working drawings, tendering procedure, site supervision during execution and coordination with the agencies involved in the construction process.

**Expected Course Outcomes:**

CO1	To facilitate an understanding of the evolution of an architectural project from design to execution.
CO2	To enable an orientation that would include the process of development of conceptual ideas into working drawings along with estimates and other documents
CO3	To participate in meeting and to work with clients, other consultants, contractors etc
CO4	To understand the process of site supervision during execution and coordination with the agencies involved in the construction process

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	M	M	H
	CO2	H	H	H	H	M	H
	CO3	H	H	H	H	M	M
	CO4	H	H	H	H	M	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
							✓
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

The internship program would be done in offices empaneled by the Institution and in firms registered under the Council of Architecture. The progress of practical training shall be assessed internally through submission of log books supported by visual documents maintained by students every month along with the progress report from the employer/s of trainees.

- Adherence to time schedule, Discipline.
- Ability to carry out the instructions on preparation of schematic drawings, presentation drawings, working drawings.
- Ability to work as part of a team in an office.
- Ability to participate in client meetings and discussions.
- Involvement in supervision at project site.

**Report and Submissions:**

At the end of the Internship program a portfolio of work done during the period of internship along with certification from the offices are to be submitted for evaluation by a viva voce examination. This will evaluate the understanding of the students about the drawings, detailing, materials, construction method and service integration and the knowledge gained during client meetings, consultant meetings and site visits.

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**SEMESTER IX**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21013	Sustainable architecture	PC	3	0	0	3
2	BAR21014	Urban design	PC	3	0	0	3
3	BAR21E**	Departmental Elective	PE	3	0	0	3
		<b>THEORY &amp; STUDIO</b>					
4	BAR21L23	Dissertation	PEC	1	1	3	3
5	BAR21L24	Landscape Design	PC	1	1	3	3
		<b>STUDIO</b>					
6	BAR21L25	Architectural Design – VII	PC	0	0	14	14
		<b>Total Hrs</b>	<b>33</b>		<b>Total Credits</b>		<b>29</b>

**ELECTIVES LIST**

Sem	Subject Code	Elective list	Category	Lecture	Tutorial	Studio	Credits
	BAR21E05	Conservation	PE	3	0	0	3
	BAR21E06	Construction Technology	PE	3	0	0	3
	BAR21E07	Set Design	PE	3	0	0	3
	BAR21E08	Smart Cities	PE	3	0	0	3

**BAR21013****SUSTAINABLE ARCHITECTURE**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To give an understanding of the concept of sustainability and sustainable development. To inform about issues like climate change, ecological footprint, etc. To provide familiarity with low impact construction practices, life cycle costs and alternative energy resources. To give exposure to the different rating systems for building practices with case studies. To enable understanding of the concept of sustainable communities and associated socio-economic dimensions through case studies

**Expected Course Outcomes:**

CO1	Knowledge on the concept of sustainability and sustainable development; and issues like climate change, ecological footprint, etc
CO2	Knowledge on low impact construction practices, life cycle costs and alternative energy resources
CO3	Exposure to the different rating systems for building practices
CO4	Understanding of the concept of sustainable communities and associated socio-economic dimensions

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	M	M	H	H
	CO2	H	H	M	H	H	-
	CO3	M	H	H	H	H	-
	CO4	H	H	M	M	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 - Introduction To Sustainability**..... **7**

introduction to Sustainability in Built Environment. Concept of sustainability. Carrying capacity, sustainable development. Bruntland report. Ethics and visions of sustainability. Circles of sustainability. Sustainable economy and use.

**Unit 2 - Climate Change And Sustainability**..... **10**

Environment, Energy, Climate Change and Economics, need for sustainability. Overview of climate change and its impact on a global and regional scale. Principles of energy systems. Energy crisis and global environment. Study on vernacular techniques and technological advancements in climate control in different climatic zones.

**Unit 3 - Site Selection And Green Building Rating System**..... **8**

Sustainable site selection and development. Introduction to Green building concepts. Ecology and sustainability. Different sources of energy, recyclable products and embodied energy. Assessment or Rating methods of Sustainable buildings. Green Building or Contemporary High-Performance Buildings: TERI, LEED, GIRHA and BREEAM.

**Unit 4 - Sustainable Materials**..... **10**

Selection of materials. Eco building materials and construction. Low impact construction—bio mimicry, zero energy buildings, nano technology and smart materials. Recyclable products and embodied energy. Life cycle analysis. Energy sources—Renewable and non-renewable energy. 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

**Unit 5 - Sustainable Concept And Design Strategies**..... **10**

Method of Achieving Sustainability in Buildings Understanding Energy Efficiency, Daylighting, Passive Heating/cooling, Water Resource management, Renewable Energy etc, LEED -Case study project in Operations and Maintenance of Existing Building

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**References:**

1. Lechner, Heating, Cooling, Lighting : Sustainable Design Methods for Architects 3rd Edition, John Wiley and sons, 2000.
  2. Sandra F. Mendler & Willian Odell, "HOK Guidebook to Sustainable Design", John Wiley and sons, 2000.
  3. Tom Woolley, Green Building Handbook, New Rider Publishers
  4. Spiegel R., Green Building Materials 3ed: A Guide To Product Selection & Specifications, JWO Publishers
  5. IGBC Green New Buildings Rating System Version-3.0, Reference Guide Sep-15, IGBC.
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**BAR21014****URBAN DESIGN**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To introduce Urban design as a professional discipline situated at the interface between architecture, landscape architecture and urban planning; To sensitise the students about the concept of public realm, understanding of the city as a three-dimensional entity and perception of spaces at multiple scales; familiarize with the implementation processes through various statutory and non-statutory guidelines.

