

Model Curriculum for Bachelor of Architecture (B. Arch)

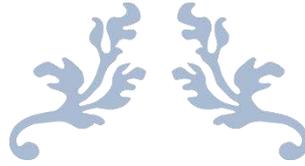
2019



ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

Nelson Mandela Marg, Vasant Kunj, New Delhi 110070

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MODEL CURRICULUM FOR BACHELOR OF ARCHITECTURE

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MESSAGE

The quality of technical education depends on many factors but largely on- outcome based socially and industrially relevant curriculum, good quality motivated faculty, teaching learning process, effective industry internship and evaluation of students based on desired outcomes. Therefore, it was imperative that a revised AICTE model curriculum be prepared by best experts from academia and industry, keeping in view the latest industry trends and market requirements in Architecture and be made available to all universities/ institutions in the country. AICTE constituted a team of five experts to revise the model curriculum of Bachelor in Architecture. Similar exercise was already done for programmes at UG and PG level in engineering, MBA, PGDM, Pharmacy, etc.

The revised model curriculum for Bachelor of Architecture has been designed where number of credits have been kept as 273 satisfying minimum standards of architectural education regulations, 2017. It is comprising of courses on Design, Construction, Human Values, History of Architecture etc. Significant number of courses on Design and Construction alongside numerous studio courses have been kept to help students better understand the subject through practical learning. Focus has been on application of concepts and thus, Student- Industry interaction through internship as well as site visits have been emphasized. These features will allow students to develop a problem-solving approach to face the real life challenges in the future.

As a major initiative by AICTE, a three-week mandatory induction program for students has also been designed and has to be given at the beginning of the course. The idea behind this is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

Professors from MANIT Bhopal, MNIT Jaipur, Amity University and practicing Architects have used their expertise to design this model curriculum. We are sure that the model curriculum will help to enhance employability, entrepreneurship and enable youngsters to develop deep interest to pursue Architecture as a career.

We strongly urge the institutions/ universities in India to adopt this Model Curriculum for B. Arch Program. This is a suggestive curriculum and the concerned university/ institution should build on and exercise flexibility in readjustment of courses/ credits within the overall 273 credits.


(Prof Anil D Sahasrabudhe)

PREFACE

Taking cognisance of growing concern about quality of technical education in India, AICTE in its 49th council meeting held on 14.03.2017 approved a package of measures for improving quality of technical education - revision of curriculum, mandatory internships and Student Induction Program were amongst the few.

AICTE fully aware of the fact that Architecture education attracts interest of students but improving employability skills will enhance and enrich number of youngsters pursuing architecture. AICTE constituted a committee with experts drawn from academia and industry to prepare model curriculum of Bachelor in Architecture.

The rationale behind this exercise is standardization and development of state of art curriculum of B. Arch., suitable for architecture and allied profession across India. During the development of curriculum, employability and employment opportunities for youth were kept in mind. Desired attributes and traits of a fresh graduate in Bachelor of Architecture were pinpointed and studied. Further Matrix of Skills required for possible categories of employability were identified and then the syllabus is revised accordingly.

AICTE has made internship mandatory for the whole penultimate semester. Internship will equip the students with practical understanding and training about industry practices in a suitable industry or organization. It will serve the objective of providing application based learning. Further every semester constitutes of a good mix of theory and studio courses. Thus giving students an opportunity to better understand the theoretical concept and learn them in an interesting manner.

After due deliberations, the scheme and syllabus for Bachelor in Architecture have been formulated. Salient features of this model curriculum are enumerated below:

- Each course has course learning objectives & course outcomes.
- Almost every semester carries a good mix of theory and studio.
- Electives are offered to give flexibility to students and choice based learning.
- To the extent possible, the weightage of theory and practical (in terms of contact hours) are balanced.
- As part of Architectural Design Studio Course, Compulsory study trip / tour will be conducted.
- Syllabus satisfies minimum standards of architectural education regulations, 2017 as prescribed by Council of Architecture, New Delhi



(Prof Yogesh K. Garg)
Professor and Head,
Department of Architecture
and Planning
M.A.N.I.T. Bhopal

ACKNOWLEDGEMENT

The development of an outcome based Model Curriculum for Bachelor of Architecture is a result of thoughtful deliberations at various stages of dedicated and specialized experts. The efforts were driven by need for standardization of curriculum for B. Arch students. The important points kept in mind while developing the curriculum are employment opportunities for youth, market driven approach and rural development. This model curriculum has been framed to meet the expectations of an academically challenging environment, develop problem solving skills, and align with current standards and to enrich the students to make them self-enablers and/ or match job requirements.

I wish to acknowledge the contribution of our esteemed experts involved in the process of developing this outcome based model curriculum. We are thankful to Chairman of the committee Prof. Yogesh K. Garg, MANIT Bhopal and members of the committee namely Dr. Vinay Mohan Das, MANIT Bhopal; Prof. Abhijit Shirodkar, Amity University, Mumbai; Ar. Ahutosh Agarwal, New Delhi; Prof. Rajeev Shringi, MNIT, Jaipur who committed themselves towards framing this model curriculum.

I highly appreciate and thank Prof. Rajeev Sangal of IIIT Hyderabad and his team for developing a Guide to Induction Program along with mandatory humanities courses. I am greatly gratified to Shri R. Subrahmanyam, Secretary, MHRD and Dr. S. S. Sandhu, Additional Secretary (TE) for their supervision, contribution, guidance and support throughout the development of this model curriculum.

Special thanks and gratitude to Prof. Anil D. Sahasrabdhe, Chairman; Prof M.P. Poonia, Vice Chairman and Prof. A.P. Mittal, Member Secretary, AICTE who all have been instrumental and encouraging throughout the process of developing this model curriculum.

I appreciate the officers and officials of Policy & Academic Planning Bureau, in particular the dedication put in by Dr. Neeraj Saxena, Dr. Neetu Bhagat, Shri Manoj Singh, Mr. Dharmesh Kumar Dewangan and Mr. Sunil Kumar for compiling the inputs from the experts and coordinating the whole process. I also sincerely thank all officers and officials of AICTE, who have contributed in one way or other for the development of this model curriculum.



(Prof. Rajive Kumar)

Adviser-I

Policy & Academic Planning Bureau, AICTE

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1. Introduction

On the 28th of July 2017, a committee was constituted by the All India Council for Technical Education, New Delhi, vide their departmental order no. F.No. AICTE/P&AP/Misc./2016 (B.Arch.) for quick revision of model curriculum of B. Architecture (U.G. Program).

The committee consisted of following members:

1	Dr. Yogesh K. Garg, Professor, Department of Architecture and Planning MANIT, Bhopal. PIN-462007 Email: yogeshkgarg@gmail.com, gargyk@manit.ac.in Contact: +91 9826246754	Chairman
2	Dr. Vinay Mohan Das Professor, Department of Architecture and Planning MANIT, Bhopal. PIN-462007 Email: vinaymdas@yahoo.com, dasvm@manit.ac.in Contact: +91 9826081028	Member
3	Prof. Abhijit Shirodkar Director, Amity School of Architecture and Planning Amity University, Mumbai-Pune Expressway, Bhatan, Mumbai. PIN - 410206 Email: adshirodkar@hotmail.com, ashirodkar@mum.amity.edu Contact: +91 9823351617	Member
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During the first meeting held on 31st August 2017, Dr. (Prof.) M. P. Poonia, Vice Chairman, and Prof. Rajive Kumar, Advisor-I, P&AP, All India Council for Technical Education, New Delhi highlighted the objective of formulating the committee especially in light of the problems faced by fresh graduates. The focus was on the employability issues of professional fresh graduates, which was as low as 30%, due to a variety of reasons, including, widening of technological gap between teaching and practice, lack of knowledge of fundamentals, lack of professional and personal skills, outdated curriculum, tiresome examination system etc.

In this regard initiatives taken by A.I.C.T.E. for the engineering stream to fulfill the gap between teaching and practice were highlighted and these included the following:

1. Inclusion of minimum three weeks induction training program before commencement of regular classes.
2. Lighter curriculum with fewer credits in the first and second semesters to provide breathing time to the students.
3. Overall reduction of credits from 200-220 to 140-160.
4. Emphasis on project work.
5. Emphasis on student-industry interaction.
6. Compulsory three months internship in any industry of repute.
7. Change in the examination system from theoretical approach to a practical approach.
8. Emphasis on learning state of the art technical tools prevalent in the respective industry.

After discussions and deliberations on the initiatives taken for Engineering Stream by AICTE, it was requested that as per recent market trends the attributes & traits of architects be identified and these be reflected in the model curriculum. The committee was also requested to incorporate A.I.C.T.E. initiatives for engineering streams, to the maximum possible extent, in the B. Architecture curriculum.

With the aim to review the syllabus for improving employability of fresh graduates, by taking into account the needs of the profession and current market trends and in order to bridge the gap between theory and practice, following objectives were framed.

