



**D. Y. Patil College of
Engineering and Technology**

Kasaba Bawada, Kolhapur

An Autonomous Institute

Structure & Syllabus

Third Year B.Arch.

(Autonomous)

(School of Architecture)

2022-2023



D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY

KASABA BAWADA, KOLHAPUR-416006

An Autonomous Institute

Third Year B. Arch.

Curriculum w.e.f. 2022-2023

Syllabus structure – Semester - V

Sr. No	Course Code	Course Type	Name of the Course	Teaching Scheme Per Week			Credits	Total Marks	Evaluation Scheme			
				Lecture Hours	Tutorial Hours	Practical/ Studio Hours			Type	Max. Marks	Min. Marks for Passing	
											Individual Course	Aggregate
1	201AR301	PC	Architectural Design –V	1	-	6	7	200	ISE	100	50	100
									MSE	-	-	
									ESE(OE)	100	45	
									ESE(TH)	-	-	
2	201AR302	PC	History of Architecture – III	2	-	-	2	100	ISE	20	25	50
									MSE	30	-	
									ESE(OE)	-	-	
									ESE(TH)	50	23	
3	201AR303	PC	Estimation Costing & Specifications –I	1	-	2	3	100	ISE	20	25	50
									MSE	30	-	
									ESE(OE)	-	-	
									ESE(TH)	50	23	
4	201AR304	PC	Working Drawing –I	1	-	3	4	100	ISE	100	50	50
									MSE	-	-	
									ESE(OE)	-	-	
									ESE(TH)	-	-	
5	201AR305	PC	Landscape Architecture	1	-	2	3	100	ISE	50	25	50
									MSE	-	-	
									ESE(OE)	50	23	
									ESE(TH)	-	-	
6	201AR306	BS&AE	Building Construction & Materials – V	2	-	2	4	150	ISE	20	25	75
									MSE	30	-	
									ESE(OE)	50	23	
									ESE(TH)	50	23	
7	201AR307	BS&AE	Structural Engineering For Architecture – III	2	-	-	2	100	ISE	20	25	50
									MSE	30	-	
									ESE(OE)	-	-	
									ESE(TH)	50	23	



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Sr. No	Course Code	Course Type	Name of the Course	Teaching Scheme Per Week			Credits	Total Marks	Evaluation Scheme			
				Lecture Hours	Tutorial Hours	Practical/ Studio Hours			Type	Max. Marks	Min. Marks for Passing	
											Individual Course	Aggregate
8	201AR308	BS&AE	Building Services-III	2	-	-	2	100	ISE	20	25	50
									MSE	30		
									ESE(OE)	-	-	
									ESE(TH)	50	23	
9	201AR309 & 201AR310	PE	Professional Elective-IV	1	-	2	3	100	ISE	50	25	50
									MSE	-	-	
									ESE(OE)	50	23	
									ESE(TH)	-	-	
Total				13		17	30	1050		1050		525

ISE - In Semester Evaluation MSE - Mid Semester Examination ESE - End Semester Examination
 OE - Oral Examination TH - Theory

ESE (TH) will be conducted for 100 marks and converted to 50 marks.

NOTE :- As per CoA Gazette 2020 norms, minimum passing percentage for each individual course to be minimum 45%

LIST OF PROFESSIONAL ELECTIVE COURSES

PROFESSIONAL ELECTIVE-IV			
Sr. No.	Course Code	Name of the Course	Semester
1	201AR309	Digital Architecture	V
2	201AR310	Architectural Design with Steel	



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Syllabus Structure – Semester - VI

Sr. No	Course Code	Course Type	Name of the Course	Teaching Scheme Per Week			Credits	Total Marks	Evaluation Scheme			
				Lecture Hours	Tutorial Hours	Practical/ Studio Hours			Type	Max. Marks	Min. Marks for Passing	
											Individual Course	Aggregate
1	201AR311	PC	Architectural Design –VI	1	-	6	7	300	ISE	100	50	150
									MSE	-	-	
									ESE(OE)	100	45	
									ESE(TH)	100	45	
2	201AR312	PC	History of Architecture –IV	2	-	-	2	100	ISE	20	25	50
									MSE	30		
									ESE(OE)	-	-	
									ESE(TH)	50	23	
3	201AR313	PC	Estimation Costing & Specifications –II	1	-	2	3	100	ISE	20	25	50
									MSE	30		
									ESE(OE)	50	23	
									ESE(TH)	-	-	
4	201AR314	PC	Working Drawing –II	1	-	3	4	200	ISE	100	50	50
									MSE	-	-	
									ESE(OE)	100	45	
									ESE(TH)	-	-	
5	201AR315	BS&A E	Building Construction & Materials –VI	2	-	2	4	150	ISE	20	25	75
									MSE	30		
									ESE(OE)	50	23	
									ESE(TH)	50	23	
6	201AR316	BS&A E	Structural Engineering For Architecture- IV	2	-	-	2	100	ISE	20	25	50
									MSE	30		
									ESE(OE)	-	-	
									ESE(TH)	50	23	
7	201AR317	BS&A E	Building Services –IV	2	-	1	3	100	ISE	20	22	50
									MSE	30		
									ESE(OE)	-	-	
									ESE(TH)	50	23	



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Curriculum w.e.f.2022-2023

Sr. No	Course Code	Course Type	Name of the Course	Teaching Scheme Per Week			Credits	Total Marks	Evaluation scheme			
				Lecture Hours	Tutorial Hours	Practical /Studio Hours			Type	Max. Marks	Min.Marksfor Passing	
											Individual Course	Aggregate
8	201ARL318 & 201ARL 319	OEL	Open Elective-I	3	1	-	4	100	ISE	50	25	50
									MSE	-	-	
									ESE(OE)	50	23	
									ESE(TH)	-	-	
9	201ARMC 320	Mandatory Course	Entrepreneurship Skills for Architects	2	-	-	-	-	ISE	50	25	-
									ESE(TH)	-	-	
									ESE(OE)	50	23	
									ESE(TH)	-	-	
Total				14	1	14	29	1150		1150		525

ISE - In Semester Evaluation MSE - Mid Semester Examination ESE - End Semester Examination
 OE - Oral Examination TH - Theory

ESE will be conducted for 100 marks and converted to 50 marks.

NOTE :- As per CoA Gazette 2020 norms, minimum passing percentage for each individual course to be minimum 45%

ABBREVIATIONS

PC	Professional Core
BS&AE	Building Sciences And Applied Engineering
PE	Professional Elective
OEL	Open Elective
PAECC	Professional Ability Enhancement Core Courses
SEC	Skill Enhancement Courses



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MANDATORY COURSE

1	Entrepreneurship Skills for Architects	Introduction to entrepreneurship, leadership skills and self-motivation, starting a small business, social entrepreneurship and its relevance to the practice of architecture.
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LIST OF OPEN ELECTIVE COURSES

OPEN ELELECTIVES (OEL)			
Sr. No.	Course Code	Name of the Course	Semester
1	201ARL318	Role of Art and Technology in Interior Design	VI
2	201ARL319	Residential Gardening	



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Open Elective:

Open elective courses are offered to gain the knowledge of multidisciplinary areas. Students must choose one open elective course from the list of courses offered by other departments (excluding open elective courses offered by their department). Following is the list of open elective courses. The detailed syllabus is available on to the college website under academic tab.

Sr. No.	Department	Course Code	Open Elective-I Course
1	Chemical	201CHL318	Industrial Safety and Act
		201CHL319	Energy Conservation and Audit
2	Mechanical	201MEL313	Human Resource Management
		201MEL314	Electric Vehicle
3	Civil	201CEL330	Disaster Management
		201CEL331	Green Building
4	Electronics and Telecommunication	201ETL314	Sensor Technology
		201ETL315	Electronic Instrumentation
5	Computer Science & Engineering	201CSL319	E- Commerce & Digital Marketing
		201CSL320	Python Programming
6	Computer Science & Engineering (Artificial Intelligent & Machine Learning)	201AIML320	Applications of AI ML
		201AIML321	Augmented Reality and Virtual Reality
7	Computer Science & Engineering (Data Science)	201DSL319	Basics of Data Science
		201DSL320	Basics of Database



Course Title: Architectural Design - V	
Course Code: 201AR301	Semester: V
Teaching Scheme: L-T-P: 1-0-6	Credits: 07
Evaluation Scheme: ISE Marks: 100	ESE (OE) Marks: 100

Course Description:

The course emphasizes on creative and rational thinking skills for designing multi-level and multi-functional buildings viz. public/religious/healthcare/leisure/institutional, with built up area approximately between 1500 to 2000 sq.mt. Design proposal will be dealt as a contextual comprehensive thought with integration of universal Design, basic services, structural systems and construction details along with landscape and site planning.

Course Objectives:

1	To understand the process of designing buildings with multi levels and multiple functions.
2	To understand integration of advanced technology, materials and services in architectural design.
3	To understand the aspects of campus planning in architectural design.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C301.1	Design the complex buildings with multi levels and multiple functions.
C301.2	Apply appropriate materials, construction technology and services in designing and planning.
C301.3	Design the buildings with due consideration to campus planning aspects.

Prerequisite: Knowledge of designing a small-scale contextual building with basic services and construction technology.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C301.1	2	2	2	2	1	-	-	-	2	-	-	2	-	-	4
C301.2	2	2	2	2	1	-	-	-	2	-	-	2	-	-	3
C301.3	2	2	2	2	1	-	-	-	2	-	-	2	-	-	3



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Literature Study	14
1.1	Literature study related to given design assignment. Study of prevailing building by laws and NBC. Book case study/ Net case study of similar design problem	
1.2	Group discussions & group presentation.	
Unit 2	Case Study	14
2.1	Data collection of the proposed design assignment through relevant live case studies.	
2.2	Comparative analysis of Case studies, presentation and report.	
Unit 3	Architectural Design	56
3.1	Study of site, site analysis (topography, ground surface and 3 dimensional aspects - manmade and natural features). Zoning and inter relationship of spaces through matrix. Conceptual design and Preliminary design with study models.	
3.2	Final Design presentation with drawings, supporting sketches, models and views.	

Sessional Work:

1. Major design Assignment:

- Students should deal with one major design project with approximate built up area of 1500-2000 sq.mt.
- Design assignment may include essence of all subjects learnt in previous years.

Note: Design portfolio for major project should be completed with the help of scaled drawings, the process of drawings, with supporting sketches, models and views.

Reference Books:

1	Julius Panero , Martin Zelnik, Human Dimension & Interior Space: A Source Book of Design Reference Standards, Watson-Guption Publications
2	D. K. Ching , Third edition - Form, Space & Order, John Wiley & Sons, Inc
3	Charles Harris, Time saver standards for landscape architecture, Second edition, McGraw Hill Education
4	National Building Code of India 2016- Vol-1/2/3
5	Fred Hall & Roger Greeno : Building Services Handbook-Students corner .
6	Michael Herz, Campus Landscape Planning & Design, Design Media Publishing (UK) Limited; Sew edition

Video/ Audio Link's:

1	https://youtu.be/d-GzKyK0iw4
2	https://youtu.be/f4HAMuBmJms



Course Title : History of Architecture – III	
Course Code : 201AR302	Semester : V
Teaching Scheme : L-T-P: 2-0-0	Credits : 02
Evaluation Scheme : ISE Marks : 20+MSE Marks: 30	ESE(TH) Marks : 50

Course Description:

This course offers study of Architectural development in chronological manner in western countries with respect to historical periods within the restraints of social and religious customs, geography, climate, building materials and construction techniques, structural complexity and technology available at that time.

Course Objectives:

1	To introduce evolution of settlement patterns.
2	To explain intervention of various impacts on development of buildings in the particular time era.
3	To explain architectural characteristics of particular era with relevant illustrations.
4	To study architecture inspired by Western historic buildings.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to:
C302.1	Understand development of settlements with respect socio economic, cultural and political context of particular time period.
C302.2	Understand architectural development with respect to impacts of climate, geography, culture, religion, technology etc.
C302.3	Understand architectural ornamentation of particular time period.
C302.4	Appraise a historical structure.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C302.1	2	-	-	-	-	-	-	-	3	2	-	-	-	-	2
C302.2	2	-	-	-	-	-	-	-	3	2	-	-	-	-	2
C302.3	2	-	-	-	-	-	-	-	3	2	-	-	-	2	2
C302.4	2	-	-	-	-	-	-	-	3	2	-	-	-	-	2

Prerequisite: Basic understanding of historical buildings with respect to different eras.