**Expected Course Outcomes:**

CO1	Knowledge on Urban design as a professional discipline situated at the interface between architecture, landscape architecture and urban planning
CO2	Better understanding of urban planning strategies and techniques
CO3	Sensitise the students about the concept of public realm, understanding of the city as a three-dimensional entity and perception of spaces at multiple scales
CO4	Implementation processes through various statutory and non-statutory guidelines

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	H	M	H
	CO2	H	H	H	H	H	M
	CO3	H	H	H	H	H	H
	CO4	H	H	H	H	M	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Introduction and Scope** 9

Relationship between Architecture, Urban Design and Urban Planning; Brief review of the evolution of the urban design as a discipline, basic principles and theories. Broad understanding of urban forms and spaces at various spatial scales through examples from historic cities.

### **Unit 2 – Typologies and Procedures** 9

Concepts of public and private realm; understanding different types and procedures of urban design interventions their scale relationships; constraints and challenges of urban design in democratic versus authoritarian settings.

### **Unit 3 – Elements of Urban Design** 9

Understanding the city as a three-dimensional element; Urban form as determined by interplay of masses, voids, order, scale, harmony, symmetry, colour and texture; Organization of spaces and their articulation in the form of squares, streets, vistas and focal points; Concept of public open space; Image of the city and its components such as edges, paths, landmarks, street features.

### **Unit 4 – Urban Design and Sustainability** 9

Sustainability concept; Relationship of urban design with economic, environmental and social sustainability; Urban renewal and urban sprawl; Concepts of Transit Oriented Development, Compact City, Healthy City and Walkable City.

### **Unit 5 – Urban Design Implementation** 9

Urban design and its control; Institutional arrangements for design and planning, their roles, powers and limitations; Types of planning instruments, structure plans, master plans and local area plans and zoning guidelines; Design communication and role of public participation.

*Studio component of the subject may be integrated with Architectural Design of the current semester.*

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## References:

1. Larice, M. and Macdonald, E. Ed. (2013). The Urban Design Reader. 2nd Ed. The Routledge UrbanReader Series, Abingdon, Oxon : Routledge.
  2. Carmona, M., Heath, T., Oc, T. and Tiesdell, S. (2010). Public Places Urban Spaces. Oxford :Architectural Press.
  3. Marshall, S. (2009). Cities design and evolution. New York : Routledge.
  4. Lang, J. T. (2005). Urban Design: A Typology of Procedures and Products. Oxford :Elsevier/Architectural Press.
  5. Moughtin, C., Cuesta, R., Sarris, C. and Signoretta, P. (2003). Urban Design - Methods andTechniques. Oxford : Architectural Press.
  6. Watson, D., Plattus, A. and Shibley, R. (2003). Time-Saver standards for urban design. New York :McGraw Hill.
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**BAR21L23****DISSERTATION**

Number of credits	3	Subject Category	PEC
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** The primary objective of this subject is to enable students to establish a strong theoretical foundation, clarity of thought and also to orient the students to structured research in a focussed manner. The process of study shall enable students to conduct in depth analysis and objective research on a topic of their interest. Students may be encouraged to select the topic which may eventually culminate in the Architectural Design Thesis in the subsequent semester.

**Expected Course Outcomes:**

CO1	To establish a strong theoretical foundation
CO2	To enable students to conduct in depth analysis and objective research on a topic of their interest
CO3	To perform the structured research in a focussed manner.
CO4	To select the topic which may eventually culminate in the Architectural Design Thesis in the subsequent semester

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	M	H	H	M	M	M
	CO2	M	H	H	H	H	M
	CO3		H	H	H	H	
	CO4	H	H	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
							✓
4	Approval					Meeting of Academic Council, May 2021	



**Course Content:****Topics of Study:**

Students may choose a topic related to Architecture and allied subjects. The topics must be vetted by the faculty. Emphasis must be on critical understanding, logical reasoning and structured writing. Students may be encouraged to select the topic which may eventually culminate in the Architectural Design Thesis of the subsequent semester. Students can thus utilise this as an opportunity for pre-thesis study, amounting to literature review and relevant case studies which are otherwise required for Thesis.

**Method of Submission:**

By the end of the semester, students are expected to submit a written paper of approximately 3500 words. Standard referencing conventions and technical writing norms must be adhered to. Students are expected to present the progress of the study at various stages of the semester. Final assessment of the students' work may be based on written Paper as well as oral communication. However, greater weightage may be given for writing skills and research content of the study.

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**References:**

1. Anderson, J. and Poole, M. (1998). Thesis and assignment writing. Brisbane : John Wiley.
  2. Borden, I. and Ray, K. R. (2006). The dissertation: an architecture student's handbook. 2nd Ed. Oxford : Architectural Press.
  3. Fink, A. (1998). Conducting research literature reviews: from paper to the Internet. Thousand Oaks : Sage.
  4. Murray, R. (2005). Writing for academic journals. Berkshire: Maidenhead, Open University Press
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**BAR21L24****LANDSCAPE DESIGN**

Number of credits	3	Subject Category	PEC
Lecture periods per week	2	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	3	End Semester Exam	50
Total period per week	5	Total Marks	100
Total periods	75		

**Subject Objectives:** To introduce the students to the discipline of Landscape architecture & its relevance to Architecture. To gain an insight into the changing relationship of human with nature, to develop the understanding of site and site planning. To develop the skill of integrated design of open and built spaces.