- To prepare a table of desired attributes and traits of fresh graduates that would act as a stepping point for the formulation of B. Arch. Curriculum.
- To prepare Matrix of Skills required for Possible Categories of Employability in architecture and allied fields, there by developing a choice based curriculum.
- Finalizing program objectives and learning outcome for Five-year Bachelor of Architecture program.
- To develop a choice based curriculum for better employability.

2. Desired attributes and traits of a fresh graduate of B. Architecture

Desired attributes and traits for a fresh graduate were divided in four categories, viz. Conceptual Skills, Interpersonal Skills, Technical Skills and Additional Traits. Architecture being one of the oldest professions attributes and traits as given in the Ancient Indian Treatise and contemporary requirements of the profession were compared. It was observed that even Ancient Indian Treatise clearly lays emphasis on conceptual and interpersonal skills apart from technical skills required at that time. Additional traits related to personal and professional ethics were also mentioned in the treatise, generating the need to introduce courses related to ethics and morals in professional conduct. Table below illustrates the desired attributes and traits of a fresh graduate in B. Architecture.

Table of desired attributes and traits of a fresh graduate

	Attributes and traits as described in Ancient Indian Architectural Treatises	Contemporary attributes and traits
Conceptual Skills (Attributes)	<ul style="list-style-type: none"> • Intellect (<i>Pragya</i>) • Relation between theory and practice • Aesthetics (<i>Chhand</i>) & Proportions 	<ul style="list-style-type: none"> • Visualization • Creativity • Sense of Design • Logical Reasoning (problem formulation, problem solving, decision making) • Relation between theory and practice
Interpersonal Skills (Attributes)	<ul style="list-style-type: none"> • Able Communication Skills • Compassionate • Physically, Mentally and Spiritually Fit 	<ul style="list-style-type: none"> • Able Communication Skills • Management & Team Work • Passionate towards Work • Confident
Technical Skills (Attributes)	<ul style="list-style-type: none"> • History of Architecture • Knowledge of Architecture • Knowledge of Mechanical Sciences • Knowledge of carpentry, brick & stone masonry, sculpture, chiseling, construction material & metallurgy • Mathematics & Geometry 	<ul style="list-style-type: none"> • Technical • Drawing • Professional • Legal
Additional Traits	<ul style="list-style-type: none"> • Not Greedy • Generous • Master of Senses • Honest • Straight Forward • Just (<i>Nyaya Priya</i>) • Unbiased • Free from seven vices • Attentive 	<ul style="list-style-type: none"> • Observant • Leadership • Multi-tasker • Upholder of Professional Ethics

3. Matrix of Skills required for Possible Categories of Employability

Model Curriculum for Undergraduate Programme in Bachelor of Architecture 2013 was reviewed in light of desired attributes and traits. Following were the observations:

- Emphasis should be on choice based curriculum, to prepare students with focus on entrepreneur, job seeker or researcher, as categories of employment.

- b. Dynamic curriculum is needed for the core subjects to keep them abreast with the dynamics of professional needs.
- c. Education imparted should be more practical oriented with respect to employability. Emphasis on technical skills, student-industry interaction, development of personality and communication skills, etc. should be increased.
- d. Principles of Ancient Indian Architecture should be included.
- e. There should be an inclusion of an induction training program and subjects such as environmental sciences, Indian Constitution, moral science, value education etc., to make students more aware about sensitive issues related to Indian society and to enhance their skills. Essence of traditional Indian knowledge should also be incorporated in the syllabus, as core or elective subjects, looking to the market requirements.

For giving emphasis on choice based curriculum and to prepare students with focus on employability categories a matrix is proposed, consisting of two broad divisions i.e. Core subjects in Architecture and subjects with focus on employability as electives. Employability is further classified as entrepreneurs, job seekers and researchers. Matrix in core architecture subjects and subjects related to categories of employability were compiled and prepared. Table below illustrates Matrix of Skills required for Possible Categories of Employability.

Matrix of Skills required for Possible Categories of Employability

	Common / Core Subjects	Subjects with Respective Focus		
		Additional Skills for Academic (PG/Research/Teaching)	Additional Skills for Job (Core Skill domain/allied skills domain)	Additional Skills for Entrepreneur (Own practice /office)
Conceptual Skills	<ul style="list-style-type: none"> • Architectural Design • Graphic Design • Visual Arts, etc. 	<ul style="list-style-type: none"> • Research Methodologies • Research Techniques • Pedagogy, etc. 		<ul style="list-style-type: none"> • Managerial • Social • Personality Development • Decision Making • Information Gathering • Marketing • Communication • Leadership, etc.
Interpersonal Skills	<ul style="list-style-type: none"> • Communication skills • Personality development • Guided Study in every semester, etc. 		Visual Communication Skill, etc.	Extra-curricular activity, etc.
Technical	<ul style="list-style-type: none"> • Construction 	Planning	Arch. Design	Technical

Skills	<ul style="list-style-type: none"> Structures Graphics Architectural Drawing History of Architecture Bldg. Services Bldg. Sciences Estimation (Cost Accounting) Survey Computer Application Byelaws Bldg. Materials Structural Systems Allied Legal Knowhow Aspects of Professional Practice Specifications Energy Efficiency Theory of Design Basics of Urban Design Basics of Project Management Basics of Site Planning & Landscape, etc. 	<ul style="list-style-type: none"> Urban Planning Housing Rural Planning Transportation Planning Real Estate Development, etc. 	<ul style="list-style-type: none"> Theory of Design Design Philosophy Vernacular Design Conservation Urban Design Landscape Architecture Architectural Journalism Art in Architecture, etc. 	<ul style="list-style-type: none"> Construction Mgmt. Bldg. Engg. Mgmt. Construction Tech. BIM Operation Research Hospital Mgmt. etc. 	<ul style="list-style-type: none"> Film Animation Computer Application GIS Ancient Principles e.g. <i>Sthapatya</i> 3D modeling Graphic Design 	<ul style="list-style-type: none"> Accounting Finance RERA WTO Labour Law Professional Liability
Additional Traits	<ul style="list-style-type: none"> Value Education Humanities Relationship of Architecture with Society & Culture Environmental Science Indian Constitution, etc. 				<ul style="list-style-type: none"> Advance Electives related to Building Services Special Electives related to Hospital Planning, Large Infrastructure Projects such as Airport/Rail Terminus/Multi-Transit Interchanges, etc., Skyscrapers, Hotel Planning, Interiors, Green/Intelligent Buildings, etc. 	

4. Framework for developing scheme for B. Architecture Curriculum

The program shall be called Bachelor of Architecture (B. Arch.) and shall be of 5-years duration. Classes for 1st year of a 5-year B.Arch. Course shall not commence later than the 1st working day in the month of September of a calendar year (Prescribed under the Minimum Standards of Architectural Education, 2008; under section 21 of the Architects Act, 1972).

Following illustrates nature of study, program objectives and learning outcome for the course.

Nature of Study:

Architecture is the design, visualization, aesthetic coordination, structural conceptualization, specification and supervision and giving responsible direction to the erection of buildings and built environments, effected through the medium of plans, specifications, investigations, consultations, contract documents and evaluations.

The profession/practice of architecture encompasses the provision/delivery of services in relation with the site, design, physical planning, construction, addition, alteration, renovation, remodeling, restoration, conservation or adaptive reuse of a building or a group of buildings.

Program Objectives:

The objectives of the 5-year Bachelor of Architecture program are aimed at integrating knowledge based and skill based pedagogies in a balanced manner, essential to enable the students to become responsive and sensitive architects. With this in mind the objectives are directed towards the following:

1. Understanding the basic philosophy and fundamental principles of the multi-dimensional aspects and multi-faceted nature of architecture.
2. Preparing the students to acquire and enhance creative problem solving skills including critical thinking and assessment and developing design concepts and solutions and presentation of these skills.
3. Performing standard proficiencies, in harmony with the scope of local practice of architecture in particular and the global practice in general i.e. making the student market ready or employable.
4. Preparing the students to work effectively in a multi-disciplinary/inter-disciplinary team in the building industry, by providing 360° knowledge of architecture.
5. Directing and focusing the thrust of architecture education to the needs and demands of society and its integration for social, economic, cultural, and environmental aspects of nation building.
6. Instilling receptiveness to new ideas and knowledge and infusing a sense of scientific research.
7. Developing the overall personality and professional confidence of the student towards all the stakeholders in the building industry.

Learning Outcomes:

The objectives of the program are translated into a number of learning outcomes. These outcomes are directly related to the profession of architecture, the way it is practiced in the country and the knowledge components that are necessary for such professional practice. Towards the end, the students who complete this program will possess the ability to:

1. Understand the real-life situation in architectural practice and recognize the dialectic relationship between people and the built environment (especially with reference to the Indian sub-continent) with reference to their needs, values, behavioral norms, and social patterns.

2. Thrive in a rigorous intellectual climate which promotes inquiry through design research.
3. Work collaboratively toward synthetic design resolution which integrates an understanding of the requirements, contextual and environmental connections, technological systems and historical meaning with responsible approach to environmental, historical and cultural conservation.
4. Apply visual and verbal communication skills at various stages of the design and delivery process.
5. Produce professional quality graphic presentations and technical drawings/documents.
6. Critically analyze building designs and conduct post-occupancy evaluations.
7. Work in a manner that is consistent with the accepted professional standards and ethical responsibilities.
8. Work in collaboration with and as an integral member of multi-disciplinary/inter-disciplinary design and execution teams in the building industry.
9. Conduct independent and directed research to gather information related to the problems in architecture and allied fields.