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Egyptian Civilization	
1.1	Introduction and study of Architectural characteristic features with respect to typologies like Mastabas, Pyramids, Temples (mortuary and cult), Rock hewn chambers. Development of Indian architecture parallel to Egyptian civilization.	2
1.2	Critical appreciations of structures like Pyramid of Cheops – Gizeh, Stepped Pyramid of Zoser Sakkara, Bent Pyramid of Dashur, Temple of Khons at Karnak, Great temple of Abu simbel.	2
Unit 2	Greek Civilization	
2.1	Introduction and study of architectural characteristic features with respect to typologies like temples and civic building. Development of Indian architecture parallel to Greek period.	1
2.2	Critical appreciation of structures like Acropolis, Agora, Stoas, Theatres, Dwellings	1
2.3	Study of Greek orders- Doric, Ionic, Corinthian	1
2.4	Study of their contributions like optical corrections in architecture, method of column entasis and use of golden section.	1
Unit 3	Roman Civilization	
3.1	Introduction and study of architectural characteristic features with respect to typologies like dwellings, colosseum, Thermae, aqua ducts, Triumphal arches, temples, amphitheatres etc. Development of Indian architecture parallel to Roman period.	2
3.2	Study of column orders – Tuscan and Composite	1
3.3	Study of Roman contribution towards engineering – Discovery of Puzzolona cement and construction of walls, arches, vaults, bridges etc.	1
Unit 4	Early Christian and Byzantine Period	
4.1	Introduction and study of Architectural characteristic features. Development of Indian architecture parallel to Early Christian and Byzantine Period.	2
4.2	Study of parts of Basilican churches – Basilica of St. Peters, Rome, St Clemente Rome.	1
4.3	Study of Byzantine features in Constantinople- St. Hagia Sophia, study of domes and Pendentives.	1
Unit 5	Romanesque Architecture	
5.1	Introduction and study of architectural characteristic features of typologies like Pisa complex- cathedral, campanile baptistery. Development of Indian architecture parallel to Romanesque period.	2
5.2	Study of new concepts of external massing, articulation, crossing, triforium gallery, radiating chapels etc.	2
Unit 6	Gothic Architecture	
6.1	Introduction to development of Gothic period in France, Britain and Italy. Development of Indian architecture parallel to Romanesque period.	1
6.2	Study of architectural features like pointed arch. Vaulting, flying buttresses, frescoes, rose window etc.	1
6.3	Study of ornamental features with examples.	1
6.4	Study of structures like St. Dennis, Notre Dame de Paris.	1



Text Books:

1	Sir Banister Fletcher, A History of Architecture CBS publication 20 th Edition 2002
2	Francis D.K. Ching, Mark. M Jarzombek, VikramadityaPrakash, 'Global History of Architecture' John Wiley and Sons 2017

Reference Books:

1	Sushma Parashar 'Global History of Architecture'
2	Francesca Prina, 'The Story of Romanesque Architecture', Prestel New York 2011
3	Francesca Prina, 'The story of Gothic Architecture' . Prestel New York 2011
4	Daren Yarwood, 'Chronology of western Architecture' , Pover publications Inc, New York 2010
5	Watkin D. 'A history of western Architecture'. Thames and Hudson 1986.

Video / Audio links:

1	Egyptian architecture - Pyramids : https://youtu.be/lotbZQ55SgU Temples : https://youtu.be/EabKVN5pAxc
2	Greek architecture - Acropolis : https://youtu.be/15vilcnw3BI
3	Roman architecture - Colosseum : https://youtu.be/7FpQ1CmcPYQ Aquaducts : https://youtu.be/BihMQVi5T00 Roman baths : https://youtu.be/h6dkadxtvIY
4	Romanesque architecture – Structures : https://youtu.be/QT0ITLRkNyg Churches : https://youtu.be/-DLI4BPcoq8
5	Byzantine architecture –Istanbul : https://youtu.be/XfpusWEd2jE Early Christian Architecture : https://youtu.be/DdhVEejCbiA
6	Gothic architecture -Notre Dame, Paris : https://youtu.be/5zXtIRI3pkI Milan Cathedral, Italy : https://youtu.be/BnWh2hDF6XI



Course Title : Estimation, Costing and Specifications- I	
Course Code : 201AR303	Semester : V
Teaching Scheme : L-T-P : 1-0-2	Credits : 03
Evaluation Scheme : ISE Marks : 20 + MSE Marks: 30	ESE(TH) Marks: 50

Course Description:

This course deals with tools and techniques of estimation and costing of construction projects. It also involves understanding financial aspects in construction projects. The course covers understanding of terms estimation, costing & specifications, aims and objectives of estimation, various methods of approximate estimates. It also covers types of estimates & types of specifications.

Course Objectives:

1	To understand methods of estimation.
2	To understand the methods of rate analysis.
3	To understand concept of specification writing.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C303.1	Prepare bill of quantities
C303.2	Prepare rate analysis.
C303.3	Write specifications

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C303.1	3	3	-	-	-	2	2	2	2	2	-	-	-	-	3
C303.2	3	3	-	-	-	2	2	2	2	2	-	-	-	-	3
C303.3	3	3	-	-	-	2	2	2	2	2	-	-	2	-	2

Prerequisite: Basic understanding of construction components and sequence of construction.



Unit No.	Course Content	Hrs.
Unit 1	Types of estimates	
1.1	Definitions and meaning of estimation and costing.	6
1.2	Approximate estimates and its types.	
1.3	Detailed estimates and its types.	
Unit 2	Terms of estimation	
2.1	Revised estimate , supplementary estimate, revised supplementary estimate, annual repairs, Maintenance estimate, Out turn, B.O.Q.	6
2.2	Contingencies, Work charge establishment, Lead & lift Provisional items, Provisional quantities, Provisional sum, Spot items	
Unit 3	Method of estimation	
3.1	Listing of building items and modes of measurements (I.S.1200) of various items of construction.	9
3.2	Measurement and abstract forms	
3.3	Principles and methods of taking out quantities	
3.4	Center line method	
3.5	Long wall- Short wall method	
3.6	Rules of deduction	
Unit 4	Rate analysis	
4.1	Principals of rate analysis, factors affecting rate analysis.	9
4.2	Market survey of materials & labor rates	
4.3	Analysis of rates for various items of construction.	
Unit 5	Specifications	
5.1	Introduction to specification	6
5.2	Purpose of specifications	
5.3	Types of specifications	
5.4	Method of drafting specifications.	

Sessional work:

- Notebook.
 - Estimates of construction components.(septic tank, water tank, garage, compound wall etc.)
 - Estimate of a load bearing structure (50 sq.m.).
- Market survey of rates of materials' & labour.
- Analysis of rates of various building items.
- Collection and study of sample estimate from an architect's office.

Text Books:

1	B. N. Datta ,Estimation and costing in Civil Engineering, CBS Publishers & Distributors Private Limited; 28th edition
2	Estimating, costing, specification & valuation in Civil engineering by M. Chakraborty, M.K. Publishers and Distributors; 24th edition

Reference Books:

1	PWD-SSR (latest published)
2	I.S. Code 1200



Course Title : Working Drawing-I	
Course Code : 201AR304	Semester : V
Teaching Scheme : L-T-P : 1-0-3	Credits : 04
Evaluation Scheme : ISE Marks : 100	ESE Marks :- Nil

Course Description:

The purpose of this course is to develop and transform design into computerized working drawings & municipal drawings as per latest building bylaws. This course deals with preparation of working drawings as a means of communication between architect & contractor/s for execution of buildings.

Course Objectives:

1	To introduce working drawing and its significance in the construction of buildings.
2	To identify an appropriate structural system for building.
3	To explain content and methodology of municipal drawing.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C304.1	Distinguish between architectural drawing & working drawing.
C304.2	Prepare working drawing as per appropriate structural system.
C304.3	Prepare municipal drawing.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C304.1	3	2	2	-	2	-	-	-	-	2	-	-	-	-	4
C304.2	3	2	3	-	3	-	-	-	2	3	-	-	3	-	3
C304.3	3	2	3	-	3	-	-	-	3	3	-	-	-	-	3

Prerequisite: Basic knowledge of building construction technology & architectural graphics.



Unit No.	Course Content	Hrs.
Unit 01	Introduction to Working Drawing	04
Unit 02	Sub-structure	
2.1	Centerline plan	08
2.2	Excavation plan	
2.3	Foundation plan with footing details	
Unit 03	Super-structure	
3.1	Ground beam & Plinth beam	28
3.2	Slab layouts with floor beams	
3.3	Detail floor plans along with schedule of internal finishes, door & window schedule.	
3.4	Sections with brief specification min. 4 (Toilet & staircase section compulsory)	
3.5	All side elevations with brief specifications.	
Unit 04	Municipal submission–municipal drawing and file submission, contents of municipal drawing as per prevailing bylaws for approval.	8

Text Books:

1	Robert C. McHugh_1982_ Working Drawing Handbook: A Guide for Architects and Builders, Van Nostrand Reinhold Company.
2	Mantri Institute of Development and Resarch,Pune_1998_Practical building construction & its Management, Third Edition, Satya Prakashan

Reference Books:

1	Francis D.K.Ching_2018_Building Construction illustrated _Fourth edition , Wiley
2	Anirudha Kolhatkar_2015_Building Construction &Material_First Edition,

Video Links:

1	Complete construction of RCC –DESIGN _ https://www.youtube.com/watch?v=_A7_tfvT0UY
2	How To Make Building Plan I Sanction Map Drawing I Explain ByArPrashantPardhi _ https://www.youtube.com/watch?v=5aNOOgNUJpg

Note :- ESE (OE) for the courses Working Drawing-I (Sem.–V) and Working Drawing-II (Sem.–VI) will be conducted at the end of Sem. VI.



Course Title : Landscape Architecture	
Course Code : 201AR305	Semester : V
Teaching Scheme : L-T-P : 1-0-2	Credits : 03
Evaluation Scheme : ISE Marks : 50	ESE(OE) Marks : 50

Course Description: This course is designed to give students a brief overview of landscape architecture, its importance in site planning and awareness about sustainable practices in landscape. This course shall have a direct application in the design studio of the same semester as well as subsequent semesters for site planning and landscape design of the respective design assignments.

Course Objectives:

1	To understand elements, principles, aspects and scope of Landscape Architecture.
2	To identify the role of hardscape and soft scape elements in design of indoor and outdoor environments for various projects.
3	To learn principles of site planning, sustainable practices and technical details of landscape services.
4	To distinguish the characteristics of historic landscapes and the development of modern, contemporary landscape.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C305.1	Use the elements and apply principles of Landscape Architecture in their design assignments.
C305.2	Select appropriate hardscape and soft scape elements for the subsequent design assignments.
C305.3	Apply principles of site planning, sustainable practices and landscape services in their subsequent design assignments.
C305.4	Analyze the sequential development of landscape character from historical to modern era and contemporary landscape developments.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C305.1	3	3	3	3	2	3	3	-	2	3	-	-	3	3	2
C305.2	3	3	3	3	2	3	3	-	2	3	-	-	3	3	3
C305.3	3	3	3	3	2	3	3	-	2	3	-	-	3	3	2
C305.4	3	3	3	3	2	3	3	-	2	3	-	-	3	3	3

Pre requisite: Basic understanding of aesthetics and principles of design.



Unit No	Course Content	Hrs.
Unit 1	Introduction to Landscape Architecture	
1.1	Need and scope.	9
1.2	Aspects of landscape architecture from functional, socio-cultural, ecological, economical, aesthetical point of view.	
1.3	Study of landscape characters, Landscape elements (natural/manmade).	
1.4	Such as land, vegetation, water, geology & climate, etc.	
1.5	Principles of landscape design.	
	Studio - Introduction of Landscape design assignment and its concept development.	
Unit 2	Hardscape and Softscape elements	
2.1	Hardscapes such as pergolas, garden furniture, water features, fences, rockery, masonry, paving & surfacing, roads& parking lots, walkways & plazas w.r.t. materials and landscape construction details.	6
2.2	Softscapes such as plantation, turfing. Design criteria for landscape design such as visual, functional, micro-climatic, ecological and aesthetic. Basic horticultural study of plants, plant selection, planting design and care of plants. Artificial Landscape elements.	
	Studio- Site development w.r.t Zoning and hardscape & soft scape elements of given Landscape design assignment.	
Unit 3	Site planning and site analysis	
3.1	Lecture - Study of factors affecting landscape design, i.e. context, climate(Macro & Micro) w.r.t. surrounding environment.	6
3.2	Site analysis includes study of physical and socio-cultural context, topography, hydrology and vegetation.	
3.3	Introduction to sustainable site planning and sustainable Landscape design. Green practices: Soil protection during and after construction, reduction of hard paving and circulation areas water efficient landscapes, designs to include existing natural features.	
	Studio- Site development w.r.t site planning aspects and Green practices of given Landscape design assignment.	
Unit 4	Landscape design and Services	
4.1	Lecture - Landscape Services like electrical, surface water drainage, irrigation, soil management techniques and plantation detail.	6
	Studio- Site development w.r.t Landscape Services of given Landscape design assignment.	
Unit 5	History of Landscape Architecture	
5.1	Lecture –Brief historic overview of the evolution of the landscape history, origin of garden concept, history of Landscape Architecture including natural & cultural factors of the place, development of landscape architecture through history in different parts of the world such as Persia, Egypt, Greece, Rome ,China, Japan, Italy, France, Spain, England and Ancient India and Mughal Period.	
5.2	Concepts of Modern & Contemporary Landscape architecture.	



Curriculum w.e.f. 2022-2023

5.3	Study of elements and types through contemporary works of renowned landscape architects – Ravindra Bhan, Mohamed Shahir, Aniket Bhagwat, Jayant Dharap, Varsha and Ravi Gavandi, Nilima and Vikas Bhosekar, Mangesh Prabhugaonkar, Dr. Priyaleen Singh.	6
5.4	Studio- Development of working drawing and plantation plan w.r.t given Landscape design assignment.	
Unit-6	Final presentation & working Drawings	6
6.1	Lecture – Presentation techniques & landscape working drawings.	
	Studio- Final Submission of given Landscape design assignment.	

Text Book:

1	Landscape architecture a manual of site planning and design – Symonds Residential landscape architecture, Norman. K. Booth
2	Visual analysis of landscape development, Peter Jacobs and Douglas Way
3	Landscape planning and energy conservation. Gary. O. Robinette (ed), Van-Nostrand Reinhold Introduction to landscape architecture, Michael Laurie
4	The landscape of man, Geoffrey and Susan Jellicoe, Thames and Hudson
5	Site planning by Kevin Lynch and Gary Hack.
6	Elke Mertens, publisher Medialis, Berlin - Visualizing Landscape Architecture- functions, concepts, strategies, edition 2010.
7	K.C. Sahni, publisher Oxford University Press - The book of Indian Trees, edition 2000.
8	Shrikant Ingalhalikar, Sharvari Barve, publisher Corolla Publications, Pune – Trees of Pune, field guide to 482 Arore plants of Pune city, edition 2010.
9	Bushra Ahmed, Hina Jain, Nidhilekha Mathur, publisher D.K. Penguin Random House – Gardening in Urban India with practical projects for small spaces, edition 2016.
10	Archiworld Co.Ltd - Landscape Space Volumes 1,2,3,4&5
11	Landscape Architecture: History, Ecology and Patterns by I P Singh (Author), Minakshi Jain (Author) Copal Publishing Group.
12	Landscape Architecture In India. by Mohammad Shaheer (Editor), Geeta Wahi Dua (Editor), Adit Pal (Editor) – LA Journal of Architecture.