**Expected Course Outcomes:**

CO1	Knowledge on Landscape design as a professional discipline situated at the interface between architecture, outdoor planning and site planning
CO2	Better understanding of site planning, landscape planning strategies and techniques
CO3	Gain insight into the changing relationship of human with nature, to develop the understanding of site and site planning
CO4	Develop skills of integrated design of open and built spaces

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	H	H	M
	CO2	H	H	H	H	H	M
	CO3	H	H	H	H	M	H
	CO4	M	M	H	H	H	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

## **Course Content:**

### **Unit 1 – Introduction**.....9

Introduction to landscape - its meaning, Experience of a landscape, Aesthetics & Imagery of a landscape, Relationship of humans and nature; How landscapes relate to land, nature, environment and place; How the scales & conception of landscapes evolve over time, Sense of place in the landscape.

### **Unit 2 – Site Planning**.....9

Site survey and appraisal, Site Inventory checklist – Topography, vegetation, soil, hydrology, climate etc. Principles of site planning, Design issues in site planning and siting of buildings. Integrating the built and open spaces.

### **Unit 3 – Elements of Designed Landscapes**.....9

Brief overview of the use of landforms, water, plants, built elements, application of materials, street furniture in a designed landscape.

### **Unit 4 – Landscape Solutions**.....9

Exploration of sustainable landscape solutions at the site, brief overview of Xeriscaping, green roofs & walls, rain water harvesting etc.

### **Exercises:**.....9

Studio component of the subject may be integrated with Architectural Design of the current semester.

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## **References:**

1. Appleton. (1996). The Experience of Landscape. Wiley.
  2. Geoffrey, and Jellico, S. (1987). The Landscape of Man. Thames and Hudson.
  3. Holl, G. P. (2006). Questions of Perception Phenomenon logy of Architecture. Richmond : William Stout Publishers.
  4. Laurie. (1986). An Introduction to Landscape Architecture. Elsevier.
  5. Lynch, K. (1962). Site Planning. Cambridge : The MIT Press.
  6. Reid, G. (2002). Landscape Graphics. New York : Watson-Guptill.
  7. Simonds, J. O. (2006). Landscape Architecture: A Manual of Land Planning and Design.
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Number of credits	12	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	9	End Semester Exam	50
Total period per week	12	Total Marks	100
Total periods	180		

**Subject Objectives:** To understand the various components and aspects of the urban environment as well as their interrelationships. To understand in specific components/issues such as public spaces, physical infrastructure, socio-cultural aspects- heritage, gender, class, dynamics of urban growth. To understand people as users of the urban environment in various scales. To explore techniques of mapping and diagramming to understand the dynamic urban environment. To take design decisions in a comprehensive manner understanding their implications in the larger context.

**Expected Course Outcomes:**

CO1	To understand the various components and aspects of the urban environment as well as their interrelationships
CO2	To understand in specific components/issues such as public spaces, physical infrastructure, socio-cultural aspects- heritage, gender, class, dynamics of urban growth
CO3	To understand people as users of the urban environment in various scales.
CO4	To explore techniques of mapping and diagramming to understand the dynamic urban environment and to make decisions in a comprehensive manner understanding their implications in the larger context.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	H	H	M	H	H
	CO2	H	H	H	H	H	H
	CO3	H	H	H	M	M	H
	CO4	M	H	H	H	M	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
					✓		
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

Scale and Complexity: projects involving the urban context and architecture with a thrust on understanding inter dependencies and formulating appropriate design directions.

Areas of focus/ issues:

- exploration of relationship between building and larger context
- contemporary processes in design
- appropriate architecture
- addressing issues in urban areas - transportation, sustainability, heritage, sprawl, place making, identity, collective memory
- Mixed use programming

Suggestive Typology/ project: those involving large scale urban interventions as well as large scale projects which have impact on the urban context- revitalization and renewal of urban fragments, evolving guidelines for heritage areas, adaptive reuse, urban waterfront development, transportation nodes, new communities, multi-use urban complexes.

**Students shall be encouraged to participate in design competitions appropriate to their level as one of the class projects.**

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**References:**

1. Time saver standards for building types, DeChiara and Callender, Mc Graw hill company
  2. Neufert Architect's data, Bousmaha Baiche & Nicholas Walliman, Blackwell science ltd
  3. National Building Code – ISI
  4. New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press
  5. Mills E. D., Planning: Architect's Handbook, 10/e, Butterworths, 1985.
  6. Ramsey C. G., H. R. Sleeper, Architectural Graphic Standards, 11/e, Wiley, 2008
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**ELECTIVES:****BAR21E05 ARCHITECTURAL CONSERVATION**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To understand the values of conservation and the various factors that affects the values of conservation.