Mapping of programme objectives (PO) with learning outcome (LO):

A broad relation between the programme objectives and the outcome is shown below.

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9
PO1	✓		✓	✓					
PO2	✓	✓	✓	✓					
PO3	✓	✓	✓	✓	✓				
PO4	✓	✓	✓	✓	✓	✓	✓		
PO5	✓	✓	✓	✓	✓	✓	✓		
PO6	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO7			✓	✓	✓	✓	✓	✓	✓

Subject Coding:

Simplified Coding pattern is generated to identify the semester, subject number, whether the subject is core or elective and whether the subject is theory or studio. The coding composed of eight alpha numeric characters. First two characters 'AR' indicate the branch as Architecture. Third character contains 'C', 'E' or 'L' indicating core, elective or self-learning compulsory subject respectively. Fifth and sixth numeric characters indicate the semester. '00' in these fields indicate subjects are electives and not semester specific. Seventh and eighth numeric characters indicate subject number. Last character contains 'T' or 'S' indicating theory or studio/Lab subject. Following example further clarifies the coding pattern.

Example No.	CODING	EXPLANATION
1	ARC-0104T	AR = Architecture, C = Core subject, 01 = First semester, 04 = Fourth subject of the semester, T = Theory subject
2	ARC-0107L	AR = Architecture, C = Core subject, 01 = First semester, 07 = Seventh subject of the semester, L= Self Learning
3	ARC-0201S	AR = Architecture, C = Core subject, 02 = Second semester, 01 = First subject of the semester, S = Studio subject
4	ARE-0001S	AR = Architecture, E = Elective subject, 00 = Not semester specific, 01 = First elective subject, S = Studio subject
5	ARE-0007T	AR = Architecture, E = Elective subject, 00 = Not semester specific, 07 = Seventh elective subject, T = Theory subject

Defining Credits:

One Lecture period / Hour	1 credit
Two lab / workshop / studio / seminar periods / Hours	1 credit
One Design studio / Construction studio / thesis period / Hour	1.5 credits

5. Scheme of examination

Considering the nature of field of study, program objectives and learning outcomes along with Matrix of Skills required for Possible Categories of Employability, following scheme is proposed.

First Semester B. Architecture							
S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC -0101S	Architectural Design – 1	-	8	8	Studio	12
2	ARC – 0102T	History of Art & Culture	1	2	3	Theory	2
3	ARC - 0103T	Introduction to Principles of Architecture	3	-	3	Theory	3
4	ARC - 0104S	Architectural Drawing – 1	3	4	7	Studio	5
5	ARC - 0105T	Environment & Ecology	2	-	2	Theory	2
6	ARC - 0106S	Communication Skills / Communicative English	1	4	5	Lab	3
7	ARC - 0107L	Universal Human Values	-	-	-	Self-Learning	-
Total					28		27

NOTE: Inclusion of 3 weeks induction training program in First Semester.

Second Semester B. Architecture							
S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC -0201S	Architectural Design – 2	-	8	8	Studio	12
2	ARC - 0202T	History Architecture – 1	1	2	3	Theory	2
3	ARC – 0203S	Building Materials & Construction – 1	1	4	5	Studio	7
4	ARC - 0204S	Architectural Drawing – 2	1	4	5	Studio	3
5	ARC - 0205S	Architectural Sketching & Model-Making	-	4	4	Studio	2
6	ARC - 0206T	Structural Mechanics	1	2	3	Theory	2
7	ARC - 0207L	Personality Development	-	-	-	Self-Learning	-
Total					28		28

Third Semester B. Architecture

S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC -0301S	Architectural Design – 3	1	6	7	Studio	10
2	ARC - 0302T	History Architecture – 2	2	-	2	Theory	2
3	ARC - 0303S	Building Materials & Construction – 2	1	4	5	Studio	7
4	ARC - 0304S	Computer Applications – 1	-	4	4	Lab	2
5	ARC - 0305T	Structure – 1	1	2	3	Theory	2
6	ARC-0306T	Climatology	1	2	3	Theory	2
7	ARC-0307S	Surveying	1	4	5	Lab	3
Total					29		28

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

Fourth Semester B. Architecture

S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC - 0401S	Architectural Design – 4	1	6	7	Studio	10
2	ARC – 0402T	Building Services – 1 (Water Supply & Sanitation)	1	2	3	Theory	2
3	ARC – 0403S	Building Materials & Construction – 3	1	4	5	Studio	7
4	ARC - 0404S	Computer Applications – 2	-	4	4	Lab	2
5	ARC - 0405T	Structure – 2	1	2	3	Theory	2
6	ARC - 0406S	Site Planning	2	2	4	Studio	3
7	ARC - 0407T	Theory of Design	1	2	3	Theory	2
Total					29		28

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

Fifth Semester B. Architecture

S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC -0501S	Architectural Design – 5	1	6	7	Studio	10
2	ARC - 0502T	Building Services – 2 (Electrical Services)	1	2	3	Theory	2
3	ARC – 0503S	Building Materials & Construction – 4	1	4	5	Studio	7
4	ARC -0504S	Computer Applications – 3	-	4	4	Lab	2
5	ARC -0505T	Structure – 3	1	2	3	Theory	2
6	ARC - 0506T	Acoustics	1	2	3	Theory	2
7	ARC - 0507S	Quantity Surveying & Specifications	2	2	4	Studio	3
Total					29		28

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

Sixth Semester B. Architecture

S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC -0601S	Architectural Design – 6	1	6	7	Studio	10
2	ARC - 0602T	Building Services – 3 (Mechanical Services)	1	2	3	Theory	2
3	ARC – 0603S	Building Materials & Construction – 5	1	4	5	Studio	7
4	ARC - 0604S	Computer Applications – 4	0	4	4	Lab	2
5	ARC - 0605T	Structure – 4	1	2	3	Theory	2
6	ARC - 0606S	Working Drawing	1	2	3	Studio	2
7	Refer the enlisted Electives	Elective – 1	2	2	4	Theory	3
Total					29		28

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

Seventh Semester B. Architecture

S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC - 0701S	Architectural Design – 7	1	6	7	Studio	10
2	ARC - 0702T	Building Economics & Sociology	3	0	3	Theory	3
3	ARC - 0703S	Landscape Architecture	2	2	4	Studio	3
4	ARC - 0704S	Interior Design	-	4	4	Studio	2
5	ARC - 0705T	Project Management	3	-	3	Theory	3
6	ARC - 0706T	Introduction to Town Planning	4	-	4	Theory	4
7	Refer the enlisted Electives	Elective – 2	2	2	4	Theory	3
Total					29		28

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

Eighth Semester B. Architecture

S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC -0801S	Architectural Design – 8	1	6	7	Studio	10
2	ARC - 0802S	Entrepreneurship skills for architects	1	4	5	Studio cum Self-Learning	3
3	ARC - 0803S	Dissertation	1	2	3	Studio	2
4	Refer the enlisted Electives	Elective – 3	2	2	4	Theory	3
5	Refer the enlisted Electives	Elective – 4	3	2	5	Studio	4
6	Refer the enlisted Electives	Elective – 5	3	2	5	4	4
Total					29		26

Note: Compulsory study trip / tour in Architectural Design subject as a part of studio.

Ninth Semester B. Architecture							
S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC -0901S	Professional Training / Internship	-	-	-	Studio	26
Total			-	-	-	-	26

Tenth Semester B. Architecture							
S. No.	Subject Code	Subject Name	Instruction Hours		Weekly Contact Hours	Theory, Studio / Lab	Credits
			Lecture	Studio			
1	ARC -1001S	Design Thesis	-	10	10	Studio	15
2	ARC -1002T	Professional Practice	3	-	3	Theory	3
3	Refer the enlisted Electives	Elective – 6	3	2	5	Studio	4
4	Refer the enlisted Electives	Elective – 7	3	2	5	Studio	4
Total					23		26

6. Highlights of the Scheme

Following are the highlights of the scheme:

Proposed curriculum is divided in two stages with First stage from First to Third Year and Second stage from Fourth to Fifth Year. It is proposed that most of the core subjects shall be completed in the first three years of B. Arch. curriculum (Stage – 1) and for next two years (Stage – 2). The emphasis should be on choice based subjects depending on the possible category of employment and practical oriented subjects related to employability apart from emphasis on thesis project and practical training.

a. Induction Training

In the first year three weeks of the course, an induction training program is proposed, before the start of formal classes, to orient the students towards architectural aptitude, education and career. Induction training should also include introduction of faculty members, discussion with faculty members, visits to various spaces in the department/school, such as climatology lab, computer center, material museum, construction yard, students' works exhibition, etc. Subjects such as Environmental Science, Indian Constitution, Value Education, Moral Science and essence of traditional Indian culture and knowledge may also be included in induction training.