Reference Books:

1	Time saver standards for landscape architecture
2	National building code 2016
3	Trees of Central India by Pradip Kishan.
4	'Landscape Architecture' by JO Simonds, McGrawhill education, Delhi, 1983 and onwards.
5	Griha Manual Volume 2-4 Adarsh.

Video/ Audio Link's:

1	How Much Sun A Plant Needs Gardening Basics Part1- https://youtu.be/Neda0goqbRk
2	Home Gardening Tips for Beginners Lesson - 1 Home/Garden- https://youtu.be/CyhpDmwzP-w
3	How to Make a Terrace Vegetables Garden- https://youtu.be/feIJXJqNfoc
4	Grow Plants in small Balcony- https://youtu.be/nHLTxMojOg8



Course Title: Building Construction & Materials - V	
Course Code:201AR306	Semester: V
Teaching Scheme: L-T-P: 2-0-2	Credits: 4
Evaluation Scheme: ISE Marks : 20 + MSE Marks: 30	ESE Marks:(TH):50+ (OE):50

Course Description:

The course intends to explore process of construction activities, supervision of construction, appropriate use of building materials and preparation of detailed drawings to be used for construction by understanding various structural concepts and properties of building materials. Along with modern construction methods, the course also describes prevailing non conventional construction methods. The course also includes site visits, case studies and measure drawings of various stages of construction.

Course Objectives:

1	To introduce contemporary construction techniques.
2	To introduce non-conventional building construction methods.
3	To explain construction details through case studies.
4	To explain process of construction and supervision.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C306.1	Apply knowledge of contemporary construction techniques during preparation of detailed drawings.
C306.2	Select proper material based on contextual needs.
C306.3	Design details in order to make better buildings.
C306.4	Apply knowledge of construction process for supervision and construction of better buildings.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C306.1	3	-	2	2	-	-	3	-	2	2	-	-	-	2	3
C306.2	2	-	1	1	-	-	2	-	2	1	-	-	-	1	2
C306.3	3	-	2	2	-	-	3	-	3	2	-	-	-	2	3
C306.4	3	-	2	2	-	-	3	-	2	2	-	-	-	2	3

Prerequisite: Understanding of preparing detail construction drawings.



Unit No.	Course Content	Hrs.
Unit 1	Material	8
1.1	Mastic Sealants, Waterproofing compounds, Additives	
1.2	Various types, their compositions, properties and application.	
1.3	Construction	
	Retaining Walls Masonry retaining walls- gravity retaining walls, mass retaining wall. R.C.C. retaining walls- various types, reinforcement details, formwork details, construction joints, water bars, waterproofing details.	
Unit 2	Material	8
2.1	Ferrous and Non-ferrous materials	
	Introduction, iron ores, selection of iron ores, variation of iron ores <ul style="list-style-type: none"> • Cast iron- composition, types, properties, uses. • Wrought iron- properties, defects, uses. • Zinc- properties, types, uses. • Copper- properties, types, uses. 	
2.2	Construction	
	Pre-Engineered buildings (PEB)	
	Concept of pre-engineered buildings, steel stanchions, beams, castellated beam, built up stanchions, built up beams, connection details of stanchion- foundation, stanchion-stanchion, stanchion- beam, beam-beam, flooring connections, haunched connection, connections of steel sections with concrete.	
Unit 3	Material	8
3.1	Soil for rammed earth construction	
	Type of soil, composition of soil, properties of soil, structure of soil, soil identification, soil stabilization methods.	
3.2	Construction	
	Non-Conventional Building Construction methods -Rammed Earth Construction	
	Introduction to rammed earth construction techniques for shallow foundation plinth details, rammed earth walls and its junctions, door and window fixing details in rammed earth.	
Unit 4	Material	8
4.1	Alloys	
	Aluminium alloys, copper alloys, their properties and uses.	
4.2	Construction	
	Claddings	



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		Various cladding materials, construction details of claddings in stone, brick, wood, tiles, aluminium composite panels (ACP), UPVC. Cladding for industrial buildings.	
Unit 5	Material		
5.1	Glass		
		Classification, composition, and properties of glass, Different types of glass, coloured glass, Available size and thickness of glass,	8
5.2	Glass Curtain walls and structural glazing		
		Typical construction details of glass curtain walls and structural glazing, spider fittings, double skin curtain walls, maintenance of curtain walls and structural glazing.	
Unit 6	Material		
6.1	Thermal insulation materials		
		Introduction, types and uses of thermal insulation materials	
6.2	Construction		
		Vertical transportation	8
		Wooden staircase ,Composite staircase- constructional details of staircase with composite materials- steel & plywood/ block board, wood, tile etc., R.C.C and wood etc. Different types of railings. Lifts & Escalators	

Text Books:

1	Chudley Roy Advanced Construction Technology–Prentice Hall; 4th edition (13 July 2006)
2	S. P. Arora, S.P. Bindra , A Text-Book of Building Construction - Dhanpat Rai & Co.,14 th edition
3	Building Materials & Construction – Punmia

Reference Books:

1	McHenry Paul Graham, Adobe and Rammed Earth Buildings, University of Arizona Press
2	Anirudha Kolhatkar, 2015, Building Construction & Material, First Edition,

Video/ Audio Links:

1	http://www.earth-auroville.com/index.php (For Rammed Earth construction)
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Course Title : Structural Engineering For Architecture - III	
Course Code :201AR307	Semester :V
Teaching Scheme : L-T-P : 2-0-0	Credits : 2
Evaluation Scheme : ISE Marks : 20+MSE Marks: 30	ESE Marks(TH) : 50

Course Description:

This course deals with use and application of tools and techniques required to study the behavior of various structural system and feasibility of different structural systems. The course also includes Design process for RCC members. It also develops knowledge about choice of proper section, strength consideration, behavior and response of loads. The site visits will help students to understand the practical difficulties.

Course Objectives:

1	To understand the behavior of RCC Structural systems.
2	To Analyze feasibility of different structure systems, limitation of forms spans.
3	To study the strength of material and its behavior under the load.
4	To select proper structural section with concept of factor of safety, characteristic strength of material.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C307.1	Predict the behavior RCC Structural systems.
C307.2	Select the appropriate structural system.
C307.3	Calculate the sizes of then different structural members.
C307.4	Design proper structural section with concept of factor of safety, characteristic strength of material.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C307.1	3	3	-	-	-	2	2	2	2	2	-	-	-	-	2
C307.2	3	3	-	-	-	3	2	2	2	2	-	-	-	-	3
C307.3	3	3	-	-	-	3	2	2	2	2	-	-	2	-	2
C307.4	3	3	-	-	-	2	2	2	2	2	-	-	2	-	3

Prerequisite: Fundamentals of theory of structures and material properties like tensile strength, compressive



strength. etc

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Unit No.	Course Content	Hrs.
Unit 1	Introduction to RCC	
1.1	Definition, advantages of RCC, Types of load combinations, limit state method of design	2
1.2	Characteristic strength of materials, factor of safety, practical knowledge about compressive strength of concrete and tensile strength of steel.	
1.3	Laboratory experiment observations expected.	1
Unit 2	Design of singly reinforced beam	
2.1	Limit state of collapse, assumptions, stress-strain relationship, strain diagram, stress block diagram for singly reinforced beam.	1
2.2	Design parameters, neutral axis, lever arm, total tensile and compressive force.	1
2.3	Types of sections, balanced section, under-reinforced section, over-reinforced section, design and analysis of singly reinforced section. Concept of Doubly Reinforced section T Beam and L Beam (Only Theory)	3
Unit 3	Design of shear reinforcement	
3.1	Concept of shear, bond and development length	1
3.2	Design of shear reinforcement.	2
3.3	Site visit to study the reinforcement.	1
Unit 4	Design of short axially loaded RC column	
4.1	Design of short axially loaded RC columns (circular, rectangular, square).	2
4.2	Analysis of RCC columns.	2
Unit 5	Simply supported slab and cantilever slab	
5.1	Concept of one-way and two-way slab.	1
5.2	Design of one-way simply supported slab.	2
5.3	Design of cantilever slab.	1
Unit 6	Design of axially loaded RCC footing	
6.1	Structural action of foundation.	1
6.2	Design of axially loaded RCC footing.	2
6.3	Information about software available to design the components like column and footing.	1

Sessional work

- Class notes.
- Assignments based on above topics
- Case study report
- Structural layout for 1st year design problem.



Text Book:

1	S. Ramamrutham ,RCC Design.
2	HR. R. Gadpal and D. J. Khamkar ,Design of steel and RCC Structure.

Reference Books:

1	IS 456-2000
2	Hulse, Ray and Chain, Jack (2016) Structural Mechanics, Macmillan International Higher Education.
3	Salvadori, M and Heller , RA (1963), Structure in Architecture,3 rd ed. ,prentice Hall
4	Hjelmstad, Keith D.(2005),Fundamentals of Structural Mechanics,2 nd ed., Springer

Video/ Audio Link's:

1	Design of RCC Structures by limit state method. https://youtu.be/ebS3r-hmxaM
2	Relationship of structure to Architectural Buildings . https://youtu.be/3uUZt-w-p-l



Course Plan

Course Title : Building Services - III	
Course Code : 201AR308	Semester : V
Teaching Scheme : L-T-P : 2-0-0	Credits : 02
Evaluation Scheme : ISE Marks : 20+MSE Marks: 30	ESE (TH) Marks : 50

Course Description:

The variety in the Design Projects leads to variation in the Services they contain. In this course, the students are explored to various services needed for different types of projects like hospital, hotels and high rise structures.

Course Objectives:

1	To explain various hospital and hotel services
2	To update latest technological concepts of automation used in building services
3	To introduce the various services which are required while designing high rise structures.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C308.1	Understand various hospital and hotel services in the building.
C308.2	Use the latest concepts of building automation in services
C308.3	Understand various services required for high rise structures

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C308.1	3	3	3	-	-	3	-	-	3	2	-	-	-	2	2
C308.2	2	2	2	-	-	2	-	-	2	1	-	-	-	1	3
C308.3	3	3	2	-	-	3	-	-	2	2	-	-	-	1	2

Prerequisite: Knowledge of basic building services.



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Hospital gases & CSSD, Bio-medical waste and Incinerator	4
1.1	Hospital gases & CSSD (Central Sterile Supply Department) Types of gases needed for hospitals. Flow chart, tentative plan, location, area and planning of CSSD.	
1.2	Bio-medical waste and Incinerator- Classification, segregation, collection, treatment and disposal of Bio-medical waste along with details of ducts to be provided.	
Unit 2	Laundry & Housekeeping-	4
2.1	Laundry - Location of laundry in building, laundry process, laundry operation, planning and its space requirements, flow process chart, factors to be considered while designing.	
2.2	Housekeeping- Flow chart for housekeeping personnel, coordination of housekeeping with other departments, housekeeping services.	
Unit 3	Pneumatic Medicine distribution system & Infection control system	4
3.1	Pneumatic Medicine distribution system- Introduction, Application for hospital buildings, types, its working and area requirements.	
3.2	Infection control system- Introduction, function, area requirement, space allocation for equipments required, special treatment required.	
Unit 4	Commercial kitchens & Swimming pool services	4
4.1	Commercial kitchens - Function, planning and area requirements for hotel/ restaurant kitchen, diet kitchens for hospitals and community kitchen.	
4.3	Swimming pool Services- Filtration plant, balancing tank, water strainers, water heating, underwater lighting.	
Unit 5	Building Automation System	2
5.1	Automation control from server room, Modern security systems	
5.2	Home Automation, alarm system, intercommunication, monitoring devices	
Unit 6	High rise Building Services & STP	6
6.1	High rise building services- Water supply, drainage & Electrical distribution for high rise buildings. Pneumatic waste collection system, service floors, drainage transfer floors.	
6.2	STP- Working of Sewage/Effluent water treatment plant for hospitals and hotels in order to reuse the water for toilet flushing or gardening. Space requirement, location and capacity of the same.	

Sessional work

- Class notes.
- Assignments based on above topics.
- Prepare layout showing allocation of above services into design problems of semester V.



Reference Books:

1	Kunders G. D., Hospitals Facilities Planning and Management, McGraw Hill Education.
2	Kunders G. D., Designing for total quality in health care, Prism
3	Mittal A.K. Electrical and Mechanical Services in High rise Buildings, Design and Estimation manual.
4	Lepik Andres, Skyscraper, Prestel
5	Dutta Subijoy, Environmental Treatment Technologies for Hazardous and Medical Wastes, Remedial Scope and Efficacy, Tata McGraw Hill Education (22 March 2002)
6	Ghose D.N, Operation and maintenance of sewage treatment plant, CBS Pub. & Distri. Delhi
7	Dr. Sharad Gajuryal, Linen and Laundry service
8	Raghubalan and Smritee Raghubalan, Hotel Housekeeping Operations Management, Oxford Higher Education
9	NBC 2016
10	UDCPR 2020

Video/ Audio Link's:

1	CSSD- https://youtu.be/CtVWzU8FG4M
2	Hospital Gases- https://youtu.be/u7H5EEQBra0
3	Hospital services integration- https://youtu.be/Xph4w8vo9bI , https://youtu.be/Xph4w8vo9bI
4	Laundry- https://youtu.be/tITG0ckop70



Course Title : Professional Elective - IV – Digital Architecture	
Course Code : 201AR309	Semester : V
Teaching Scheme : L-T-P : 1-0-2	Credits : 3
Evaluation Scheme : ISE Marks :- 50	ESE Marks (OE) :- 50

Course Description:

Digital Architecture is the revolution in the field of architecture that utilizes digital media in the process of architectural design. The students will be acquainted with the paradigm shift from computerization to computation. It will also help in designing the concept, design development and detail designing of the architectural form. This course will enable students to understand the evolution of digital architecture, scope of digital architecture, apply the knowledge of software to create walkthroughs and models using 3D printing.