**Expected Course Outcomes:**

CO1	Understanding the Heritage, culture in Architectural context
CO2	Gaining knowledge on architectural conservation at national and international level
CO3	Imparting knowledge on preservation, restoration and adaptive reuse of heritage buildings
CO4	Gaining knowledge on adaptive reuse of heritage buildings adhering to ethics of conservation

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	M	M	H	H
	CO2	M	H	M	H	H	M
	CO3	H	M	M	H	H	M
	CO4	H	M	H	H	M	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 - Introduction**.....9

Introduction - Definition of the term Conservation, Heritage, Culture in Architectural context - Various stages in conservation such as Preservation, Restoration, Adaptation, Consolidation- Study of history of Conservation movement -Need for conservation in modern context.

### **Unit 2 - Historic Cities**.....9

Historic Cities - Factors affecting the Architectural aspects of historic cities- geographical, social, cultural and religious. Case Study of historic cities- Shahjahanabad, Madurai, Pondicherry

### **Unit 3 - Ethics of Conservation**.....9

Ethics of Conservation - Values in conservation- Social, Economic, Religious and Use Values – Planning guidelines - Legislation related to Architectural Conservation.

### **Unit 4 - Charters in development of Conservation**.....9

Charters in development of Conservation – Conservation Agencies like ASI, INTACH, Research and Funding Organisations like UNESCO – Components in conservation: Inventory, Listing, Documentation, Education, Community Participation and creating Public awareness.

### **Unit 5 - Case studies**.....9

Case studies of conservation Projects in Indian and International Context. Emerging trends in Conservation Practices.

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## References:

1. Conservation of Historic Buildings – Bernard Fielden.
  2. INTACH Handbook – INTACH Publications
  3. The Architecture of Towns and Cities – Paul do Spreiregen.
  4. Urban Renewal in Amercian Cities – Scott Greet.
  5. Character of Towns – Roy Workhest.
  6. Conservation of European cities, Donald Appleyard, 1979
  7. Architectural Heritage of Pondicherry, INTACH publication
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**BAR21E06****CONSTRUCTION TECHNOLOGY**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To study the advancements in construction with concrete for large span structures. To familiarize the students with the manufacture, storage and transportation of concrete. To inform the various equipment used in the construction industry and the criteria for choice of equipment. To familiarize the students with an overview of construction management, planning and scheduling.

**Expected Course Outcomes:**

CO1	To study the advancements in construction with concrete for large span structures
CO2	To familiarize the students with the manufacture, storage and transportation of concrete
CO3	To inform the various equipment used in the construction industry and the criteria for choice of equipment.
CO4	To familiarize the students with an overview of construction management, planning and scheduling

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1		H	H	M	H	
	CO2	M	H	H			
	CO3	M	H	H	M	M	
	CO4	M	H	H	H	M	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	



## Course Content:

### **Unit 1 -Construction Systems**..... **10**

Structural systems and design: Planning - pre-stressed, concrete constructions pre-cast concrete and pre- fabrication system - Modular coordination.

### **Unit 2 -Construction Practice**..... **10**

Modern Construction Materials - Manufacture, storage, transportation and erection of pre-cast component forms, molds and scaffoldings in construction - safety in erection and dismantling of constructions.

### **Unit 3 -Construction Methods and Equipment**..... **10**

Uses of the following: Tractors, bulldozers, shovels drag lings, cableways and belt conveyors, batching plants - Transit mixers and agitator trucks used for ready mix concrete pumps Guniting equipment - Air compressors - welding equipment - cranes and other lifting devices Choice of construction equipment for different types of works.

### **Unit 4 -Construction Technology and High-Rise Buildings**..... **6**

Planning and scheduling for high rise building: Scheduling- Simulation – Typical Floor Construction Cycle – Appropriate working schedule.

### **Unit 5 -Construction Management**..... **9**

Overview of construction management topics including estimating, cost control, quality control, safety, productivity, value engineering, claims, and legal issues.

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## References:

1. R. Chudley, Construction Technology, Pearson, 2005.
  2. R. Barry, The Construction of Buildings, The English Language Book Society and Crosby Lockwood, Staples, London, 1976.
  3. Construction Planning equipment and Methods by RL Peuriboy Tata McGraw Hill, 1979 4. Modern Construction and Management. Frank Harris John Wiley and Sons, 1983.
  4. National Building Code of India, 2005 (NBC 2005)
  5. Frank R. Dagostino, Materials of Construction, Details given Reston Publishing Company, nc. Virginia, 1976.
  6. M. Mohsin, Project Planning and Control, Vikas Publishers, New Delhi, 1983
  7. Concrete Technology – Theory and Practice, M.S. Shetty, Chand & Co, New Delhi, 2005.
  8. Gurcharan Singh, “Building, Planning, Designing and Scheduling”, Standard Publications, 2009.
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**BAR21E07****SET DESIGN**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To create awareness and provide exposure about the design potential in theatre & cinema set design to architecture students, to inculcate the ability to translate the requirements of the script to physical manifestations according to the traditions followed in the theatre & cinema industry.

**Expected Course Outcomes:**

CO1	Exposure to design potential in theatre & cinema set design
CO2	Better understanding of the set design through cultural and socio-economic conflicts portrayed, and how it has influenced the set design
CO3	Knowledge on the ability to translate the requirements of the script to physical manifestations according to the traditions followed in the theatre & cinema industry
CO4	Design processes required and implemented in set design process

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	H	-
	CO2	H	M	H	H	-	H
	CO3	H	H	H	H	M	M
	CO4	H	H	H	H	H	-
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 – Film and Society**.....9

Examination of the 20th century culture and society through film. Critical analysis of cultural and social conflicts are portrayed and worked out in popular films, and examination of how motion pictures create a window into modern society. Film as cultural text to better understand history and cultural manifestations.