Induction Program (As per AICTE mandate: Common for all professional courses)

Students entering an institution have diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose.

In this context, in the beginning of the first semester a three-week long induction program is proposed for the students. Regular classes would start after the completion of the induction program. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature. The Induction Program is also used to rectify some critical lacuna, like deficiency in comprehension of English language by many students. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

Physical Activity

This would involve a daily routine of physical activity with games and sports. It would start with all students coming to the field for light physical exercise or yoga in the morning. There would also be games in the evening or at other suitable times according to the local climate. These would help develop team work. Each student should pick one game and learn it for three weeks. There could also be gardening or other suitably designed activity where labour yields fruits from nature.

Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, flow into architectural design later.

Universal Human Values

It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting staff in the hostel and department, be sensitive to others, etc. Need for character building has been underlined earlier. A module in Universal Human Values provides the base.

Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but by getting students to explore and think and by engaging them in a dialogue. It is best learnt through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values. The teachers must be from within the institute and also from outside of the Institute.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions and activities could even continue for rest of the semester, and not stop with the induction program. Besides

drawing the attention of the student to larger issues of life, it would build relationships between teachers and students which last for their entire 5-year stay and possibly beyond.

Literary

Literary activity would encompass reading, writing and possibly debating, enacting a play etc.

Proficiency Modules

This period can be used to overcome some critical lacunas that students might have, for example, English, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially.

Lectures by Eminent People

Lectures by eminent people, say, once a week would give the students exposure to people who are socially active or are in public life. They could be from any field well known for their integrity.

Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize the students with their city as well as expose them to the world of under privileged.

Familiarization

The students should be told about different methods of teaching and learning being used in the institute and how it is different as compared to school education or coaching. They should also be shown the laboratories, workshops & other facilities and also be introduced to the faculty, administrative staff etc. and whom they should approach for a specific need or issue. They should be told about what becoming an architect means and the importance of the role of architect in society, and in nation building.

Schedule

The activities during the Induction Program would have an Initial Phase, a Regular Phase and a Closing Phase. The Initial and Closing Phases would be two days each.

Day 0	
Whole day	Students arrive - Hostel allotment. (Preferably do pre-allotment)
Day 1	
09:00 am - 03:00 pm	Academic registration
04:30 pm - 06:00 pm	Orientation
Day 2	
09:00 am - 10:00 am	Diagnostic test (for English etc.)
10:15 am - 12:25 pm	Visit to respective departments
12:30 pm - 01:55 pm	Lunch
02:00 pm - 02:55 pm	Director's address
03:00 pm - 04:00 pm	Interaction with parents
04:00 pm - 05:00 pm	Mentor-mentee groups - Introduction within group. (Same as Universal Human Values groups)

Regular Phase

Regular Phase of induction begins after two days of the start. With this phase there would be regular daily program.

Daily Schedule

Some of the activities are on a daily basis, while some others are at specified periods within the Induction Program. A typical daily timetable is as follows:

Day 3 Onwards			
Session	Time	Activity	Remarks
	06:00 am	Wake up call	
I	06:30 am - 07:10 am	Physical activity (mild exercise/yoga)	
	07:15 am - 08:55 am	Bath, Breakfast, etc.	
II	09:00 am - 10:55 am	Creative Arts / Universal Human Values	2 groups—one group does Creative Arts
III	11:00 am - 12:55 pm	Universal Human Values / Creative Arts	Groups interchanged
	01:00 pm - 02:25 pm	Lunch Break	
IV	02:30 pm - 03:55 pm	Afternoon Session	
V	04:00 pm - 05:00 pm	Afternoon Session	
	05:00 pm - 05:25 pm	Tea Break	
VI	05:30 pm - 06:45 pm	Games / Special Lectures	
VII	06:50 pm - 08:25 pm	Rest and Dinner	
VIII	08:30 pm - 09:25 pm	Informal interactions (in hostels)	

Sundays are off. Saturdays have the same schedule as above or have outings.

Afternoon Activities (Non-Daily)

The following five activities are scheduled at different times of the Induction Program, and are not held daily for everyone:

1. Familiarization
2. Visits to local area
3. Lectures by eminent people
4. Literary activity
5. Proficiency modules

Here is the approximate activity schedule for the afternoons (may be changed to suit local needs:

Session.	Activity	Remarks
IV	Familiarization with Dept./Branch & Innovations	For 3 days (Day 3 to 5)
IV, V & VI	Visits to Local Area	For 3 days - interspersed (e.g., 3 Saturdays)
IV	Lectures by Eminent People	As scheduled - 3-5 lectures
IV	Literary (Play/Book reading/Lecture)	For 3-5 days
V	Proficiency Modules	Daily, but only for those who need it

Closing Phase

Last but one day	
Time	Activity
08:30 am - 12 noon	Discussions and finalization of presentation within each group
02:00 pm - 05:00 pm	Presentation by each group in front of 4 other groups besides their own (about 100 students)
Last day	
Whole day	Examinations (if any). May be expanded to last 2 days, in case it is necessary.

Follow Up after Closure

As a follow up program of the formal three-week Induction Program the groups which are formed should function as mentor- mentee network. A student should feel free to approach his faculty mentor or the student guide, when facing any kind of problem, whether academic or financial or psychological etc. (For every 10 undergraduate first year students, there would be a senior student as a student guide, and for every 20 students, there would be a faculty mentor). Such a group should remain for the entire duration of the stay of the student. Therefore, it would be good to have groups with the students as well as teachers.

The following is a list some important suggestions:

- **Follow Up after Closure - Same Semester**

It is suggested that the groups meet with their faculty mentors once a month, within the semester after the three-week Induction Program is over. This should be a scheduled meeting shown in the timetable. (The groups are of course free to meet together on their own more often. The student groups could be invited to their faculty mentor's home for dinner or tea, nature walk, etc.)

- **Follow Up - Subsequent Semesters**

It is extremely important that continuity be maintained in subsequent semesters. It is suggested that at the start of the subsequent semesters (up to sixth semester), some days be set aside for activities related to follow up to Induction Program. The students could be shown inspiring films on architects, architecture or any other topic. They can also do collective art work, have moderated focus group discussions on any important architectural issue. Subsequently, the groups should meet at least once a month.

Summary

Architectural institutes were set up to generate well trained professionals in architecture with a feeling of responsibility towards oneself, one's family, society and nation. In most of the cases the incoming undergraduate students are in architecture as they could not get into engineering. As a result, they fail to link up with the goals of their own institute.

The graduating student must have values as a human being, and knowledge and meta- skills related to his/her profession as an architect and as a citizen. Most students, who get demotivated, also lose interest in learning. The Induction Program is designed to make the new students feel comfortable, sensitize them towards exploring their academic interests and

activities, reduce competition and make them work towards excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build their character.

The Universal Human Values component acts as an anchor, develops awareness and sensitivity, feeling of equality, compassion and oneness, draws attention to society and nature, and character to follow through. It also makes them respect their relationship with their families and extended family in the institute (with hostel stay and others). It also connects students with each other and with teachers so that they can share any difficulty they might be facing and seek help.

b. Subjects

It is proposed that most of the core subjects shall be completed in the first three years of B. Arch. Curriculum and for next two years the emphasis should be on choice based subjects depending on practical oriented subjects related to employability. Few essential subjects such as Professional Practice, Introduction to Town Planning, Urban Design, etc. shall be included in the curriculum of fourth and final year. Scheme comprises of seven subjects in each semester up to seventh semester. Six, one and four subject are proposed in eighth, ninth and tenth semester respectively

c. Credits

Following are the highlights of the credits

- a. Total minimum credits for the B. Arch. Curriculum are limited to 273. In Stage – 1 (First Year to Third Year) there are 167 credits and in stage – 2 (Fourth Year and Final Year) there are 106 credits.
- b. Weightage in terms of credits for
 - Professional core Subjects: 138 credits (50%)
 - Basic science and applied engineering subjects: 60 Credits (22%)
 - Professional electives: 27 credits (10%)
 - Professional ability enhancement compulsory courses: 37 Credits (14%)
 - Skill enhancement Courses: 11 Credits (4%)
 - Choice based curriculum, prepares students with specific focus on entrepreneurship, job seeking or research. Choice based credits can be earned through *SWAYAM*, a program initiated by Government of India with an objective to provide best teaching learning resources to all, including the most disadvantaged. *SWAYAM* seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy. (Ref: www.swayam.gov.in)

- c. List of Activities and Mandatory Courses under Personality Development can be:
- Physical and Health
 - Physical Activities
 - NCC
 - NSS
 - Culture including Learning an art form, Heritage, Intangible Cultural Heritage
 - Literature & Media including Literature, Cinema and Media, Group reading of classics
 - Social Service including Social Awareness and Service
 - Self-Development including Spiritual, Mindfulness & Meditation, Religion and Inter-faith
 - Nature including Nature Club, Environment Protection

d. Contact Hours

Following are the highlights of Contact Hours.