Course Objectives:

1	To understand the potential of digital architecture as future architecture.
2	To develop a conceptual understanding of the software used in digital architecture.
3	To use digital software for the development of concepts and intended design outcomes.
4	To illustrate creative design outcomes with reference to use of appropriate software.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C309.1	To understand the scope and evolution of digital architecture.
C309.2	To analyze the difference between conventional and digital working methodologies while creating design outputs.
C309.3	To apply digital software to prepare conceptual models.
C309.4	To prepare design models by using appropriate software.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSO)		BTL
													1	2	
C309.1	-	3	-	3	3	-	3	-	3	-	-	3	-	-	2
C309.2	-	2	-	3	3	-	3	-	3	-	-	3	-	-	4
C309.3	-	2	-	3	3	-	3	-	3	-	-	3	-	-	3
C309.4	-	2	-	3	3	-	3	-	3	-	-	3	-	3	3

Prerequisite: Creating 2D plans, AutoCAD drafting, 3D modeling.



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit- 1	Introduction to Digital Architecture	
1.1	Aspects of digital architecture	3
1.2	Types of digital architecture.	
1.3	Works of prominent architects.	
Unit-2	History and Scope of Digital Architecture	
2.1	Evolution of digital architecture – Past, Present and Future.	6
2.2	Digital Innovations throughout history of architecture – Planning and designing tools, BIM, Artificial Intelligence, Surveying Software, Project Management tools, Environment Simulation tools, 3D printing, Graphic Designing Tools.	
Unit -3	Application of Software	
3.1	Design of furniture, artifacts, etc. by using Google SketchUp.	9
3.2	Rendering using Lumion, walkthroughs, scene settings, presentation drawings using Photoshop, CorelDraw.	
Unit -4	Parametric Software	
4.1	Introduction to Rhino and Grasshopper	9
4.2	Different techniques of using the computer for designing	
Unit -5	Digital Printing	
5.1	Application of Creality Slicer software.	6
5.2	3D printing – Introduction to machine handling, materials required, 3D printing of models.	
Unit- 6	Introduction to Virtual Reality and Augmented Reality	
6.1	Introduction to VR, AR, MR.	3
6.2	Use of VR in Architecture, scope of VR in Architecture, Difference between VR and AR.	

Text Book:

1	Author (Paulson E. D.) Computer Aided Drafting and Design - BPB Publisher
2	Author (David L. G) Corel Draw in a Day - Printec Hall Publisher

Reference Books:

1	Kolarevick Branko - Architecture in the Digital Age: Design and Manufacturing
2	Kolarevick Branko – Manufacturing Material Effects Rethinking Design and Making in Architecture
3	Oxman Rivka – The New Structuralism - John Wiley & Sons
4	Oxman Rivka and Oxman Robert – Theories of Digital in Architecture - Routledge
5	Iwamoto Lisa – Digital Fabrication and Material Techniques - Princeton Architectural Press

Video/ Audio Link's:

1	https://www.youtube.com/c/DigitalArchitecture
2	https://www.youtube.com/watch?v=Lc-Af72EuRY
3	https://www.youtube.com/watch?v=YR3_8MPz-7c

NOTE: Practical examination to be taken during the ESE (OE).



Curriculum w.e.f. 2022-2023

Course Plan

Course Title : Professional Elective - IV – Architectural Design with Steel	
Course Code : 201AR310	Semester : V
Teaching Scheme : L-T-P : 1-0-2	Credits : 03
Evaluation Scheme : ISE Marks : 50	ESE Marks (OE) :- 50

Course Description:

The subject will help the students to explore the steel as a construction material, its different qualities. It will help the students to learn application of the steel in architectural way. Students can also study different aspects of steel structure over conventional architectural structure. With the help of different case studies the student can analyze the different forms of steel structures and its suitability also they will learn how they can implement this knowledge in their design.

Course Objectives:

1	To understand the design potential of steel as a material for architectural design.
2	To inform the various components of steel as a structural and aesthetic design element.
3	To study the different aspect of steel structure over conventional architectural structure.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C310.1	Understand different properties of steel as a construction material
C310.2	Implement different form of steel structures.
C310.3	Understand difference between conventional architectural structure and steel structure.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C310.1	3	3	-	-	-	2	2	2	2	2	-	-	-	-	2
C310.2	3	3	-	-	-	2	2	2	2	2	-	-	2	-	2
C310.3	2	2	-	-	-	1	1	1	1	1	-	-	1	-	2

Prerequisite: Knowledge of different structural systems, Current trend of construction, different physical properties of steel.



Unit No.	Course Content	Hrs.
Unit-1	Historical Background	
1.1	History of material development from iron to steel	3
1.2	Study of material of steel, structural properties of steel in construction	3
1.3	Industrial revolution and mass fabrication of steel.	4
Unit-2	Forms of Structure	
2.1	Different steel sections, Hollow structural sections, understanding of various typologies of high tech movement- extruded grid/bay, arched/ curved structures.	4
2.2	Tension and compression in diagrid structures connection types (Bolted, Welded and cast connections), member types (tubular and standard sections).	4
Unit-3	Sustainability	
3.1	Introduction to steel as a sustainable material (recycle, reuse) adaptive reuse of steel, low carbon design strategies.	3
Unit-4	Steel and Glass Study	
4.1	Study of technical aspects of combination of steel and glass, various steel and glass envelopes, (Curtain wall system, wind braced support system)	4
4.2	Spider steel connections, simple and complex cable system, Transformation of Architectural design into fabricated elements.	4
Unit-5	Protection of steel	
5.1	Corrosion and fire protection finishes and coating systems of steel.	3
Unit-6	Building Typology	
6.1	Various types of building constructed using steel as construction material. Case studies based on above. (any two)	4

Sessional work

- Class notes.
- Assignments based on above topics
- Case study report

Text Book:

1	Structure as architecture by Andrew Charleson.
2	Architectural Iron and Steel and its application in the construction of building by Wm H Birkmire (Birkmire WMH.)
3	The manufacture and properties of structural steel. (Campbell Harry house.)
4	Architectural Design in Steel (Lawson Mark.)
5	Structure and Architecture by Angus. J. Macdonald.



D.Y.PATIL COLLEGE OF ENGINEERING & TECHNOLOGY

KASABA BAWADA, KOLHAPUR-416006

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Reference Books:

1	Architecture and Construction in Steel, Alan Blanc, Michael McEvoy, Roger Plank · 1993
2	Structure for Architects, A Case Study in Steel, Wood, and Reinforced Concrete Design By Ashwani Bedi, Ramsey Dabby · 2019

Video/ Audio Link's:

1	Steel + Residential Architecture - An Architect's How-to Guide, https://youtu.be/N08XW9wNRYc
2	Rock Reach House Framed in 5 Days - Time Lapse, https://youtu.be/ycTajJov1jI



Course Title: Architectural Design - VI	
Course Code: 201AR311	Semester: VI
Teaching Scheme: L-T-P: 1-0-6	Credits: 7
Evaluation Scheme: ISE Marks: 100	ESE Marks:(TH):100+ (OE):100

Course Description:

The studio emphasis is on creative and rational skills for designing industrial buildings viz. manufacturing unit for bakery, textile, dairy, packaging etc. with built up area approximately between 1500 to 2000 sq.mt. considering the safety norms for workers. Design proposal will be dealt as a contextual comprehensive thought considering the emotional and functional aspects with integration of universal design, basic services, structural systems and construction details along with landscape and site planning.

Course Objectives:

1	To understand the industrial building design with integration of different services.
2	To understand the spatial and structural implications of construction technology and materials.
3	To understand the local building bye laws required for industrial buildings.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C311.1	Design a small-scale industrial building.
C311.2	Apply modern materials and construction technology and services in designing and planning.
C311.3	Use the appropriate building bye laws required for designing of industrial buildings.

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)
And Program Specific Outcomes (PSOs)**

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C311.1	2	2	2	2	1	-	-	-	2	-	-	2	-	-	4
C311.2	2	2	2	2	1	-	-	-	2	-	-	2	-	-	3
C311.3	2	2	2	2	1	-	-	-	2	-	-	2	-	-	3

Prerequisite: Students should have knowledge of designing a small-scale contextual building with basic services and construction technology.



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Literature Study	
1.1	Questionnaire design for case study and site study.	14
1.2	Activity mapping - Study of detailed routine (timetable) during weekdays, weekends, resolved through activity mapping in terms of spaces required to perform.	
Unit 2	Time Bound Assignment	
2.1	Minor time bound assignment of approximate duration to gauge the understanding and creative development of the student.	7
Unit 3	Case Study	
3.1	Data collection of the proposed design assignment.	14
3.2	Site visits and site analysis i.e. Topography, building services, structural systems.	
3.3	Live case study/ Book study/ Net study/ similar design problem	
3.4	Case study analysis, presentation and report	
Unit 4	Unit 4 –Architectural Design	
4.1	Design an industrial building with built up area approximately 2,000 sq.mt. Conceptual design, proper circulation of functional spaces, study of structural systems, detail specifications of materials used. Final Design presentation with supporting sketches, models and views.	49

Sessional Work:

Major design Assignment:

- Students should deal with one major design project with approximate built-up area of 2,000 sq.mt.

Minor time bound assignment:

- Minor time bound design assignment to gauge the understanding and creative development of the student. **Note:-**Design portfolio for major & minor project should include architectural design solution, building services (layout drawings- conceptual), landscape layout, structural layout (column, beam positions) & structural systems to be completed with the help of scaled drawings, the process of drawings, with supporting sketches, models and views.

Reference Books:

1	Julius Panero , Martin Zelnik, Human Dimension & Interior Space: A Source Book of Design Reference Standards, Watson-Guption Publications
2	D. K. Ching , Third edition - Form, Space & Order, John Wiley & Sons, Inc
3	Charles Harris, Time saver standards for landscape architecture, Second edition, McGraw Hill Education
4	National Building Code of India 2016- Vol-1/2/3
5	Fred Hall & Roger Greeno : Building Services Handbook-Students corner .



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Curriculum w.e.f. 2022-2023

6	Michael Herz, Campus Landscape Planning & Design, Design Media Publishing (UK) Limited; Sew edition
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Video/ Audio Link's:

1	https://youtu.be/d-GzKyK0iw4
2	https://youtu.be/c1k1TLMMn-Q



Curriculum w.e.f. 2022-2023
Course Plan

Course Title : History Of Architecture – IV	
Course Code : 201AR312	Semester : VI
Teaching Scheme : L-T-P: 2-0-0	Credits : 02
Evaluation Scheme : ISE Marks : 20+MSE Marks: 30	ESE (TH) Marks : 50

Course Description:

This course offers study of Architectural development in chronological manner in western countries with respect to historical periods within the restraints of social and religious customs, geography, climate, building materials and construction techniques, structural complexity and technology available at that time

Course Objectives:

1	To introduce evolution of settlement patterns.
2	To explain intervention of various impacts on development of buildings in the particular time era.
3	To explain architectural characteristics of particular era with relevant illustrations.
4	To study architecture inspired by Western historic buildings.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to:
C312.1	Understand development of settlements with respect socio economic, cultural and political context of particular time period.
C312.2	Understand architectural development with respect to impacts of climate, geography, culture, religion, technology etc.
C312.3	Understand architectural ornamentation of particular time period.
C312.4	Appraise a historical structure.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C312.1	2	-	-	-	-	-	-	-	2	2	-	-	-	-	2
C312.2	3	-	-	-	-	-	-	-	2	3	-	-	-	-	2
C312.3	3	-	-	-	-	-	-	-	2	3	-	-	-	2	2
C312.4	2	-	-	-	-	-	-	-	2	2	-	-	-	-	2

Prerequisite: Basic understanding of historical and modern buildings.



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Renaissance period	
1.1	Introduction to development of renaissance period in Italy, France and Britain Development of Indian architecture parallel to Renaissance period.	2
1.2	Study of geographical, geological, climatic influences'	2
1.3	Architectural characteristics during renaissance period	2
Unit 2	Industrial revolution, Art Nouveau and Art Deco	
2.1	Introduction to the period of industrial revolution.	1
2.2	New inventions in materials and its impact on building construction.	2
2.3	Introduction and synoptic study of Art Nouveau period and Art Deco period.	3
Unit 3	Modern Architecture	
3.1	Study of early Modernism – The Chicago school	2
3.2	Study of Bauhaus and its teaching concepts	2
3.3	Study of works of Louis Sullivan, Frank Lloyd Wright, Le Corbusier, Walter Gropius, Mies Van der Rohe.	2
Unit 4	Postmodernism and Contemporary Architecture	
4.1	Study of Postmodern era.	2
4.2	Introduction and study of Contemporary Architecture in Europe.	2
4.3	Introduction and study of Contemporary Architecture in India.	2

Text Book:

1	Sir Banister Fletcher, A History of Architecture CBS publication 20 th Edition 2002
2	Francis D.K. Ching, Mark. M Jarzombek, VikramadityaPrakash, 'Global History of Architecture' John Wiley and sons 2017

Reference Books:

1	SushmaParashar 'Global History of Architecture'
2	Daren Yarwood, 'Chronology of western Architecture', Pover publications Inc, New York 2010
3	Elie, G.Haddad, David Rifkind 'A critical history of contemporary Architecture'- 1960-2010 Routledge 2016
4	Bhatt and Scriver 'Contemporary Indian Architecture- After the Masters'University of Washington press 1991.
5	Diane Ghirardo 'Architecture after Modernism' Thames and Hudson 1990
6	Paolo Favole 'The story of Modern Architecture' Prestel New York 2012
7	Paolo Favole 'The story of contemporary Architecture' New York 2012
8	Robert Venturi 'Complexity and contradiction in Architecture' 1977.