**Unit 2 – History and Theater Film Set Design**.....9

Investigation the production methods, dramatic theory and conventions, and scene design of various performance media since the popularization of the motion picture, and how it has influenced all entertainment design in the 20th and 21st centuries.

**Unit 3 – Graphic Design and Typography for Exhibit Design**.....9

Principles of layout for creating effective visual signage and explore the unique problems, technique, theory, and approaches of signage in film, theatre, and other forms of mediated exhibition. Introduction to the design applications for building signage.

**Unit 4 – Set Design and Concept Wrap**.....9

Introduction to the basic concepts, through theory and practice, of scene design in theatre, film, and other fine arts and entertainment media. Students will learn how to analyze scripts for proper scenery, how to conceptualize designs that will translate into actual sets, and develop visual thinking within the creative process.

**Unit 5 – Stage Design**.....9

Stage design process from inception to performance, script analysis, visual arts analysis, research skills, and the application of principles and elements of design. Understanding stage setting through language, color, and architectural analysis.

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**References:**

1. Baiche Bousmaha & Walliman Nicholas. *Neufert Architect's data*. Blackwell science ltd.
  2. Chiara De Joseph & crosbie.J.Michael. 1990. *Time saver standards for building types*. McGraw Hill company
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**BAR21E08****SMART CITIES**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To examine the core challenges relating to the foundation of Smart cities. To develop knowledge, understanding and critical thinking related to Smart, sustainable urban development. To explore issues relating to the development and deployment of new and emerging technologies, that will create a thorough understanding of smart processes and systems of the present and future.

**Expected Course Outcomes:**

CO1	Understanding the challenges to foundation of smart cities
CO2	develop knowledge, understanding and critical thinking related to Smart, sustainable urban development
CO3	Exploring issues relating to the development and deployment of new and emerging technologies
CO4	understanding of smart processes and systems of the present and future

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	M	H
	CO2	H	M	H	H	H	H
	CO3	M	M	H	M	H	H
	CO4	H	H	H	H	H	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 - Introduction To Smart Cities** ..... **8**

Urban Scenario, Challenges in cities, Smart City definition, Evolution of Smart cities, Characteristics and factors of Smart Cities, Drivers of Smart Cities.

### **Unit 2 - Smart City Infrastructure** ..... **9**

Physical, economic, Social, Institutional – Urban Mobility , Water Management, Waste Management, Energy Management, Smart Technology-IOT, e-Governance ,etc.

### **Unit 3 - Smart City Development** ..... **8**

Traditional Vs Smart Cities, UDPI guidelines, Strategies, Transformation- Process, Selection, Implementation, funding of Smart cities and Monitoring.

### **Unit 4 - Global Experience Of Smart Cities** ..... **10**

Smart City Projects - Global Case Studies- - Barcelona, Amsterdam, Masdar, Singapore,etc.

### **Unit 5 - Towards Smart Cities In India** ..... **10**

Smart City Mission in India- Smart Cities Policies, guidelines & Benchmarks- Regulatory Bodies for the Smart Cities Mission- Funding Model for Smart Cities in India-Completed and Ongoing Smart City Projects in India

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## References:

1. Jesse Berst, Liz Enbysk and Christopher Williams Smart Cities Readiness Guide - The planning manual for building tomorrow's cities today, Smart Cities Council, 2014
  2. Aniket Bhagwat, Suparna Bhalla, Sanjay Prakash Ashish Bhalla Destination 100 (The Making of Smart Cities in India, Future Institute publishers, 2014, ISBN 13: 9781 4392 57883
  3. Vinod kumar T. M., Geographic Information Systems for Smart Cities, Copal Publishing, New Delhi, 2014, ISBN: 9788 1924 73352
  4. Joy Sen, Sustainable Urban Planning, The Energy and Resources Institute, New Delhi, 2013, ISBN 978-81-7993-324-4
  5. *Anthony M. Townsend, SMART CITIES* Big Data, Civic Hackers, and the Quest for a New Utopia, W. W. Norton & Company, Inc., 2013, ISBN-13: 978-0393082876
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**SEMESTER X**

S. No.	Subject Code	Subject	Category	Lecture	Tutorial	Studio	Credits
		<b>THEORY</b>					
1	BAR21015	Professional Practice	PEC	3	0	0	3
2	BAR21E**	Departmental Elective	PE	3	0	0	3
		<b>STUDIO</b>					
3	BAR21L26	Thesis	PC	0	0	18	<b>20</b>
		<b>Total Hrs</b>	<b>21</b>			<b>Total Credits</b>	<b>26</b>

**ELECTIVES LIST**

Sem	Subject Code	Elective list	Category	Lecture	Tutorial	Studio	Credits
	BAR21E09	Agricultural Infrastructure	BS&AE	3	0	0	3
	BAR21E10	Architectural Journalism	PE	3	0	0	3
	BAR21E11	Entrepreneurship	SE	3	0	0	3
	BAR21E12	Project Management	PEC	3	0	0	3

**BAR21015****PROFESSIONAL PRACTICE**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To create awareness regarding the various activities involved in the practice of architecture and the role of professional and statutory bodies including legalities, interdisciplinary relationships and the implications of globalization.