- a. For emphasizing skill development and generating practical orientation among students for effective use of theoretical knowledge some of the theoretical subjects are reoriented as studio/lab subjects.
- b. Out of a total of 253 contact hours during the entire course, more than 70% are studio/lab contact hours (i.e. 176 hours). Theory contact hours are limited to 77, there by emphasizing practical implementation of knowledge gained through learned theory. Apart from these studio subjects six months (one semester) training is also proposed, for familiarization with office working environment and getting equipped with state of the art technology used in the offices.

e. Thesis and Training

- i. To bridge disconnect between theory and practice with an objective to prepare students for realities and technicalities of profession, emphasis is given on thesis and training subjects. It is proposed to have training in ninth semester. An entrepreneurship skill for architects in the eighth semester is introduced with an objective to make students learn the professional requirements under the mentorship of a practicing architect and college faculty. The student is given an opportunity to apply the knowledge gained in academic to a real life architectural project, including finding a client. The student will have to identify and acquire a small live project (such to as a residence, dispensary, play school, small shopping complex, etc.) and perform all professional obligations like preparing sanction drawings, presentation drawings, technical drawings, good-for-construction drawings (working drawings), specifications and detailed estimates. The student would also make structural drawings and detailed building services drawings with respective estimates. The student will have to identify a professional mentor; either a practicing architect and/or an architect from the architecture department of any government/semi-government/public sector undertaking. Also there shall be a faculty member(s) to coordinate, guide, and mentor the progress of respective student. The evaluation shall be done by the external mentor as well as the faculty.

- ii. Apart from Knowledge Application Project, six months (one semester) professional training in an architect's office is also proposed in ninth semester after learning the choice based subjects. This training will be helpful to the student in joining offices selected by their as per their choice of electives and based on category of employment they are looking for.

f. Inclusion of Traditional Ancient India Knowledge

- i. In recent times, '*Vastushastra*' has emerged as one of the major fields of discussion in the society. The word '*Vastushastra*' brings a myriad of reaction from people in general and architects in particular. But technically, *Vastu* is meant as the Sanskrit equivalent of architecture or as the '**Indian System of Architecture**' (*Sthapatya*). '*Sthapatya*' has many aspects or fields of knowledge. It contains verses on planning of towns, villages, design of temples, halls, pavilions, and seats etc. It also has information on material specifications, brickwork, joinery and carpentry. Majority of the text is on architecture and construction. The remaining verses are on astrology, *aayadi* formulae, *mandala* diagrams, *muhurta* and other non-architectural aspects.
- ii. The chaos and confusion is mainly due to the prevailing ritualistic / mystic aspects of *vastu* as hyped by the media. This media hype has not only influenced public in general but also influenced architects to a major extent, as they are unaware about the technical aspects of the Indian System of Architecture. The objective here is to create awareness among architects regarding the Indian System of Architecture and equip them to design buildings as per *Sthapatya* (in sync with recent market trends & construction technologies).
- iii. Principles of Ancient Indian Architecture should be included as introduction in Elective – 1 and its advanced principles can be included in later electives. Moreover, to impart knowledge related to Ancient Indian System of Architecture (*Sthapatya*), besides western principles, relevant topics will be introduced in the respective core subjects.

g. Choice based subjects (Electives)

- i. Choice based subjects (Electives) are in two categories viz. studio and theory choice based subjects. Electives 1 to 3 are theory electives whereas Elective 4, 5, 6 and 7 are studio electives. Elective – 1 and elective – 2 in sixth and seventh semester respectively will give a chance to explore electives (mostly interest based). Elective – 3 to elective – 7 can be chosen as advanced electives.
- ii. The students will have options of selecting the electives depending on the specialization one wishes to acquire. About 75 electives are listed out of which 7 electives shall be chosen. This means that student will have a choice of selecting one out of 13 electives.
- iii. Credits for the electives can be earned through SWAYAM portal of A.I.C.T.E.

Following electives are proposed considering program objectives and learning outcomes along with Matrix of Skills required for Possible Categories of Employability.

Structure of choice based subjects: Skill and Employability matrix

	Teaching / Research / Post-graduation			Entrepreneur	Job	Remarks
Conceptual	Ideation (S)					
	Leadership development (T)					
	Architectural Pedagogy (T)			Entrepreneurship skills for architects (T)		
	Business environment (T)					
				NGO administration (T)		
Interpersonal	Foreign Languages can be included at institutional level					
	Marketing management and skills (T)					
	Office management (T)					
				Human resource management (T)		
				Anthropology and Architecture (T)		
Technical skills	Architectural stream	Planning stream	Technical stream		Architectural stream	Skill based
	Research Methodologies (T)			VastuShastra (T)	Valuation (T)	Ergonomics (T)
	Research Techniques in Architecture (T)			Building codes and byelaws (T)	Security systems (T)	Graphic design (S)
	Computer programming (T)			Human Rights (T)	Barrier free Architecture (T)	Animation (S)
				companies laws (T)	Hospital systems and services (T)	Digital art (S)
	Advanced theory of design (T)	Real estate development (T)	Advanced structural systems (T)	Contemporary building materials (T)	Hotel planning and services (T)	CAD customization (S)
		Urban and regional planning (S)		Financial accounting (T)	Green building (T)	Remote Sensing and GIS (S)
	Vernacular architecture (T)	Rural planning (T)	Earthquake resistant architecture (S)		Intelligent buildings (T)	Set design (S)

	Art Appreciation (T)	Disaster management (T)			Industrial building systems (T)	Photography (S)	
	Product design (S)	Environmental planning (T)			Services in tall buildings (T)	Painting (S)	
	Furniture design (S)	Evolution of human settlements (T)	Building Maintenance (T)		Hill Architecture (T)	Architectural Journalism (S)	
	Architectural Conservation (T)	Urban Housing (S)	Advanced building construction and technology (S)		Auditorium , acoustics, systems and services (S)		
	Cultural expressions in architecture (T)	EKISTICS (T)	Appropriate technology (T)		Institutional building and campus planning (S)		
	Color theory and its applications (T)	Traffic and transportation planning (S)			High rise buildings (S)		
	Steel architecture and design (T)	Infrastructure planning and design (S)			Environmental impact assessment (S)		
	Glass Architecture (T)	Housing finance (T)			Mass housing design and standards (T)		
	Low cost building design and techniques (T)				Environmental codes and energy ratings (T)		
	Sustainable building design (S)						
	Modular coordination (S)						
	Architectural literally heritage of India						

	(T)						
	Urban Design (T)						

h. Mapping with Architectural Design subject

- Architectural Design is the most important subject in the Architecture curriculum, where students are involved in studio work to design all types of buildings. Hence, emphasis is given to it in all semesters.
- Sequencing of the subjects in the proposed scheme also reflects understanding and learning of theory subjects in a semester and its professional application in the subsequent semester Architectural Design Studio.
- While proposing the sequencing of the subjects in various semesters direct input and indirect input from the theoretical subject is also considered. Table below illustrates the mapping of all subjects with Architectural Design Subject and also illustrates the sequencing of subjects in various semesters.

Mapping of subjects with Architectural Design and sequencing of subjects in various semesters.

Year	Sem	Architectural Design No.	Intent of architectural design	Direct input from other subjects	Intent of the subject	Indirect input from other subjects	Intent of the subject	Remarks
First	First	1	Ergonomics and Design of small room such as hostel room, exhibition stall, information kiosk, food stall etc.	Architectural drawing – 1	Orthographic projections	History of art and culture	Study of art and culture	
						Introduction to principles of arch	Understanding elements of arch	
	Second	2	Residential building design and building such as dispensary, Guesthouse etc. for a given small social group.	BMC -1	Brick and stone construction, foundation and plinth, arches	History of arch -1	Western history	
				Arch Drawing – 2	Perspective and sciography	Structural mechanics	Structural behavior	
			Sketching and model making	Sketching and model making in various materials				
Second	Third	3	Design (form and space) for multi-unit cluster like primary school, health center, SOS village, old-age homes, small resort etc.	Climatology	Climatic analysis	History of arch -2	Indian Architecture	
				Computer application Structure– 1	Presentation techniques	BMC -2	Timber its joinery, doors and windows in all materials	

Year	Sem	Architectural Design No.	Intent of architectural design	Direct input from other subjects	Intent of the subject	Indirect input from other subjects	Intent of the subject	Remarks
						Structure - 1	Design of simple RCC structural members Columns, beams, slabs, foundations	
						Surveying	Site survey and contouring	
	Fourth	4	Design of a simple building for public activity, without urban regulatory controls such as Panchayat Bhawan, rural school, primary health center, small forest resort, etc. The focus will be on design response to climate and site contours.	Build services – 1	Water supply sanitation	BMC-3	Cement, concrete, RCC detailing of foundations, columns, beams, slabs, staircase etc.	
				Computer application 2	2D drafting	Structure-2	Design of beams, foundation, staircase, slabs	
				Site planning		Theory of design	Design process and philosophy	
	Third	Fifth	5	Grouping of activities in a public building. design for multi activity public facility like district collectorate office, degree College, residential school corporation office, shopping complex, inns, motels, budget hotels, etc..	Building services - 2	Electrical	BMC – 4	Steel truss, partitions, ceilings, glass, etc.
Computer application - 3					3D visualization	Structure - 3	Design of timber and steel structures	
Acoustics					Acoustical details	Quantity survey and specifications	Estimating and costing	
Sixth		6	Design of closed environment building for multi activity closed environment facility like corporate office, IT office, call-centers, cinema hall, small convention centers etc.	Build services	Mechanical	BMC -5	Modular coordination, space structure, tensile material, advanced structural systems	Elective -1
				Computer application – 4		Structure – 4	Advanced str. such as rafts, piles, large span strs., pre-stress etc.	
				Working Drawing				
Fourth	Seventh	7	Design of high density housing campuses with support facilities,	Landscape architecture		Build economics and sociology	Study of Psychological and social aspects	Elective - 2