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Video / Audio links:

1	Renaissance period–Italy – Palazzo Medici Riccardi : https://youtu.be/uB_nQuzWx-I -- St.Peters Basilica : https://youtu.be/NvjtzKUaq-s
2	Renaissance period – France- Chateau de Chombord: https://youtu.be/NoAcXthpCg0
3	Renaissance period – London – St.Pauls cathedral : https://youtu.be/BmsejntbXRw
4	Bauhaus school : https://youtu.be/hj3XE0KxdXc



Curriculum w.e.f. 2022-2023

Course Plan

Course Title : Estimation costing and Specifications- II	
Course Code : 201AR313	Semester : VI
Teaching Scheme : L-T-P : 1-0-2	Credits : 03
Evaluation Scheme : ISE Marks: 20+MSE Marks: 30	ESE (OE) Marks: 50

Course Description:

This course deals with tools and techniques of estimation and costing of R.C.C. framed structure. It also involves calculating quantities of wood work and structural steel. It involves a market survey for investigation of rates of ingredients and labour for R.C.C. items of framed structure. It also involves acquiring skill of writing detailed specifications for various items of construction

Course Objectives:

1	To understand the method of estimation of R.C.C. framed structures.
2	To understand method of calculating quantities of wood and structural steel.
3	To understand concept of tenders, process and types o tenders

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C313.1	Prepare estimates of R.C.C. framed structure.
C313.2	Calculate quantities of wood and structural steel.
C313.3	Prepare tender notice.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C313.1	3	3	-	-	-	2	-	2	2	2	-	-	2	-	3
C313.2	3	3	-	-	-	2	-	2	2	2	-	-	2	-	2
C313.3	3	3	-	-	-	2	-	2	2	2	-	-		-	3

Prerequisite: Basic knowledge of R.C.C., Wooden structure structural steel components, Basic knowledge of writing specifications



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit-1	R.C.C. framed structure	9
1.1	Listing of building items of a R.C.C.. framed structure.	
1.2	Calculating quantities of R.C.C. components for a residential unit.	
1.3	Preparing abstract by using SSR.	
Unit 02	Wood	6
2.1	Listing of parts of wooden components of a building.	
2.2	Market survey of rates of materials' & labour.	
2.3	Calculating quantities of wood work of wooden components . Preparing abstract.	
Unit 03	Structural steel	6
3.1	Calculating quantities of structural steel for a M.S. sheet roof.	
3.2	Market survey of rates. Preparing abstract.	
Unit 04	Unit 04. Specifications	9
4.1	Writing specifications for various items of construction in a residential unit.	
Unit 05	Unit 05 Tenders	6
5.1	Tender notice and tender documents.	
5.2	Types of tender, Process of tendering. Award of tenders.	

Sessional work:

- Notebook
- Calculating quantities of R.C.C. components of a framed structure.
- Calculating quantities of wood work.
- Calculating quantities of structural steel.
- Drafting specifications for various items of a residential unit.

Text Book:

1	Estimation and costing in Civil Engineering by B.N.Datta.
2	Estimating, costing, specification & valuation in Civil engineering by M. Chakraborty.

Reference Books:

1	PWD-SSR (latest published)
2	I.S. Code 1200



Curriculum w.e.f. 2022-2023

Course Plan

Course Title : Working Drawing - II	
Course Code : 201AR314	Semester : VI
Teaching Scheme : L-T-P : 1-0-3	Credits : 04
Evaluation Scheme : ISE Marks : 100	ESE Marks(OE) :- 100

Course Description:

The purpose of this course is to develop and transform design into computerized working & detail drawings, which showcases all measurements & detailed plans, elevations, sections and all other details particular as per special features or requirements that need special attention.

Course Objectives:

1	To prepare working drawing with appropriate material indication and specifications with dimensions
2	To explain drawings of integrated services
3	To explain detail drawings

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C314.1	Communicate with consultants and construction team.
C314.2	Produce drawings of integrated services
C314.3	Prepare detailed drawings

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C314.1	3	2	3	-	3	-	-	-	2	3	-	-	-	-	2
C314.2	3	2	3	-	3	-	-	-	2	3	-	-	2	-	3
C314.3	3	2	3	-	3	-	-	-	2	3	-	-	-	-	3

Prerequisite: Basic knowledge of building construction technology & architectural graphics subject.



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
1	Detail Drawings	
1.1	Details of staircase including plan, sections & railing details.	16
1.2	Details of kitchen including plan & sections.	
1.3	Flooring & Skirting pattern and fixing details.	
1.4	Dado / Wall tile, Wall Cladding pattern and fixing details.	
2	Service Plans	
2.1	Layout of sanitary and plumbing lines on site and connection with the main sewer/ septic	8
2.2	Electrical layout of all floors including specification of fixtures.	
3	Component Details	
3.1	Door Details including specification of fixtures.	12
3.2	Window with grill details including specification of fixtures.	
3.3	Compound wall with Main gate.	
4	Site Development	
4.1	Landscape Details	12
4.2	Details of Septic tank & Rainwater Harvesting etc.	

Text Book:

1	Robert C. McHugh_1982_ Working Drawing Handbook: A Guide for Architects and Builders, Van Nostrand Reinhold Company.
2	Mantri Institute of Development and Resarch,Pune_1998_Practical building construction & its Management_Third Edition, SatyaPrakashan.

Reference Books:

1	Francis D.K.Ching_2018_Building Construction illustrated _Fourth edition .
2	Anirudha Kolhatkar_2015_Building Construction &Material_First Edition.

Video Links:

1	Technology and technical construction stairs stone granite_ https://www.youtube.com/watch?v=KpHr3xWFZbs
2	Projects Construction & Install Concrete Kitchen Table Directly With Ceramic Tiles Modern_ https://www.youtube.com/watch?v=KLVBDZIDvrk
3	Skirting Tiles Fitting I Skirting Tiles installation process Complete _https://www.youtube.com/watch?v=B_8sodwnDmA

Note :- ESE (OE) for the courses Working Drawing-I (Sem.-V) and Working Drawing-II (Sem.-VI) will be conducted at the end of Sem. VI.



Course Title: Building Construction & Materials- VI	
Course Code:201AR315	Semester: VI
Teaching Scheme: L-T-P: 2-0-2	Credits: 4
Evaluation Scheme: ISE Marks:20 + MSE Marks: 30	ESE Marks:(TH):50+ (OE):50

Course Description:

The course intends to explore process of construction activities, supervision of construction, appropriate use of building materials and preparation of detailed drawings to be used for construction by understanding various structural concepts and properties of building materials. The course also includes site visits, case studies and measure drawings of various stages of construction.

Course Objectives:

1	To introduce contemporary construction techniques
2	To introduce non-conventional building construction methods
3	To explain construction details through case studies
4	To explain process of construction and supervision

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C315.1	Apply knowledge of contemporary construction techniques during preparation of detailed drawings.
C315.2	Select proper material based on contextual needs.
C315.3	Design details in order to make better buildings.
C315.4	Apply knowledge of construction process for supervision and construction of better buildings.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C315.1	3	-	2	2	-	-	3	-	2	2	-	-	-	2	3
C315.2	2	-	1	1	-	-	2	-	2	1	-	-	-	1	2
C315.3	3	-	2	2	-	-	3	-	2	2	-	-	-	2	3
C315.4	3	-	2	2	-	-	3	-	3	2	-	-	-	2	3

Prerequisite: Understanding of preparing detail construction drawings.



Unit No.	Course Content	Hrs.
Unit 1	Material	
1.1	Sound Insulation Materials	
	Introduction, types and uses of sound insulating materials	8
	Construction	
1.2	M.S. Roofing	
	Different types of M.S. roof trusses for span up to 25 meters with roofing materials – details of simple fink roof truss and north light roof truss.	
Unit 2	Material	
2.1	Epoxy Materials	
	Properties, application in building industry	8
	Construction	
2.2	Doors and Windows	
	Rolling Shutter, Revolving doors, UPVC doors & windows	
Unit 3	Material	
3.1	Paints, polishes and Varnishes	
	Different types of paints, polishes and varnishes, their composition, properties, application and uses	8
	Construction	
3.2	Ferrocement	
	Introduction to ferrocement, casting techniques, uses.	
Unit 4	Material	
4.1	Bamboo	
	Types of bamboo, properties of bamboo, defects of bamboo, advantages of bamboo construction.	8
	Construction	
4.2	Non-Conventional Building Construction methods - Bamboo Construction	
	Various techniques of bamboo construction and its joinery	
Unit 5	Material	
5.1	Plastics	8



Curriculum w.e.f. 2022-2023

		Historical background, composition, polymerization, classification, different types of resins, moulding, compound fabrication and uses, Application in building industry.		
		Construction		
	5.2	Precast construction components		
		Precast construction components for columns, beams, staircase, flooring, partitions, doors and windows frames, compound walls		
Unit 6		Material		
	6.1	Materials for tensile structures		
		Materials for tensile structures, thin film photovoltaic, texlon foil, PVC coated polyester cloth, poly tetra fluoroethylene, coated glass cloth, properties and application	8	
		Construction		
	6.2	Long Span Roofs		
		Domes, Shell structures, Folded plates, Space frames, Pneumatic structures, Tensile structures, Cable structures.		

Reference Books:

1	Chudley Roy Advanced Construction Technology–Prentice Hall; 4th edition (13 July 2006)
2	S.P.Arora, S.P. Bindra , A Text-Book of Building Construction - Dhanpat Rai & Co.
3	B. C. Punmia, Building Materials & Construction, Laxmi Publications; Eleventh edition (1 January 2016)
4	S.C. Rangwala, Building Construction, Charotar Publishing House Pvt. Ltd.; 33rd Edition (1 January 2016)
5	Gernot Minke, Building With Bamboo, Design and Technology of a Sustainable Architecture, Birkhauser; Second and revised edition (10 May 2016)

Video/ Audio Links:

1	https://www.youtube.com/watch?v=4INvrT-87FY (For Pre cast construction)
2	https://www.youtube.com/watch?v=yxgXR8M6V4g (For Bamboo construction)



Course Title : Structural Engineering For Architecture - IV	
Course Code :201AR316	Semester : VI
Teaching Scheme : L-T-P : 2-0-0	Credits : 02
Evaluation Scheme : ISE Marks - 20 + MSE Marks- 30	ESE (OE) : - 50

Course Description:

This course deals with concepts behind advanced structural systems and advanced constructional methodology and also learns concept of advanced foundation work. The student prepares structural designs for building involving simple RCC and steel frames and simple RCC water containing structures & earth retaining structures.

Course Objectives:

1	To understand the advanced structural systems.
2	To study RCC water containing structures & earth retaining structures
3	To understand advanced construction methodology.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C316.1	Implement the knowledge of advanced structural system in their design.
C316.2	Understand structural behavior of RCC water containing structures & earth retaining structures.
C316.3	Develop project management skills by selecting appropriate construction methodologies .

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C316.1	3	3	-	-	-	3	2	2	2	2	-	-	2	-	2
C316.2	3	3	-	-	-	3	2	2	2	2	-	-	-	-	2
C316.3	2	2	-	-	-	2	1	1	1	1	-	-	1	-	2

Prerequisite: Mechanics of structures. RCC and steel design theory.



Unit No.	Course Content	Hrs.
Unit 1	Foundation	
1.1	Combined footing – Concept, types & structural behavior reinforcement details Raft foundation – Concept, types & structural behavior, reinforcement details.	2
1.2	Pile foundation – Types like friction, end bearing, tension piles etc	2
1.3	Under reamed piles, group of pile, pile cap. Other pile foundations – compaction piles, bored piles etc.	2
Unit 2	Slabs	
2.1	Two way slab – concept, design steps, design problem.	1
2.2	Flat slab – concept, advantages, disadvantages, elements.	2
2.3	Grid/waffle/Coffer Slab – concept.	2
2.4	Hollow block slab – concept and advantages.	1
Unit 3	Stairs	
3.1	Structural behavior and reinforcement detailing of Waist slab	2
3.2	Structural behavior and reinforcement detailing of Stringer beam, type Circular & semicircular , Helical	2
3.3	Free standing For all the above types detailing in structural steel as material also .	2
Unit 4	Retaining Wall & Concrete Mix	
4.1	Elements, structural behavior & reinforcement details of Cantilever retaining wall Counter fort/Buttress type retaining wall <ul style="list-style-type: none"> • Cantilever retaining wall • Counter fort/Buttress type retaining wall 	3
4.2	Advantages and Disadvantages Parameters for mix design, Water cement ratio Test for wet & hardened concrete, Concept of ready Mix Concrete (RMC), Self Compacting Concrete (SCC), High Strength Concrete (HSC), Parameters for mix design, Water cement ratio, Test for wet & hardened concrete. <ul style="list-style-type: none"> • Concept of ready Mix Concrete (RMC) • Self-Compacting Concrete (SCC) High Strength Concrete (HSC)	3
Unit 5	Water Tanks	
5.1	Structural behavior and reinforcement detailing of Underground (UG), resting on ground water tank.	2



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5.2	Elevated service reservoir (ESR) Shape in plan square, rectangular, circular,	2
5.3	Shape in plan square, rectangular, circular, advantages and disadvantages. Aesthetical effect on their structural systems and shapes. Aesthetical effect on their structural systems and shapes.	2
Unit6	Constructional Methodology	
6.1	Precast Concrete elements – advantages and disadvantages, Transportation, erection & Handling stresses.	2
6.2	Prefabricated Steel works – advantages and disadvantages	2
6.3	Pre-stressed concrete structure – Concept, Pre-tensioning & post tensioning, advantages and disadvantages	2

Sessional work

1. Class notes.
2. Assignments based on above topics
3. Case study report

Text Book:

1	S.Ramamrutham ,RCC Design.
2	R.R.Gadpal and D.J.Khamkar ,Design of steel and RCC Structure.
3	Prestressed concrete design,M.K.Hurst

Reference Books:

1	IS 456-2000
2	Hulse,Ray and Chain,Jack (2016) Structural Mechanics, Macmillan International Higher Education.
3	Salvadori,M and Heller , RA (1963), Structure in Architecture,3 rd ed. ,prentice Hall
4	Hjelmstad,KeithD.(2005),Fundamentals of Structural Mechanics,2 nd ed.,Springer
5	Sarkisian,Mark(2012),Designing Tall Building-Structureas Achitecture,Routledge,New York.