**Expected Course Outcomes:**

CO1	To create awareness regarding the various activities involved in the practice of architecture
CO2	To learn the legal and economic aspects of architectural practice
CO3	To understand the role of professional and statutory bodies, interdisciplinary relationships and the implications of globalization
CO4	To acquire skills necessary to practice effectively on entry into the architectural profession

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low								
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	
	CO1	H	M				H	
	CO2	H	M	H	H	M	H	
	CO3	H	M	H	M	M	H	
	CO4	H	M	M		M	H	
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)		
				✓				
4	Approval					Meeting of Academic Council, May 2021		

## Course Content:

### **Unit 1 - Architect and Profession: Services and Scale of Fees** ..... **9**

Role of architect in society - relationship with client and contractor - code of conduct – Conditions of engagement of an architect - normal additional, special and partial services – scale of fees for various services - claiming of fees

### **Unit 2- Architectural Competitions** ..... **6**

Open and closed competitions - appointment of assessors - duties of assessors - instructions to participants - rejection of entries - award of premium - guidelines prescribed by COA AND IIA for promotion and conduct of competitions

### **Unit 3- Building Legislation and Easements** ..... **12**

Salient features of various Acts such as Architects' Act 1972 -Chennai Corporation Building Rules 1972-The Panchayat Building Rules 1942-The Tamil Nadu Factory Rules 1950-Development control Rules for Chennai Metropolitan Area 1990 -Definition - types of easements – acquisition extinction and protection of easements

### **Unit 4- Tender & Contract** ..... **12**

Calling for tenders - tender documents - open and closed tenders - item rate, lumpsum, labor and demolition tender - conditions of tender - submission of tender - scrutiny and recommendations. Conditions of contract - Form of contract articles of agreement - Contractor's bill certification.

### **Unit 5 - Arbitration** ..... **6**

Types of ADR -Arbitration in disputes - arbitration agreement - sole arbitration - umpire - excepted matters - award

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## References:

1. J.J. Scott, Architect's Practice, Butterworth, London 1985
  2. Publications of COA IIA Hand book on Professional Practice, The Architects publishing Corporation of India, Bombay 1987
  3. D.C. Rules for Chennai Metropolitan Area 1990
  4. T.N.D.M. Building Rules, 1972
  5. T.N.P. Building Rules 1942
  6. Chennai City Corporation Building Rules 1972
  7. Derek Sharp, The Business of Architectural Practice William Collins Sons & Co. Ltd, 8 Erafton St., London W1 19868. Roshan Namavathi, Professional Practice, Lakshmi Book Depot, Mumbai 1984 Publication of IIA
  8. Environmental Laws of India - by Kishore Vanguri, C.P.R. Environmental Education Centre, Chennai
  9. The Tamil Nadu Hill Areas Special Building Rules - 19
  10. Heritage Act
  11. Consumer Protection Act
  12. Indian Easements Act
  13. Professional Practice –Prof.Radhey Mohan Chundur.
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**BAR21L26****THESIS**

Number of credits	14	Subject Category	PC
Lecture periods per week	5	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	9	End Semester Exam	50
Total period per week	*	Total Marks	100
Total day	**		

**Subject Objectives:** All the five years of Architectural Design culminate in the Thesis Project to motivate student to involve in individual research and methodology. This is to train the students in handling projects independently.

**Expected Course Outcomes:**

CO1	To represent the entire understanding of the field as a student
CO2	To motivate to involve in an individualistic research and methodology
CO3	To prepare students for working independently
CO4	Top provide an opportunity to engage in advanced design research in a way not possible given the time constraints of a typical semester-long studio.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low								
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	
	CO1	H	H	H	H	H	H	
	CO2	M	H	H	H	M	M	
	CO3	H	H	H	H	H	H	
	CO4	H	H	H	H	H	H	
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)		
				✓		✓		
4	Approval					Meeting of Academic Council, May 2021		

**Course Content:****Topics of Study:**

The main areas of study and research shall be Architecture, Urban design, Urban renewal and rural settlements, Environmental Design, Conservation, Landscape Design, House etc... However, the specific thrust should be architectural design of built environment.

**Method of Submission:**

The Thesis Project shall be submitted in the form of drawings, project report, models, slides etc.

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**References:**

1. Linda Grant and David Wang, Architectural Research Methods, John Wiley Sons, 2002
  2. Donald Appleyard, The Conservation of European Cities, M.I.T. Press, Massachusetts
  3. Michelle Provoost et al., Dutchtown, NAI Publishers, Rotterdam, 1999
  4. Richard Kintermann and Robert small site planning for cluster Housing van Nastrand Reinhold company, Jordon/ New York 1977.
  5. Miller T.G. Jr., Environmental Sciences, Wadsworth Publishing Co. (TB)
  6. Kevin Lynch - Site planning - MIT Press, Cambridge, MA - 1967.
  7. Geoffrey and Susan Jellicoe, The Landscape of Man, Thames And Hudson, 1987.
  8. Arvind Krishnan & Others, Climate Responsive Architecture, A Design Handbook for
  9. Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2001.
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**ELECTIVES:****BAR21E09                      AGRICULTURAL INFRASTRUCTURE**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** This subject aims to improve the understanding of agricultural infrastructures in students. The students will learn about the various types of infrastructures and the policies and funds in the agricultural sector, and how architects can develop them further.