Year	Sem	Architectural Design No.	Intent of architectural design	Direct input from other subjects	Intent of the subject	Indirect input from other subjects	Intent of the subject	Remarks
			Malls, large office complexes etc.	Interior design		Project management		
				Introduction to town planning	Town planning principles			
	Eighth	8	Design of university campus, business districts (place), cultural centers etc. (Urban Design Scale projects)					Elective 3 4 5
		Entrepreneur skills for architects	Correlation of theory and practice					
		Dissertation	Development of research attitude					
Final	Ninth	Thesis	Project	Professional practice				Elective 6 and 7
	Tenth	Training	Professional training					

7. Compliance with COA minimum Standards of Architectural Education – 2017

AS per COA minimum Standards of Architectural Education – 2017 following table gives the detailed account of lecture periods/ studio contact hours/ total contact Hours/ credits and course types

S.N	Code	Subject name	Lecture Periods	Studio Periods	Total Contact Hours	Theory / studio/ lab	Credits	Course type
1	ARC - 0101S	Architectural Design – 1	0	8	8	Studio	12	PC
2	ARC – 0102T	History of Art & Culture	1	2	3	Theory	2	PC
3	ARC - 0103T	Introduction to Principles of Architecture	3	0	3	Theory	3	PC
4	ARC - 0104S	Architectural Drawing – 1	3	4	7	Studio	5	PC
5	ARC - 0105T	Environment & Ecology	2	0	2	Theory	2	BS&AE
6	ARC - 0106S	Communication Skills / Communicative English	1	4	5	Lab	3	SEC
7	ARC - 0107L	Universal Human Values	0	0	0	Self-Learning	0	

TOTAL					28		27	
1	ARC - 0201S	Architectural Design – 2	0	8	8	Studio	12	PC
2	ARC - 0202T	History Architecture – 1	1	2	3	Theory	2	PC
3	ARC - 0203T	Building Materials & Construction – 1	1	4	5	Studio	7	BS&AE
4	ARC - 0204S	Architectural Drawing – 2	1	4	5	Studio	3	PC
5	ARC - 0205S	Architectural Sketching & Model-Making	0	4	4	Studio	2	PC
6	ARC - 0206T	Structural Mechanics	1	2	3	Theory	2	BS&AE
7	ARC - 0207L	Personality Development	0	0	0	Self-Learning	0	
TOTAL					28		28	
1	ARC - 0301S	Architectural Design – 3	1	6	7	Studio	10	PC
2	ARC - 0302T	History Architecture – 2	2	0	2	Theory	2	PC
3	ARC - 0303S	Building Materials & Construction – 2	1	4	5	Studio	7	BS&AE
4	ARC - 0304S	Computer Applications – 1	0	4	4	Lab	2	SEC
5	ARC - 0305T	Structure – 1	1	2	3	Theory	2	BS&AE
6	ARC - 0306T	Climatology	1	2	3	Theory	2	BS&AE
7	ARC - 0307S	Surveying	1	4	5	Lab	3	BS&AE
TOTAL					29		28	
1	ARC - 0401S	Architectural Design – 4	1	6	7	Studio	10	PC
2	ARC - 0402T	Building Services – 1 (Water Supply & Sanitation)	1	2	3	Theory	2	BS&AE
3	ARC - 0403S	Building Materials & Construction – 3	1	4	5	Studio	7	BS&AE
4	ARC - 0404S	Computer Applications – 2	0	4	4	Lab	2	SEC
5	ARC - 0405T	Structure – 2	1	2	3	Theory	2	BS&AE
6	ARC - 0406S	Site Planning	2	2	4	Studio	3	PC
7	ARC - 0407T	Theory of Design	1	2	3	Theory	2	PC
TOTAL					29		28	
1	ARC - 0501S	Architectural Design – 5	1	6	7	Studio	10	PC
2	ARC - 0502T	Building Services – 2 (Electrical Services)	1	2	3	Theory	2	BS&AE
3	ARC - 0503S	Building Materials & Construction – 4	1	4	5	Studio	7	BS&AE

4	ARC - 0504S	Computer Applications – 3	0	4	4	Lab	2	SEC
5	ARC - 0505T	Structure – 3	1	2	3	Theory	2	BS&AE
6	ARC - 0506T	Acoustics	1	2	3	Theory	2	BS&AE
7	ARC - 0507S	Quantity Surveying & Specifications	2	2	4	Studio	3	PC
TOTAL					29		28	
1	ARC - 0601S	Architectural Design – 6	1	6	7	Studio	10	PC
2	ARC - 0602T	Building Services – 3 (Mechanical Services)	1	2	3	Theory	2	BS&AE
3	ARC - 0603S	Building Materials & Construction – 5	1	4	5	Studio	7	BS&AE
4	ARC - 0604S	Computer Applications – 4	0	4	4	Lab	2	SEC
5	ARC - 0605T	Structure – 4	1	2	3	Theory	2	BS&AE
6	ARC - 0606S	Working Drawing	1	2	3	Studio	2	PC
7	Refer the enlisted Electives	Elective – 1	2	2	4	Theory	3	PE
TOTAL					29		28	
1	ARC - 0701S	Architectural Design – 7	1	6	7	Studio	10	PC
2	ARC - 0702T	Building Economics & Sociology	3	0	3	Theory	3	PC
3	ARC - 0703S	Landscape Architecture	2	2	4	Studio	3	PC
4	ARC - 0704S	Interior Design	0	4	4	Studio	2	PE
5	ARC - 0705T	Project Management	3	0	3	Theory	3	PAECC
6	ARC - 0706T	Introduction to Town Planning	4	0	4	Theory	4	PC
7	Refer the enlisted Electives	Elective – 2	2	2	4	Theory	3	PE
TOTAL					29		28	
1	ARC - 0801S	Architectural Design – 8	1	6	7	Studio	10	PC
2	ARC - 0802S	Entrepreneurship skills for architects	1	4	5	Studio cum Self-Learning	3	PAECC
3	ARC - 0803S	Dissertation	1	2	3	Studio	2	PAECC

4	Refer the enlisted Electives	Elective – 3	2	2	4	Theory	3	PE
5	Refer the enlisted Electives	Elective – 4	3	2	5	Studio	4	PE
6	Refer the enlisted Electives	Elective – 5	3	2	5	Studio	4	PE
TOTAL					29		26	
1	ARC - 0901S	Internship	0	0	0	Studio	26	PAECC
		TOTAL			0		26	
1	ARC - 0901S	Design Thesis	0	10	10	Studio	15	PC
2	ARC - 0902T	Professional Practice	3	0	3	Theory	3	PAECC
3	Refer the enlisted Electives	Elective – 6	3	2	5	Studio	4	PE
4	Refer the enlisted Electives	Elective - 7	3	2	5	studio	4	PE
TOTAL					23		26	
GRAND TOTAL			77	176	253		273	

Percentage of various course types proposed and its variation with percentages suggested by COA minimum Standards of Architectural Education – 2017

S.N.	Course Type	Percentage of Credits as suggested by COA	Percentage of Credits Proposed
1	Professional Core subjects (PC)	45%	50.55%
2	Building Science and Applied Engineering subjects (BS&AE)	20%	21.98%
3	Professional Electives (PE)	15%	9.89%

4	Professional ability enhancement Compulsory courses (PAECC)	15%	13.55%
5	Skill Enhancement Courses (SEC)	5%	4.03%
	Total percent	100%	100.00%

8. Syllabus of core subjects

Following are the highlights of the proposed syllabus of various Core subjects.

Syllabus is drafted in easy English language for clarity in understanding rather than using complex language with jargon of words that are vague and difficult to understand.

Most of the courses are proposed in five modules with module 1 as introduction to the subject and Module -5 as its practical application of theory learned in modules – 2 to 4.

Detailed syllabus of the core subjects are as follows.