Video/ Audio Link's:

1	https://youtu.be/2j6b3Xrk2MA for design of reinforced concrete slab.
2	https://youtu.be/2mxRULE9Cjk for different methods of constructions



**Curriculum w.e.f. 2022-2023
Course Plan**

Course Title :Building Services - IV	
Course Code : 201AR317	Semester :VI
Teaching Scheme : L-T-P : 2-0-1	Credits :03
Evaluation Scheme : ISE Marks : 20+MSE Marks: 30	ESE (TH) Marks : 50

Course Description:

Building services are the systems installed in buildings which make them comfortable, functional, efficient and safe. The course intends to provide knowledge about firefighting systems, HVAC systems and acoustics which will help the students to design the buildings efficiently.

Course Objectives:

1	To introduce the concept of acoustics and its application.
2	To introduce various HVAC systems used in various building typologies.
3	To introduce firefighting systems in the building services.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C317.1	Illustrate acoustical calculations.
C317.2	Select the various HVAC systems according to the building typology
C317.3	Prepare the firefighting layout required for the building.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C317.1	3	3	3	-	3	3	3	-	3	2	-	-	-	2	3
C317.2	3	3	2	-	2	3	3	-	2	2	-	-	-	2	2
C317.3	3	3	3	-	3	3	3	-	3	2	-	-	-	2	3

Prerequisite: Observation regarding the use of fire fighting, acoustical treatment and air conditioners.



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Fire Fighting systems	12
1.1	Fire sources, classification, spreading, Classification of buildings and fire grading of structural elements as per NBC, Fire rating for different materials.	
1.2	Firefighting systems- Fire detectors, fire alarm system, control panel, external and internal firefighting systems, water & foam sprays, sprinkler system- types and advantages, Fire escape staircase, fire lifts, water storage requirements, refuge areas, fire tender access, fire tower, FHC, fire escape chute. Introduction to Autonomous vehicles, biotelemetry, 360° video & VR technology	
1.3	Integration and representation of fire safety norms at design and construction stage, design of escape routes, fire escape staircase, fire lifts, water storage requirements. Emergency exits for differently able persons.	
Unit 2	Acoustics	6
2.1	Definition and functions of Acoustics. Study of absorptive & reflective materials. Transmission of sound (structure & air borne). Understand noise its psychological and physiological effects, various noise control and mitigation systems.	
2.2	Acoustical defects- sound shadow, dead spot, whispering galleries, sound creep & their remedies. Characteristics and components of good sound reinforcing system such as microphones, amplifiers & speakers.	
Unit 3	Acoustical Design	9
3.1	Design Considerations for good acoustical design such as shape, size, occupancy, purpose, geometry for open Amphitheater, auditorium, recording studio, Discotheque, Home theater, lecture halls, classrooms.	
3.2	Calculation of reverberation time.	
3.3	Exercise- Design an acoustical room (Auditorium, conference, studio, etc. which is existing in design problem of Semester V) with desired reverberation time, material usage, surface treatment, construction details. Study of acoustical materials used to reduce, elevate, absorb & divert sound.	
Unit 4	HVAC	9
4.1	Principles and components of mechanical ventilation & air conditioning systems, Design consideration for chiller rooms, cooling plants, AHU, Etc.	
4.2	Integration with natural ventilation and other energy conservation technologies like VRF. Heating for buildings, central & local heating, insulation, radiators, convertors.	
4.3	Selection based on design condition, star rating and accordingly implementation of appropriate type of AC, split AC, central AC etc. in their design of semester V.	

Sessional work

- Class notes.
- Assignments based on above topics.
- Prepare layout showing allocation of above services into design problems of semester V.



Text Book:

1	Brannigan Francis L., Third Edition, Building Construction for the fire Service, National Fire Protection Association
2	Templeton Ducan, Acoustics in the Built Environment, advice for the design team, Second edition, Architectural press.
3	Dr. Punmia B.C. Building Construction, Laxmi Publications
4	Rangwala S.C. Building construction., Charotar Publishing house pvt. Ltd.
5	Arora S.P., Bindra S.P., Building Construction, Dhanpat Rai Publications

Reference Books:

1	National Building Code of India: National Electrical Code.
2	National Building Code Of India (Fire and Life safety)
3	Grueneisen Peter, Sound space Architecture for sound and Vision, Brikhauser
4	Mittal A.K. Electrical and Mechanical Services in High rise Buildings, Design and Estimation manual.
5	Harris Norman C., Third Edition, Modern Air Conditioning Practice, McGraw Hill Education.
6	Ermann Michael, Architectural acoustics Illustrated, Wiley
7	Haines R.W., Wilson C.L., HVAC System Design Handbook, New York : McGraw-Hill

Video/ Audio Link's:

1	Sprinkler working- https://youtu.be/_DjvcDCo-MA
2	Firefighting in high rise- https://youtu.be/MVkh0StB3Vo
3	HVAC- https://youtu.be/ScVBPAitibQ
4	HVAC- https://youtu.be/uqc81yenwQo
5	VRF System- https://youtu.be/d7W80HvNi8Y
6	Acoustics- https://youtu.be/nxiwWfvIdKY
7	Acoustical applications- https://youtu.be/jCb_Tv9DwXw



Course Plan

Course Title: Entrepreneurship Skills For Architects	
Course Code: 201ARMC320	Semester: VI
Teaching Scheme: L-T-P: 2-0-0	Credits: NIL
Evaluation Scheme: ISE Marks :Nil	ESE(TH) Marks:50

Course Description:

This course aims to bridge the gap between academia and architectural practice and encouraging the students to take a proactive role in building their careers by introducing them to entrepreneurship; leadership and self-motivation skills; also it caters to the pioneering content for the business side of architecture through marketing and finance management; starting a small business; future-oriented design principles to increase the design organization's innovative and competitive qualities; in the course creating a Sustainable practice; Risk-taking; Job procurement; Employee management; marketing; Social entrepreneurship and its relevance to the practice of architecture.

Course Objectives:

1	To introduce scope and meaning of entrepreneurship.
2	To understand the concept of office management systems.
3	To study, architectural firm's philosophy.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C320.1	Differentiate between entrepreneurship and other career options.
C320.2	Apply knowledge of management and setting of office systems for better efficiency.
C320.3	Analyze the impact of philosophy on entrepreneurship development.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C320.1	3	2	-	-	1	-	-	-	2	-	-	1	-	-	1
C320.2	2	2	-	-	1	-	-	-	2	-	-	1	-	-	2
C320.3	3	2	-	-	1	-	-	-	2	-	-	1	-	-	2

Prerequisite: Basic knowledge of an architect's office



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Introduction to entrepreneurship	
1.1	Scope and Challenges faced by fresh graduate, entrepreneurship meaning, self-motivation, Risk-taking	6
Unit 2	Setting up office	
2.1	Conventional and contemporary office setups, finance management, Employee	6
Unit 3	Architect and his work	
3.1	Firm's philosophy, various stages of architect's work.	6
Unit 4	Marketing and finance management	
4.1	Websites, Forums & Networking, Social entrepreneurship and its relevance to the practice of architecture, publications, exhibition of works, Thesis on live issues.	6

Reference Books:

1	Dr. Roshan Namavati, 2018, Professional Practice
2	Prof. Madhav Deobhakta, Ar. Meera Deobhakta, 2007, Architectural Practice in India



**D. Y. Patil College of
Engineering and Technology**

Kasaba Bawada, Kolhapur

An Autonomous Institute

Syllabus Open Elective-I

Third Year B.Arch.

(Autonomous)



(School of Architecture)

2022-2023



Curriculum w.e.f. 2022-2023

Open Elective:

Open elective courses are offered to gain the knowledge of multidisciplinary areas. Students must choose one open elective course from the list of courses offered by other departments (excluding open elective courses offered by their department). Following is the list of open elective courses. The detailed syllabus is available on to the college website under academic tab.

Sr. No.	Department	Course Code	Open Elective-I Course
1	Chemical	201CHL318	Industrial Safety and Act
		201CHL319	Energy Conservation and Audit
2	Mechanical	201MEL313	Human Resource Management
		201MEL314	Electric Vehicle
3	Civil	201CEL330	Disaster Management
		201CEL331	Green Building
4	Electronics and Telecommunication	201ETL318	Sensor Technology
		201ETL319	Electronic Instrumentation
5	Computer Science & Engineering	201CSL319	E- Commerce & Digital Marketing
		201CSL320	Python Programming
6	Computer Science & Engineering (Artificial Intelligent & Machine Learning)	201AIML320	Applications of AI ML
		201AIML321	Augmented Reality and Virtual Reality
7	Computer Science & Engineering (Data Science)	201DSL319	Basics of Data Science
		201DSL320	Basics of Database



Course Title : Role of Art and Technology in Interior Design	
Course Code : 201ARL318	Semester : VI
Teaching Scheme : 3-1-0	Credits : 4
Evaluation Scheme : ISE Marks : 50	ESE (OE) Marks : 50

Course Description:

This course focuses on art and technology in designing interiors. It highlights various types of arts and technologies used in interiors and expresses it as a techno-art. It also takes into consideration the context of different types of materials used in different climates & acoustical considerations. It emphasizes the role of technology as a key influence that drives, shapes and inspires contextual and contemporary interior and art work.

Course Objectives:

1	To understand the meaning of Art & technology in interior.
2	To interpret different forms of Art & technology in any interior.
3	To study various materials in context with Climate & Acoustics.
4	To differentiate between Art & technology in Residential & Commercial interiors.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C318.1	Understand the meaning of Interior Design
C318.2	Apply technology in Interior.
C318.3	Apply of various materials with respect to climate & Acoustical condition.
C318.4	Differentiate between Art & technology in Residential & Commercial interiors.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C318.1	2	2	2	-	-	-	-	-	2	2	-	-	2	-	2
C318.2	2	2	3	-	-	-	-	-	2	2	-	-	2	-	3
C318.3	2	2	3	-	-	-	-	-	2	2	-	-	-	2	2
C318.4	2	2	2	-	-	-	-	-	2	2	-	-	2	-	2



D.Y.PATIL COLLEGE OF ENGINEERING & TECHNOLOGY

KASABA BAWADA, KOLHAPUR-416006

An Autonomous Institute

Third Year B. Arch.

Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Introduction to interior design	
1.1	Definition & meaning of Interior Design , role of Interior Designer	4
1.2	Definition & meaning of craftsman and Interior design as a techno-art	4
Unit 2	Components of interior design	
2.1	Different forms of Art used in interior	4
2.2	Elements & principles of Interior Design	4
2.3	Study of Anthropometry & Ergonomics	4
Unit 3	Material and technology in interior design	
3.1	Various materials used in interiors	4
3.2	Different type of technologies used in interior like False ceiling, Partitions, Wall	4
3.3	Application of materials with respect to Climate and Acoustics	4
Unit 4	Commercial & Residential Interiors	
4.1	Difference between Commercial & Residential Interiors	4
4.2	Art & Technology in Residential Interior and Commercial Interiors	4
Unit 5	Case studies	
5.1	Two case studies each of Residential and Commercial Interior	4
Unit 6	Analytical study	
6.1	Comparative analysis and presentation of Residential and Commercial Interior case studies done	4

Text Book:

1	J.K. Mckay , Building Construction , Pearson
2	R. Chudley, Construction Technology, Pearson

Reference Books:

1	Ahmed Kasu - Interior Design , Ashish book center , Mumbai
2	McGRAW-HILL -Time-Saver Standards For Interior Design and Space Planning



D.Y.PATIL COLLEGE OF ENGINEERING & TECHNOLOGY

KASABA BAWADA, KOLHAPUR-416006

An Autonomous Institute

Third Year B. Arch.

Curriculum w.e.f. 2022-2023

Tutorials

Tutorial No.	Tutorial Description
1	Explain in brief what do you mean by Interior Design
2	Write briefly about Artist and Technologist
3	Enlist various materials used in Interior design for carpentry work.
4	Enlist various materials used in Interior design for Upholstery, drapery and furnishings.
5	Explain how is Interior Design is a Techno art
6	Explain the various elements of Design
7	Explain the various principles of Design
8	Explain how is study of Anthropometry and Ergonomics necessary for any Interior Designer
9	Draw a neat sketch of any residential space e.g. Living room , Bed room
10	Enlist various materials used for acoustical treatment for Seminar hall.
11	Describe in brief the procedure of Wall Panelling
12	Explain the difference between Commercial interior and Residential interior.