**Expected Course Outcomes:**

CO1	Improved understanding of agricultural architecture
CO2	Knowledge on the classification based on the inputs
CO3	Understanding of the policies that controls the agricultural infrastructure
CO4	Introduction to Agricultural research on technology and services

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	M	H	M			H
	CO2		H	H			
	CO3	M	H	H		M	
	CO4	M	H	H	M	M	H
3	Category	General (A)	Basic Sciences & Math (B)	Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)	
					✓		
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1 - Introduction to Agricultural Infrastructure ..... 6**

What is agricultural infrastructure, Types, Various Government Policies and Funding options to develop agricultural sector.

**Unit 2 - Input based infrastructure ..... 6**

Seed, Fertilizer, Pesticides, Farm equipment and machinery

**Unit 3 - Resource based infrastructure ..... 12**

Irrigation engineering - Types and suitability, Sustainable energy and power sources

**Unit 4 - Physical infrastructure ..... 15**

Road & Transportation Engineering, Facilities for storage, processing & preservation

**Unit 5 - Institutional infrastructure ..... 6**

Introduction to Agricultural research, extension & education technology, information & communication services, financial services, marketing, etc.,

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**References:**

1. James, Introduction to Transportation Engineering, McGraw Hill
  2. Collis, Transport Engineering and Architecture, A Press
  3. Asawa, Irrigation and Water Resources Engineering, New Age Publications 2006
  4. S.K.Sharma, Irrigation Engineering and Hydraulic structures, S.Chand and company
  5. <https://agricoop.nic.in/en>
  6. <https://www.india.gov.in/topics/agriculture>
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**BAR21E10****ARCHITECTURAL JOURNALISM**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** It introduces students to the fundamentals of writing, explaining of various strategies and Introduction to Photojournalism and the contributions of photography to the professional their criticism. Practice of architecture and develop proficiency in this art using modern photography techniques.

**Expected Course Outcomes:**

CO1	Knowledge on fundamentals of writing, explaining of various strategies and design narratives.
CO2	Understanding of Contemporary Architectural Journalism by the students
CO3	Knowledge on Regional, National, and international discussion forums
CO4	Understanding of Photojournalism and the contributions of photography

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M	H	M	H	H
	CO2	H	M	H	M	M	M
	CO3	H	H	H	H	M	M
	CO4	H	M	H	H	H	H
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 – Introduction**.....9

Introduction to journalism, key concepts and objectives of Journalism – Specialized journalism: with emphasis on architectural journalism - Journalism skills: research, reporting, writing, editing, photography, columnists, public relationships, criticism. Issues such as copyright, public art policy, the arts and urban redevelopment. Introduction to local culture scene.

### **Unit 2 – Technologies in Journals**.....9

Environment, Social Change, Persuasion- Interviewing techniques, Argument and debate as a technique in the investigation of social problems; evidence, proof, refutation, persuasion; training in argumentative speaking. Introduction to software needed in journalism and photography, video coverage, walk-through of buildings, production of contemporary architectural journalism. Understanding the individual demands in the context of newspapers, radio, film, and television.

### **Unit 3 – Contemporary Architectural Journalism**.....9

Role of the Editor - Editing of Articles, Features and other stories - Editing for online newspaper and magazines - Text preparation, Mode of presentation, Standards and Guidelines for documentation, Code of ethics, Basic knowledge on Press laws, Press Council of India, Multimedia/online journalism and digital developments.

### **Unit 4 – Discussions and Issues**.....9

Regional, National and International discussion forums, Changes in contemporary and historical design practices. Discussions on topics needed in an architectural journal and current issues - types of journals, works of key architectural journalists, Public Discourse on the Internet, Mass Media and Public Opinion – critique on selected pieces of journalism.

### **Unit 5 – Architectural Photography**.....9

Introduction to architectural photography and role of the photographic image in the global world – basic instruction in Photojournalism Equipment: cameras and lenses – techniques: film speed, exposure measurement, gray scale– photo- finishing and editing digital images. Perspectives: Single Point, Two- Point, Three- Point and methods of correcting distortions – Lighting: External and Interior

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## References:

1. Edward Jay Friedlander and John Lee, “Feature Writing for Newspapers and Magazines”, 4th edition, Longman, 2000.
  2. Fuller, David & Waugh, Patricia eds., “The Arts and Sciences of Criticism”, Oxford: Oxford University Press, 1999
  3. Foust, James, Online Journalism, “Principles and Practices of News for the Web”, Holcomb Hathaway Publishers, Scottsdale, AZ, 2005
  4. M. Harris, “Professional Architectural Photography”, Focal Press, 2001.
  5. M. Harris, “Professional Interior Photography”, Focal Press, 2002 68
  6. Huckerby, Martin., The Net for Journalists: A Practical Guide to the Internet for Journalists in Developing Countries. UNESCO/Thomson Foundation/ Common wealth Broadcasting Association, 2005.
  7. Ward, S. J. A. “Philosophical Foundations of Global Journalism Ethics.” Journal of Mass Media Ethics., Vol. 20, No. 1, 3-21, 2005
  8. M .Heinrich, “Basics Architectural photography”, BirkhauserVerlag AG, 2008.
  9. Gerry Kopelow, “Architectural Photography: the professional way”, 2007
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**BAR21E11****ARCHITECTURAL ENTREPRENEURSHIP**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To understand the fundamentals of architectural entrepreneurship and the basic terminology. To inform the legal aspects of architectural entrepreneurship. To familiarize the students with ethical codes, time management and skills. To apply the knowledge gained in an architectural design assignment.