FIRST SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0101S	ARCHITECTURAL DESIGN – 1	-	8	Studio	8	12
<p>The objective of the subject is to enable students to:</p> <ul style="list-style-type: none"> Get familiarized with human scale, basic ergonomics; develop perception and comprehension of space and form. 						
Keywords: Human scale, Anthropometrics, Ergonomics						
<p>Anthropometrics: human body as a basis of measurement. Relating space and self. Human scale. Basic ergonomics; measurement and perception of movement, single activity/ function spaces. Human body derived measurement systems as described in Indian architectural treatises. The relation of human body with furniture design -like height of seat and knee height etc. Colour theory and visual composition.</p> <p>Exercises on anthropometric studies for postures and single/multiple person activities, design of furniture items like chairs, tables for self/specific person. Design (colours, space and form) for single/multi activity like hostel room, exhibition stall, drinking water fountain, information kiosk, food stall etc. (Designing detailing of door, window, ventilators. woodworking, main gate, railings, boundary etc.)</p>						
Course outcome:						
<p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> Design basic furniture items and their spatial layout keeping optimum utilization of space and human comfort in mind. Formulate a design process for architectural design of single activity space for one or two users and demonstrate the same in the form of design proposal. 						
References:						
Subject Code	Subject Name	Instruction Hours		Theory / Studio/Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0102T	HISTORY OF ART AND CULTURE	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> Influence of socio-economic, demographic, political, cultural and regional influences on the evolution of various styles of art. To understand the dynamic relationship of society, culture and art. 						
MODULE 1: Prehistoric Age						
<p>Introducing concepts and beginning of culture and civilization. Introduction to art and culture of pre-historic ages along with classification under Paleolithic age, Mesolithic age, Neolithic age and the age of metals.</p>						

MODULE 2: Early Civilizations
Introduction to various art forms such as artifacts, mural, sculptures, paintings etc. of Harappan, Egyptian, Mesopotamian, Greek, Roman and Pre-Columbian American cultures.
MODULE 3: Indian Civilization
Introduction to art & culture of ancient Indian Vedic, Buddhist and Jain culture. Art and culture of Medieval India such as Rajput and Islamic art and culture. Spread of Indian culture other parts of the world.
MODULE 4: Medieval Period and Renaissance
Work of various artists like Vinci, Picasso, Husain and others. Paintings of different eras like Mughal, Rajput etc. Impact of renaissance on art and culture.
MODULE 5: Industrial revolution to modern age
Impact of industrial revolution; mass production, imperialism, colonization, on art and culture of the world. Modern art and culture movements; art novoue, art deco and other.
Course outcome:
With the successful completion of the course student should have an understanding of <ol style="list-style-type: none"> 1. Cultures of the world 2. Art forms of the world
References:
<ul style="list-style-type: none"> • Ching Francis D.K., Architecture Graphics • Gill Robert, Rendering with Pen and ink • David, Architecture in Cultural Change: Essays in Built Form and Culture Research • Jaxtheimer, How to Paint & Draw

Subject Code	Subject Name	Instruction Hours		Theory / Studio/Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0103T	INTRODUCTION TO PRINCIPLES OF ARCHITECTURE	3	-	Theory	3	3
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • Overall orientation towards architectural course and profession. • To explain fundamental knowledge of basic aesthetic principles for design • Integration of systems, services and sciences with architecture. 						
MODULE 1: Architecture as a Profession						
Defining and introducing architecture as a profession. Skills and traits for architects. Professional and moral responsibilities of architect. Contribution of pioneering architects in shaping of our environment and society. Historical role, qualities and traits of architect as described in Indian and western treatises.						
MODULE 2: Elements of Architecture						
Definition of building envelope and structure (wall, doors, window, roofs, foundations, lintels, chajjas etc.) Definition of spatial elements of building in terms of hall, corridor, portico,						

verandah, balcony, terrace, courtyard etc.																						
MODULE 3: Spatial Organisation and Stylistic Typologies																						
Old and new works of architecture and understandings of terms such as vernacular, traditional, tribal classical, Renaissance, Oriental, European, Modern etc. Different types of spatial organizations of masses like linear, centralized, radial, clustered, grid etc. Illustrations of buildings.																						
MODULE 4: Scope of Architecture Works																						
Relationship of the subject with various other interdisciplinary subjects and other professions. For example importance and role of electrical, mechanical, water supply, sanitation and other services and building science subjects such as acoustics, climatology, etc.																						
MODULE 5: Case Studies																						
Case studies of site and buildings of small residence. Case study should be supported by photographs, manual drawings and report writing explaining the details of the project.																						
Course outcome:																						
With the successful completion of the course student should be able to understand <ol style="list-style-type: none"> 1. Complexity of architectural profession 2. Multi-disciplinary nature of architectural profession. 																						
References:																						
<ul style="list-style-type: none"> • Spiro Kostof, The Architect: Chapters in the History of the Profession • Francis D. K. Ching, Architecture - Form, Space and Order • Roger H. Clark, Michael Pause, Precedents In Architecture • Ernest Burden, Elements of Architectural Design – A Visual Resource • V.S. Pramar, Design Fundamentals in Architecture • Ashok Kumar Jain, Architecture and Building 																						
<table border="1"> <thead> <tr> <th rowspan="2">Subject Code</th> <th rowspan="2">Subject Name</th> <th colspan="2">Instruction Hours</th> <th rowspan="2">Theory / Studio/Lab</th> <th rowspan="2">Weekly Contact Hours</th> <th rowspan="2">Credits</th> </tr> <tr> <th>Lecture</th> <th>Studio</th> </tr> </thead> <tbody> <tr> <td>ARC - 0104S</td> <td>ARCHITECTURAL DRAWING – 1</td> <td>3</td> <td>4</td> <td>Studio</td> <td>7</td> <td>5</td> </tr> </tbody> </table>							Subject Code	Subject Name	Instruction Hours		Theory / Studio/Lab	Weekly Contact Hours	Credits	Lecture	Studio	ARC - 0104S	ARCHITECTURAL DRAWING – 1	3	4	Studio	7	5
Subject Code	Subject Name	Instruction Hours		Theory / Studio/Lab	Weekly Contact Hours	Credits																
		Lecture	Studio																			
ARC - 0104S	ARCHITECTURAL DRAWING – 1	3	4	Studio	7	5																
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • Fundamental knowledge of drafting and lettering techniques. • Develop understanding of graphic language for communication and preparation of technical drawings in the form of orthographic projections. 																						
MODULE 1: Drafting Techniques																						
Introduction to drawing instruments and drawing materials. Basis for architectural drawing; line, essence of line continuity, quality of line sharpness, clarity, darkness (tone), weight (thickness), types of lines such as continuous thin, continuous thick, dotted, dash, etc. application of all line types in architectural drawing.																						
MODULE 2: Lettering, Annotations and Scales																						

Introduction to architectural lettering, its proportion to scale drawing simplicity of lettering. Use of annotations on drawings titles and uses in presentations drawings. Material indications symbolic representation of building materials with color code as specified Indian Standard. Introduction to different types of scales and their applications such as plain scales, diagonal scales, scale of chords etc.
MODULE 3: Orthographic Projections
Introduction to various projection systems used in architectural drawing such as orthographic, isometric and axonometric projections etc. Orthographic projection of points, lines, planes and solids in different orientations in space. Section of solids and true shape. Orthographic projection of various building elements. Development of surfaces.
MODULE 4: Interpenetration and Views of Solids
Interpenetration of various solids. Isometric, axonometric and oblique views of simple, complex solids and building elements.
MODULE 5: Free Hand Orthographic and Views
Principles of free hand sketching such as proportions, light and shade; with primary thrust on sketching of building elements and built environment. Drawing free hand orthographic isometric and axonometric views of small building.
Course outcome:
With the successful completion of the course student should have capability represent <ol style="list-style-type: none"> 1. Simple and complex geometrical objects in orthographic 2. Knowledge of isometric projections 3. To visualize objects by comprehending orthographic and other projections.
References:
<ul style="list-style-type: none"> • Ching Francis D.K., Architecture Graphics • Leslie Martin, Architectural graphics • B. James, Essential of Drafting • Pradeep Jain, AK Gautam, Engineering Graphics and Design • H. Joseph and Morris, Practical Plane and Solid Geometry • Gill Robert, Rendering with Pen and Ink • N. D. Bhatt, Elementary Engineering Drawing, Plane and Solid Geometry

Subject Code	Subject Name	Instruction Hours		Theory / Studio/Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0105T	ENVIRONMENT AND ECOLOGY	2	-	Theory	2	2
<p>The objective of the subject is to enable students to have an understanding of :</p> <ul style="list-style-type: none"> • Fundamental knowledge about natural and built environment • Fundamental concepts to understand environmental processes 						
MODULE 1: Fundamentals of Environment & Ecology						
Definitions and concepts; environment, environmental segments, ecosystem, ecology etc.						