Curriculum w.e.f. 2022-2023
Course Plan

Course Title : Residential Gardening	
Course Code : 201ARL319	Semester : VI
Teaching Scheme : L-T-P : 3-1-0	Credits : 4
Evaluation Scheme : ISE Marks : 20 + MSE Marks: 30	ESE(TH) Marks : 50

Course Description: The importance of gardens in today's hectic life is of great significance both psychologically and environmentally. Considering this need the course is designed to develop in students awareness and skills in designing residential gardens. The curriculum will equip students with various aspects of Residential Gardening such as garden elements, soil preparation and plantation, plant care, composting and manuring. The course will enable student to plan, establish and maintain a residential garden.

Course Objectives:

1	To build knowledge of basic residential gardening.
2	To identify the role of hardscape and soft scape elements in design of indoor and outdoor environments for various projects.
3	To understand the other components and contemporary trends of residential gardens.
4	To create awareness of aesthetical, environmental and economical benefits of residential gardening.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C319.1	Confidently design, develop and maintain a residential garden.
C319.2	Use the appropriate hardscape and softscape elements for residential garden.
C319.3	Experiment with appropriate components considering the contemporary trends of residential garden.
C319.4	Implement environment friendly components and processes for residential garden.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C319.1	3	3	3	3	2	3	3	-	3	3	-	-	-	-	1
C319.2	3	3	3	3	2	3	3	-	3	3	-	-	-	-	3
C319.3	3	3	3	3	2	3	3	-	3	3	-	-	3	-	2
C319.4	3	3	3	3	2	3	3	-	3	3	-	-	-	-	3

Pre requisite: Basic liking and compassion for gardening and environment.



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Introduction Lecture – Categories of Residential Garden as ornamental, orchard and kitchen gardening.	8
1.1	Types as formal and informal, natural and artificial, indoor and outdoor.	
1.2	Understanding site in terms of building, open area , natural features, climate and sun /shade.	
1.3	Introduction of hardscape and softscape elements.	
1.4	Principles of garden design.	
1.5	History of Indian landscape	
Unit 2	Hardscape elements with various materials.	8
2.1	Pathways, bridges, flower beds, pergolas and gazebos.	
2.2	Garden furniture, garden sculptures, pots and hanging baskets.	
2.3	Various water features.	
2.4	Mounds and rockery Watering, Drainage and lighting of the garden.	
Unit 3	Softscape and plant care	8
3.1	Lecture – Softscape Study of various trees, shrubs, plants, ground covers, lawn, succulents, climbers, cacti, water plants.	
3.2	Groups or types of indoor plants and outdoor plants -foliage, flowering etc. commonly used for residential gardens.	
3.3	Planting scheme, selection of appropriate plant , Best time to plant and plantation. Plant care	
3.4	Immediate Post plantation care	
3.5	Weeding	
3.6	Natural and chemical Pesticides, Pruning	
Unit 4	Soil and Nutrition	8
4.1	Understanding the nature of soil	
4.2	Soil texture and structure	
4.3	Different types of soils, Acidity and alkalinity of soils.	
4.4	Nutrient elements - Nitrogen, phosphorus, potassium, magnesium, calcium, sulphur	
4.5	Fertilizers, Ways to apply fertilizer	
4.6	Different types of Manures	
Unit 5	Other components and Contemporary trends in Residential Garden	
5.1	Lecture -Kitchen garden	



Curriculum w.e.f. 2022-2023

	5.2	Terrace, balcony gardens	8
	5.3	Vertical gardens	
	5.4	Aquaponics, hydroponics.	
	5.5	Dry landscape, xericaping ,indoor landscape, artificial landscape,Bonsai	
Unit 6		Environment responsible aspects for Residential Garden.	8
	6.1	Top soil protection	
	6.2	Hardscape to softscape ratio	
	6.3	Rain water harvesting	
	6.4	Grey water recycling	
	6.5	Composting	
	6.6	Use of native plants	
	6.7	Pollution, sound absorbing plants	
	6.8	Micro climate control through plantation	

Note :- Assignment will be based on respective units.

Text Book:

1	Landscape architecture a manual of site planning and design – Symonds Residential landscape architecture, Norman. K. Booth
2	K. C. Sahni, publisher Oxford University Press - The book of Indian Trees, edition 2000.
3	Shrikant Ingalhalikar, Sharvari Barve, publisher Corolla Publications, Pune – Trees of Pune, field guide to 482 Aroreal plants of Pune city, edition 2010.
4	Landscape Architecture In India. by Mohammad Shaheer (Editor), Geeta Wahi Dua (Editor), Adit Pal (Editor) – LA Journal of Architecture.
5	Landscape Architecture: History, Ecology and Patterns by I P Singh (Author), Minakshi Jain (Author) Copal Publishing Group.

Reference Books:

1	Time saver standards for landscape architecture
2	National building code 2016
3	Trees of Central India by Pradip Kishan.
4	'Landscape Architecture' by JO Simonds, Mcgrawhill education,Delhi,1983 and onwards.
5	Griha Manual Volume 2-4 Adarsh.

Video/ Audio Link's:

1	How Much Sun A Plant Needs Gardening Basics Part1- https://youtu.be/Neda0goqbRk
2	Home Gardening Tips for Beginners Lesson - 1 Home/Garden- https://youtube/CyhpDmwzP-w
3	How to Make a Terrace Vegetables Garden- https://youtu.be/feIJXJqNfoc
4	Grow Plants in small Balcony - https://youtu.be/nHLTxBMoJog8



Tutorials:

Curriculum w.e.f. 2022-2023

Tutorial No	Tutorial Description
1	Describe various categories of Residential gardens and principles of garden design. Support your answer with illustrative sketches.
2	Compare various types of Historic Indian Landscapes .Draw labelled sketches where required.
3	Describe in detail with neat sketches –various Hard scape elements used in residential gardens
4	Discuss various Landscape services involved in Residential gardens. Support your answer with illustrative sketches.
5	Explain in detail with neat sketches wherever necessary – i-Various types of softscape elements used for Residential Gardens. ii- Planting scheme, selection of appropriate plant , best time for plantation.
6	Describe briefly - Plant Care for Residential gardens .Draw labelled sketches where required.
7	Explain briefly various categories of type of soils.
8	Discuss various types of Manures and Fertilizers used for Residential garden.
9	Explain in detail with sketches - Contemporary components and trends in Residential Garden .
10	Discuss with illustrative sketches - Following Environment responsible aspects for Residential Garden i- Top soil protection ii- Hardscape to softscape ratio iii - Rain water harvesting
11	Discuss with illustrative sketches - Following Environment responsible aspects for Residential Garden. i-Grey water recycling ii- Composting
12	Discuss with illustrative sketches - Following Environment responsible aspects for Residential Garden. i-Use of native plants ii-Pollution, sound absorbing plants iii-Micro climate control through plantation



D. Y. Patil College of Engineering and Technology

KasabaBawada, Kolhapur

An Autonomous Institute

Structure & Syllabus

Minor Degree in Sustainable Energy Practices

(School of Architecture)

2022-2023



D.Y.PATIL COLLEGE OF ENGINEERING & TECHNOLOGY

KASABA BAWADA, KOLHAPUR-416006

**An Autonomous Institute
Minor Degree in
Sustainable Energy Practices**

Curriculum w.e.f. 2022-2023

Minor Degree in ‘Sustainable Energy Practices’ (SEP)

Year	Semester	Course Code	Course Title
2 nd	IV	201ARMIL221	Energy And Its Resources
3 rd	V	201ARMIL321	Climate Change Understanding
	VI	201ARMIL322	Solar Energy Technologies, System Installations And Maintenance
		201ARMIL323	Solar Passive Design
4 th	VII	201ARMIL411	Energy Rating

Program specific Outcome for Minor Degree in ‘Sustainable Energy Practices’ (SEP)

PSO1	Students will acquire the ability to design the built environment in tandem with intangible aspects of architecture.
PSO2	Students will acquire the ability to gain knowledge through nonlinear way and apply it to built environment.



Curriculum w.e.f. 2022-2023

Minor Degree in ‘Sustainable Energy Practices’

Syllabus Structure

Sr. No	Course Code	Course Type	Name of the Course	Teaching Scheme Per Week		Credits	Total Marks	Evaluation scheme		
				Lecture Hours	Tutorial Hours			Type	Max. Marks	Min. Marks for passing
1	201ARMIL221	PC	Energy and Its resources	3	-	3	100	ISE	20	20
								MSE	30	
								ESE(OE)	-	-
								ESE(TH)	50	20
2	201ARMIL321	PC	Climate change Understanding	3	-	3	100	ISE	20	20
								MSE	30	
								ESE(OE)	-	-
								ESE(TH)	50	20
3	201ARMIL322	PC	Solar energy technologies, system installations and maintenance	3	1	4	100	ISE	20	20
								MSE	30	
								ESE(OE)	-	-
								ESE(TH)	50	20
4	201ARMIL323	PC	Solar passive design	3	1	4	100	ISE	20	20
								MSE	30	
								ESE(OE)	-	-
								ESE(TH)	50	20
5	201ARMIL411	PC	Energy rating	3	1	4	100	ISE	20	20
								MSE	30	
								ESE(OE)	-	-
								ESE(TH)	50	20
Total				15	3	18	500		500	200



Minor Degree details

With a view to enhance the employability skills and impart knowledge in emerging areas which are usually not being covered in Undergraduate Degree credit framework, AICTE has come up with the concept of 'Minor Degree' in emerging areas.

Minor specialization in EMERGING AREAS in Under Graduate Degree Courses is allowed where a student of another Department shall take the minimum additional Credits in the range of 18-20 and get a degree with minors in specialized area. These credits are in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline.

Knowledge of these emerging areas will help students in capturing the plethora of employment opportunities available in these domains. With the help of industry-academia experts, the institute has framed the curriculum of Minor Degrees. Following are the minor degrees offered by the various departments:

Sr. No.	Department	Minor Degree Offered
1	Architecture	Sustainable Energy Practices
2	Chemical Engineering	Food and Nutrition Technology
3	Civil Engineering	Environmental Sustainability
4	Mechanical Engineering	Robotics and Industry 4.0
5	Electronics & Telecommunication Engineering	Internet of Things (IoT)
6	Computer Science & Engineering	Cyber Security
7	Computer Science & Engineering (Artificial Intelligent & Machine Learning)	Artificial Intelligence & Machine Learning
8	Computer Science & Engineering (Data Science)	Data Science

Interested students studying in semester III can choose only one minor degree track offered by other department (excluding minors offered by their core undergraduate course). The final list of allocation will be displayed, following the eligibility criteria mentioned in the academic rules and regulations, before beginning of semester IV.



D.Y.PATIL COLLEGE OF ENGINEERING & TECHNOLOGY

KASABA BAWADA, KOLHAPUR-416006

**An Autonomous Institute
Minor Degree in
Sustainable Energy Practices**

Curriculum w.e.f. 2022-2023

The minor degree will be run only when the minimum students count is 30 for respective track. Students once enrolled for any minor degree are not permitted to change the track. However, a student can withdraw at any semester.

The fee for minor degree is to be paid in addition to the college fees. There will not be any fee concession/relaxation for any category student. The fee will not be refunded when withdrawn from the minor degree.

Minor degree courses will begin from semester IV onwards as per the structure of the respective tracks.



Curriculum w.e.f. 2022-2023
Course Plan

Course Title : Energy And Its Resources	
Course Code : 201ARMIL221	Semester :IV
Teaching Scheme : L-T-P: 3-0-0	Credits :3
Evaluation Scheme : ISE Marks : 20+MSE Marks: 30	ESE(TH) Marks :50

Course Description:

This course offers study of non-renewable and renewable energy resources available locally and globally. The course creates awareness about energy consumption with social and economic parameters.

Course Objectives:

1	To understand of energy units, unit conversion, unit magnitudes
2	To distinguish between various renewable and nonrenewable energy resources
3	To understand energy needs of self, institution, country and world.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to:
C221.1	Understand energy units, unit conversion, unit magnitudes
C221.2	Use renewable energy sources.
C221.3	Quantify energy usage at various levels
Prerequisite: Basic knowledge of environmental studies.	

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C221.1	3	2	3	-	-	-	3	-	-	-	-	-	-	-	2
C221.2	3	3	3	-	-	-	3	-	-	-	-	-	-	2	2
C221.3	3	2	3	-	-	-	3	-	-	-	-	-	-	-	2



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Energy and its units	
	Discussion on role of energy in our lives, various sources of energy that we use, units of energy, small and large units of energy, magnitude of energy units, units for energy consumption of individual, institution and country	6
Unit 2	Renewable and Non-renewable energy	
	Difference between renewable and non-renewable energy, characteristics of resources, advantages and disadvantages,	6
Unit 3	India's energy scenario – non-renewable	
	India's energy consumption from all resources, consumption of oil, coal, gas, import of fossil resources, foreign exchange requirements, energy security of country and imports dependency	6
Unit 4	Renewable energy sources	
	Introduction to renewable energy sources, meaning of renewable, summary of all RE resources, global scenario of these resources	6
Unit 5	Solar energy resources	
	Sun as source of energy, solar energy reaching the Earth's surface, solar spectrum, photons of different energy, solar irradiation and solar radiation/insolation, extra-terrestrial solar radiation, global, direct and diffuse solar radiation	6
Unit 6	Energy consumption estimation	
	Estimating the monthly energy consumption (residential/commercial/industrial/institutional), including energy consumption from electricity.	6

Text Book:

1	Ch. Pavan Kalyan and M. Pavan Das, Future Energy Scenario: A Better Planet with Renewable Energy, 2020
2	O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi, 2020

Video / Audio links:

1	Knowledge Centre, Ministry of New & Renewable Energy - Government of India https://mnre.gov.in/
2	World Energy report https://www.iea.org/reports/world-energy-outlook-2021

Curriculum w.e.f. 2022-2023
Course Plan

Course Title: Climate Change Understanding	
Course Code: 201ARMIL321	Semester: V
Teaching Scheme: L-T-P: 3-0-0	Credits :3
Evaluation Scheme: ISE Marks: 20+MSE Marks: 30	ESE(TH) Marks: 50

Course Description:

Climate Change poses an increasing threat to the stability of Earth's systems. If we want to protect our planet from harmful and unprecedented change, understand the reasons behind climate change. This course will help in understanding and learning the dynamics of climate change, its causes, consequences, and the difference between 'natural' and man-made climate; and its impacts.