**Expected Course Outcomes:**

CO1	Understanding entrepreneurship & its importance in economic development.
CO2	The student would be able to understand various legal guidelines to start a small scale unit.
CO3	The students would shape themselves into an Effective and Confident entrepreneur with knowledge in project appraisal etc.,
CO4	The students would be able to understand incentives & subsidy schemes by government for entrepreneur.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H	M		M		
	CO2	H	H	M			
	CO3	H	H	H		M	M
	CO4		M		H	H	
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	

**Course Content:**

**Unit 1** ..... **9**

An introduction to entrepreneurship versus paid employment. The directions ahead for young professionals. Basic concepts of partnerships, proprietorships, private and public limited companies.

**Unit 2** ..... **9**

Legal aspects of becoming an architectural entrepreneur in the Indian environment. Statutory requirements and formalities, Insurance, taxation, documentation and records. Special statutes pertaining to the architectural profession.

**Unit 3** ..... **9**

The concept of workspace-shared workspace. Outreach-the use of social media and marketing platforms.

**Unit 4** ..... **9**

Setting up an establishment-capital and revenue studies, planning for business, review of strategy, tapping of lateral opportunities, SWOC studies.

**Unit 5** ..... **9**

Time management-the role of clients, contractors and service providers- The skills of architectural presentation and the management of project delivery. - Scaling up and planning for the future - Discussions on contemporary professional trends.

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**References:**

1. H.Nandan, Fundamentals of Entrepreneurship, PHI, 3rd Edition 2013
  2. Rajeev Roy, Entrepreneurship, Oxford, 2nd edition 2011
  3. Kaira, Entrepreneurship Development, AITBS
  4. S. S. Khanka ,Entrepreneurial Development, S Chand Publishers
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**BAR21E12****PROJECT MANAGEMENT**

Number of credits	3	Subject Category	PC
Lecture periods per week	3	Internal Assessment	50
Studio/Lab/Workshop /site visit per week	0	End Semester Exam	50
Total period per week	3	Total Marks	100
Total periods	45		

**Subject Objectives:** To equip students with a practical approach to implement building projects, basic knowledge about construction industry, project management techniques needed for managing and coordinating building projects in a professional manner.

**Expected Course Outcomes:**

CO1	To introduce students to the construction part of Architecture
CO2	To acquire basic knowledge of the construction industry
CO3	To learn methods of scheduling to manage the project progress
CO4	To learn the techniques for better coordination and management

**Mapping of Course Outcomes (COs) with Program Outcomes (POs):**

(H/M/L indicates strength of correlation) H- High, M- Medium, L- Low							
1	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6
	CO1	H		H	M		
	CO2	H	H	H	M	H	
	CO3	H	H	H	H	H	
	CO4	H	H	H	H	H	M
3	Category	General (A)	Basic Sciences & Math (B)		Professional Core(D)	Professional Elective(E)	Project/Seminar/ Internship(H)
						✓	
4	Approval					Meeting of Academic Council, May 2021	

## Course Content:

### **Unit 1 - Introduction**.....9

Introduction to project management, construction industry, stake holders, roles, responsibilities and functional relationships, Construction projects — objectives and lifecycle, existing construction practices & project management systems, Project Team, organization, roles, responsibilities. Concepts of project planning, scheduling & controlling. Project scale and construction technology, human aspects in managing projects.

### **Unit 2 – Resources Management and Value Engineering**.....9

Methods of material/ resource estimation and management, Resources scheduling and levelling. Labour welfare, applicable labour Legislations. Construction equipment types, characteristics & applications. Value engineering, its application in building design and construction.

### **Unit 3 – Contracts and Tenders**.....9

Types of building contracts, their merits and de-merits. Types of building tenders, contents of tender documents, tendering process. General conditions of contract, security deposits, interim certificates, defect liability periods, retention amounts, mobilization money and virtual completion.

### **Unit 4 – Project Planning and Scheduling**.....9

Inputs for project planning, defining activities and their interdependency, time and resource estimation. Work breakdown structures. Linear Scheduling methods - bar charts, LOB, their limitations. Principles, definitions of network-based scheduling methods: CPM, PERT. Network representation, Network analysis—forward and backward passes.

### **Unit 5 – Project Monitoring and Control**.....9

Site layout and organization, Site investigations. Quality tests for construction material and processes. Quality control inspections. Project progress tracking. Crashing Project Schedules, its impact on time, cost and quality. Project direct and indirect costs. Safety in Construction Projects.

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## References:

1. Callahan, M.T., Quackenbush, D.G., & Rowings, J.E.(1992). Construction Project Scheduling. McGraw-Hill.
  2. Chitkara, K.K. (2004). Construction Project Management: Planning, Scheduling and Controlling. Tata McGraw — Hill Education.
  3. O'Brien, J.J., and Plotnick, F.L.(2009). CPM in Construction Management. McGraw-Hill Professional.
  4. Wounter Barrs, Project Management handbook, Dans.
  5. Krishnamoorthy, Construction Project Management, CBS
  6. Howard G.Birnberg, Project Management for Designers and Facilities managers -- 3rd Edition, Cengage learning
  7. Richardson, Project Management Theory and Practice, Taylor & Francis
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