Course Objectives:

1	To understand climate change at micro and macro level
2	To understand the causes, consequences of climate change
3	To understand the future of fossil fuels in a carbon-constrained world

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to:
C321.1	Describe the key principles of climate change
C321.2	Identify the causes and consequences of climate change
C321.3	Understand the impacts on the current ecosystems
Prerequisite: Basic knowledge of environmental studies and energy resources.	

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		B T L
													1	2	
C321.1	2	2	2	-	-	-	2	-	-	-	-	-	-	-	2
C321.2	3	3	3	-	-	-	3	-	-	-	-	-	-	2	2
C321.3	2	2	2	-	-	-	2	-	-	-	-	-	-	-	2



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Understanding the climate	
	Climate, micro and macro climate, the difference between the two, and defining climate change, understanding the impact of 1.5 degrees and 2-degree Celsius warming.	6
Unit 2	Science of climate change	
	Understanding the causes of climate change due to human intervention	6
Unit 3	Understanding the depletion of natural elements	
	Understanding the depletion of the two natural resources - water and soil, amount of changes and their reasons.	6
Unit 4	Future scenarios of climate action	
	Comparative analysis of with and without use of fossil fuels and its impact on eco system.	6
Unit 5	Climate Change Agreements	
	Understanding the evolution of the climate agreements, UNFCCC, Kyoto protocol, the defining agreements of Paris and COP	6
Unit 6	Mitigation of climate change	
	possible role of individuals in the mitigation of climate change	6

Text Book:

1	O.P. Gupta, Elements of Environmental Pollution Control, Khanna Book Publishing
2	A. Chakrabarti, Energy Engineering and Management, PHI.

Video / Audio links:

1	University of Cambridge (2013). Climate Change: Action, Trends and Implications for Business. Available at: https://www.cisl.cam.ac.uk/system/files/documents/Science_Report_Briefing_WEB_EN.pdf
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Assignment: Prepare a report on the possible role of individuals in the mitigation of climate change. Prepare this report based on discussion with people in society. Frame a set of 5 to 6 questions, interview people and based on the interview prepare a report.



Curriculum w.e.f. 2022-2023
Course Plan

Course Title : Solar Energy Technologies, System Installations And Maintenance	
Course Code : 201ARMIL322	Semester :V
Teaching Scheme : L-T-P: 3-1-0	Credits :4
Evaluation Scheme : ISE Marks : 20+MSE Marks: 30	ESE(TH) Marks : 50

Course Description:

This course deals with various aspects of solar energy technologies, solar system installations and their maintenance. It also describes conversion of solar energy into thermal energy.

Course Objectives:

1	To introduce various solar PV and solar thermal technologies.
2	To understand basic parameters of solar PV panels and systems.
3	To design solar thermal system for given thermal energy requirements.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to:
C322.1	Understand conversion of sun light in electrical and heat energy
C322.2	Decide the sizes of various components of solar PV system to fulfill given electricity requirements.
C322.3	Decide the sizes of solar thermal system to fulfill given thermal energy requirements

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs)/ Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		BTL	
													1	2		
C322.1	1	2	2	-	-	-	2	-	-	-	-	-	-	-	-	2
C322.2	3	3	3	-	-	-	3	-	-	-	-	-	-	-	-	2
C322.3	3	2	3	-	-	-	3	-	-	-	-	-	-	-	-	4

Prerequisite :- Nil



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Materials for solar energy conversion	
	Different material categorization, use of semiconductors for converting sunlight into electricity and use of metals for converting sunlight into heat, basic properties of semiconductors and metal required for conversion, e.g. bandgap, absorption coefficient, solar spectrum and energy of photons	8
Unit 2	Material parameters	
	Important material parameters of semiconductors, band gap, absorption coefficient, absorption length, mobility, carrier drift, diffusion coefficient, carrier diffusion, Light absorption and recombination in semiconductors,	8
Unit 3	Solar thermal technologies	
	Various solar thermal technologies like solar hot water heater, solar cooker, discussion on need of concentration of light for higher temperatures, methods of sun light concentrations, solar concentration for powergeneration	8
Unit 4	Design of solar hot water system	
	Discussion on what should be the solar thermal system components, use of thermosyphon effect, drawing of solar hot water system, estimate the energy required for heating water, estimation of collector area required for delivering required energy, considering typical losses in conversion, efficiency equation of solar thermal system	8
Unit 5	Costing of solar PV system	
	Costing of solar components, per unit costing of panels, batteries, structure, wires, electronics, total system costing	8
Unit 6	Solar PV system	
	Interconnection of various components of system and its design.	8

Text Book:

1	Solar radiation data of any place across the world https://globalsolaratlas.info/map
2	Knowledge Centre, Ministry of New & Renewable Energy - Government of India https://mnre.gov.in/
3	O.P. Jakhar, Energy Conservations in Buildings, Khanna Publishing House, New Delhi, 2019

Video / Audio links:

1	Photovoltaics:Design and InstallationManual, Solar Energy International (SEI), USA https://www.solarenergy.org/
2	Central Solar Hot Water Systems Design Guide, U.S. Army Corps of Engineer Headquarters, https://www.wbdg.org/ffc/army-coe/design-guides/

Assignment: Visit any installation of solar PV system or solar thermal system in your institution or any nearby area. Take note of interconnection of various components of system, make a comment on



how system is designed.

Curriculum w.e.f. 2022-2023

Tutorials:

Tutorial No	Tutorial Description
1	Explain solar energy with detail description.
2	Describe solar energy materials for its conversion.
3	Estimate the energy required for heating water.
4	Describe the solar PV system & its working.
5	Enlist the materials used for solar energy conservation
6	Explain costing of solar PV Components.
7	Interpret use of semiconductors for converting sunlight into electricity and use of metals for converting sunlight into heat.
8	Compile Various solar thermal technologies.
9	Explain the efficiency of solar thermal system.
10	Explain solar spectrum & energy of photons.
11	Discuss need of concentration of light for higher temperatures.
12	Explain Solar batteries in detail.



Curriculum w.e.f. 2022-2023
Course Plan

Course Title : Solar Passive Design	
Course Code : 201ARMIL323	Semester :VI
Teaching Scheme : L-T-P: 3-1-0	Credits :4
Evaluation Scheme : ISE Marks : 20+MSE Marks: 30	ESE(TH) Marks :50

Course Description:

The course intends to describe various solar passive systems used in buildings. It also opens up modern and postmodern passive design systems through casestudies.

Course Objectives:

1	To understand principals of solar passive design
2	To understand various solar passive systems.
3	To study examples of solar passive design systems.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to:
C323.1	Understand the importance of passive solar design.
C323.2	Understand solar passive systems design of various typologies.
C323.3	Understand various modern and postmodern solar passive systems

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

CourseOutcomes (COs) / Program Outcomes (POs)/ ProgramSpecific Outcomes(PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		BTL
													1	2	
C323.1	1	2	2	-	-	-	2	-	-	-	-	-	-	-	2
C323.2	3	2	3	-	-	-	3	-	-	-	-	-	-	-	2
C323.3	3	2	2	-	-	-	2	-	-	-	-	-	-	-	2

Prerequisite: Basic knowledge of solar energy



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Introduction of passive solar systems	
	Building clusters and solar exposure, thermal environment. Types of passive systems, direct gain, thermal storage wall, attached green house, thermal storage roof and convective loop.	8
Unit 2	Classification of passive cooling systems	
	Classification of passive cooling systems according to the major natural source from which the cooling energy is derived.	8
Unit 3	Classification of passive cooling systems	
	Minimizing cooling needs by building design: building shape & layout, orientation, size of windows, shading of window, colour of the envelope and climatic impact of plants around building.	8
Unit 4	Radiative cooling	
	Radiative cooling –The earth as a cooling source for buildings. Cooling of attached outdoor spaces. Passive solar configuration – outline of various passive systems for heat gain.	8
Unit 5	Indirect Gain	
	Indirect Gain – Trombe wall, Water wall and Transwall. Sun space / attached solarium / conservatory. Roof Pond / Skytherm – Vary Thermal Wall – Earth sheltered / earth bermed structures and earth-air tunnels. The use of earth-air tunnels to heat or cool the buildings.	8
Unit 6	Modern and post modern passive design	
	Modern and post modern passive design, methods, strategies, systems, and construction details emphasizing the passive architecture and non active services.	8

Text Book:

1	Passive and low energy cooling of buildings by Givoni Baruch, Van Nostrand Reinhold, New York
2	Solar passive buildings by Sodha, M., Bansal, N. K., Bansal, P. K., Kumbhkar, A., and Malik, M. A. S., Pergamon press, Oxford

Video / Audio links:

1	Passive solar home design https://www.energy.gov/energysaver/passive-solar-home-design
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Curriculum w.e.f. 2022-2023

Tutorial

Tutorial No	Tutorial Description
1	Describe the principals of solar passive design.
2	Classify passive systems as per the building design.
3	Explain passive strategies & passive architecture.
4	Describe the concept of Indirect gain.
5	Interpret radioactive cooling for buildings.
6	Explain how cooling needs can be minimized by building design.
7	Compile various types of passive cooling systems from the natural resources.
8	Compile the components used for indirect gain.
9	Explain the importance of earth air tunnels for heating & cooling of the buildings.
10	Describe the concept used in modern & pre modern passive design.
11	Explain solar passive systems design of various typologies.
12	State importance of climate in solar passive design.



Curriculum w.e.f. 2022-2023
Course Plan

Course Title : Energy Ratings	
Course Code : 201ARMIL411	Semester :VII
Teaching Scheme : L-T-P: 3-1-0	Credits :4
Evaluation Scheme : ISE Marks : 20+MSE Marks: 30	ESE(TH) Marks : 50

Course Description:

The course intends to study various energy rating systems for energy conservation. It also explores the energy audit & management with the cost efficiency. It describes the principals of sustainable development through efficient use of energy.

Course Objectives:

1	To understand energy efficiency.
2	To understand energy conservation measures.
3	To study energy rating systems, energy audit & management.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to:
C411.1	Understand the importance of energy efficiency
C411.2	Apply energy conservation measures.
C411.3	Understand various energy rating systems for energy audit & management.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes (COs) / Program Outcomes (POs) / Program Specific Outcomes (PSOs)	1	2	3	4	5	6	7	8	9	10	11	12	(PSOs)		BTL
													1	2	
C411.1	1	2	2	-	-	-	2	-	-	-	-	-	-	-	2
C411.2	3	3	3	-	-	-	3	-	-	-	-	-	-	-	2
C411.3	3	3	2	-	-	-	3	-	-	-	-	-	-	-	2

Prerequisite: Nil



Curriculum w.e.f. 2022-2023

Unit No.	Course Content	Hrs.
Unit 1	Introduction of energy rating	
	Definition of energy rating, need of energy rating, various fields of application.	4
Unit 2	Energy rating systems	
	Introduction and guidelines of ECBC 2007, The Indian Green Building Council and LEED, The Energy and Research Institute and the GRIHA rating System.	12
Unit 3	Introduction to Energy Conservation Act	
	The Energy Conservation Act, 2001 (52 of 2001) its legal framework, institutional arrangement and a regulatory mechanism at the Central and State level to embark upon energy efficiency drive in the country.	8
Unit 4	Energy efficiency	
	Introduction to energy rating labels, energy efficiency ratio (EER), seasonal energy efficiency ratio (SEER), Energy efficiency fixtures.	8
Unit 5	Energy Audit & Management	
	A process of evaluating a building for the uses of electricity, Identification of opportunity to reduce energy consumption, cost efficiency of bill.	8
Unit 6	Energy conservation	
	Important of energy conservation, different ways of conserving energy, government initiative for energy conservation. Sustainable Development & reduction in Global warming through energy conservation.	8

Text Book:

1	GRIHA Manual, Ministry of New and Renewable Energy, Government of India, and The Energy and Resources Institute, 2010
2	Energy Conservation Act, 2001 Along with Allied Rules, Universal Law Publishing – An imprint of LexisNexis (1 January 2016)

Video / Audio links:

1	Green Building Ratings and Components https://www.youtube.com/watch?v=VE2tpwGCN0U
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Curriculum w.e.f. 2022-2023

Tutorial

Tutorial No	Tutorial Description
1	Explain the importance of energy rating.
2	Enlist various energy rating systems used in India.
3	Explain the process of energy audit & energy conservation
4	Compile energy efficient strategies with the use of energy efficient fixtures.
5	Discuss the need of energy rating
6	Explain in detail areas of focus used in various rating systems.
7	Introduce energy conservation act 2001 & its legal framework.
8	Compile various energy efficient fixtures & its star rating.
9	Evaluate the uses of electricity for different types of buildings.
10	Describe EER & SEER.
11	Explain importance of energy efficiency in sustainable development.
12	State the different ways of conserving energy