Introduction to types, characteristic features, structure and function of different ecosystems (forest, grassland, desert and aquatic ecosystem). Effects of human activities such as agriculture, housing, industry, mining and transportation activities on environment. Threats to India's and the world's biological diversity.
MODULE 2: India's Bio-Geographic Regions
India's biological diversity in relation to the physio-geographic regions. Identification of principal bio-geographic zones of India and their description. Eco-regions of India (floristic and physiographic). Distinction on the basis of flora and fauna differences in an eco-region. Evaluation of the importance of biological diversity to all life interconnections between biological diversity and human life – sustenance
MODULE 3: Environmental Degradation and Human Impacts
Environmental Pollution; definition, causes, effects and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear pollution. Role of an individual in prevention of pollution. Disaster management; floods, earthquake, cyclone and landslides. Cause-and-effect relationships between various human, natural and climatic factors that impinge upon ecological systems and their linkages. Understanding of global climate change and impacts with respect to rural/urban communities; increased risk/vulnerabilities.
MODULE 4: Techniques and Details
Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people. To understand implementation of ecological architecture at unit level. Rain water harvesting (contour bunds, wells, bunds, etc.). Techniques of waste water management (house level, bio swales etc.). Ecological planting (planting for wildlife, land improvement etc.)
MODULE 5: Environmental Acts and Movements
To understand history of environmental movements. Environment movements in world and in India (Chipko movement etc). Environmental activists and their contribution (water conservation movements). Environmental ethics. Environmental protection Act.
Course outcome:
With the successful completion of the course student should develop 1. Awareness and sensitivity to environment and ecology
References:
<ul style="list-style-type: none"> • Miller T.G Jr., Environmental Sciences, • SC Sharma & MP Poonia, Environmental Studies • OP Gupta, Elements of Environmental Pollution Control • SC Sharma, Disaster Management • Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, Environmental Encyclopedia • E.P. Odum, Ecology • Keshav Kant & Rajni Kant, Air Pollution and Control

Subject Code	Subject Name	Instruction Hours		Theory / Studio/Lab	Weekly Contact Hours	Credits
		Lecture	Studio			

ARC -0106S	COMMUNICATION SKILLS / COMMUNICATIVE ENGLISH	1	4	Lab	5	3
<p>The objective of the subject is to</p> <ul style="list-style-type: none"> • Acquire fluency in spoken and written English • To communicate and understand with clarity, precision and confidence in the workplace. 						
MODULE 1: Written and Verbal English						
Introduction to communication, language and grammar skills, speaking skills and writing skills. Exercises related to building vocabulary, building sentences, grammar, pronunciation drills, phonetics, vowels, diphthongs, consonants, stress, rhythm and intonation, conversational skills, meta language, the writing process, writing with a thesis, writing topic sentences, writing a paragraph, linking paragraph. Article review.						
MODULE 2: Communicative Skills						
Understanding sequences and framework for presentation, importance of posture, gesture, pronunciation, tone etc. on presentation quality. Decision regarding selection of appropriate media such as text, photographs, videos, etc. for effective communication.						
MODULE 3: Project						
Preparing and delivering simple and interactive presentations on a selected theme using computer software. Public speaking for above types of presentations.						
Course outcome:						
With the successful completion of the course student should have capability to						
1. Present an idea / theme / concept / notion effectively and confidently.						
References:						
<ul style="list-style-type: none"> • Abraham Benjamin Samuel, Practical Communication (Communicative English), 2002 • Eric H. Glendinning & Beverly Holmstrom, Study reading – A course in reading skills for academic purpose • John Kirkman, Good Style – Writing For Science And Technology • Sharon Bower, Painless Public Peaking • Stewart, Zimmer & Camp, College English and Communication • Alan Maley and Sandra Moulding, Learning to listen – Tasks for Developing Listening Skills • Kul Bhushan Kumar, RS Salaria, Effective Communication Skills • Dinsmore G. A., Analytical Graphics • Freeman S., Written Communication 						

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0107L	UNIVERSAL HUMAN VALUES	-	-	Self-learning	-	-
<p>The objective of the course is four fold:</p> <ol style="list-style-type: none"> 1. Sensitization of student towards issues in society and nature. 2. Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals. 						

3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

The focus is on understanding society and nature on the basis of self and human relationships.

- Ideas of self, pre-conditioning, and natural acceptance.
- Harmony in the self. Understanding human being as co-existence of self and body. Identifying needs and satisfying needs of self and body. Self-observations. Handling peer pressure.
- Nine universal values in relationships. Reflecting on relationships in family. Hostel and institute as extended family. Real life examples.
- Teacher-student relationship. Shraddha. Guidance. Goal of education.
- Harmony in nature. Four orders of nature – material order, plant order, animal order and human order. Salient features of each. Human being as cause of imbalance in nature. (Film “Home” can be used.)
- Human being as cause of imbalance in nature. Depletion of resources – water, food, mineral resources. Pollution. Role of technology. Mutual enrichment not just recycling.
- Prosperity arising out of material goods and understanding of self. Separation of needs of the self and needs of the body. Right utilization of resources.
- Recapitulation on society. Five major dimensions of human society. Fulfillment of the individual as major goal. Justice in society. Equality in human relationships as naturally acceptable. Establishment of society with *abhaya* (absence of fear).
- Ethical human conduct. Values, character and *naitikataa*.
- Professional ethics. Conduct as an engineer / architect / scientist.
- Holistic human being through holistic education in just order.

The mode of conduct would primarily be through group discussions in small groups. There would be no formal lectures in the course. In some group discussion sessions, the faculty mentor would introduce a topic and initiate the discussion. While analysing and discussing the topic, the faculty mentor’s role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students focus on the important or critical elements. In other group discussion sessions, there would be more “speaking out” and sharing by students.

While discussing different topics, the mentor encourages the student to connect with one’s own self and do self-observation. Scenarios may be used to initiate discussion. The student is encouraged to take up “ordinary” situations rather than “extra-ordinary” situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. It would be preferable to conduct the course in the mother tongue of the student. This helps connect with the student much better, and also because the Indian languages are much richer than English while describing and discussing the “self”.

Experiments or practical are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included.

The group discussions would also provide support to a student in performing actions commensurate to his/her beliefs. Hopefully, this would lead to development of commitment, namely behaving and working based on one’s beliefs (or values).

ASSESSMENT:

There would only be pass/fail grade. Participation in discussions, weekly report and final report will be used in evaluation. Pass grade will be given if student satisfies the above requirement.

Course outcome:

At the end of the course, students are expected to become more aware of their surroundings, society, social problems and their sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they believe in (humane values, humane relationships and humane society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

References:

- R R Gaur, R Sangal, G P Bagaria, Human Values and Professional Ethics
- Premvir Kapoor, Professional Ethics and Human Values
- A Nagaraj, *Jeevan Vidya: Ek Parichaya*
- A.N. Tripathi, Human Values
- The Story of Stuff
- Mohandas Karamchand Gandhi, The Story of My Experiments with Truth
- J. Krishnamurthy, On Education
- Hermann Hesse, Siddhartha
- ThichNhatHanh, Old Path White Clouds
- The Mother, On Education -
- Anne Frank, Diaries of Anne Frank
- Life and Philosophy of Swami Vivekananda
- Swami Vivekananda on Himself
- E. F. Schumacher, Small is Beautiful -
- Cecile Andrews, Slow is Beautiful -
- J. C. Kumarappa, Economy of Permanence
- Pandit Sunderlal, *Bharat Mein Angreji Raj*
- Mahatma and the Rose
- The Poet and the Charkha
- Dharampal, Rediscovering India
- Mohandas K. Gandhi, Hind Swaraj or Indian Home Rule
- Arvind Kejriwal, Swaraj
- Maulana Abdul Kalam Azad, India Wins Freedom
- Romain Rolland, Ramakrishna *Ki Jeevani* (English)
- Romain Rolland, Vivekananda (English)
- Romain Rolland, Gandhi (English)
- Paramhansa Yogananda, Autobiography of a Yogi
- Sahasrabudhe, Gandhi and Question of Science

SECOND SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC-0201S	ARCHITECTURAL DESIGN - 2	-	8	Studio	8	12
<p>The objective of the subject is to enable students to:</p> <ul style="list-style-type: none"> • Get familiarized with individual activity space, group activity space. • Comprehend the influence of personal/group, their lifestyle on design. • Arrange activity spaces to make one unit and giving it form. 						
Keywords: Activities and Spatial Development						
<p>Understanding human activities and interactions of a small group. Understanding the likes/dislikes, lifestyle of individuals and groups and its influence in shaping of architecture. Learning to use design tools and techniques like design brief, time-line activity chart, proximity chart, requirements detailing etc.</p> <p>Exercises on proportions and form development, proportion systems in Western and Indian architecture. Development process for form and space for multi-activity unit like house, dispensary, guesthouse etc. for a given small social group. The student should apply the knowledge and skills gained in first semester.</p>						
Course outcome:						
<p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> 1. Formulate a design process for architectural design of a unit for a specific use for a small homogenous group. 2. Demonstrate the same in the form of a design proposal. 3. Develop conceptualizing skills 4. Vocabulary to explain ideas and proposals. 						
References:						

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC-0202T	HISTORY ARCHITECTURE - 1	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • How different architecture solutions were evolved within the prevalent social and culture environment, availability of materials, climate and topography of a region. • Insight of the evolution of classical architecture in the west, and its various stylistic modes characterized by technology, ornamentation and planning practices. 						
MODULE 1: Ancient River Valley Civilizations						
<p>Introduction to architecture and planning of river valley civilizations of ancient Egypt, Mesopotamia and China. Study of palace, hypostyle hall, temple, tomb architecture.</p>						

MODULE 2: Classical Architecture
Introduction to architecture and planning of ancient Greece and Rome. Study of principles of design, proportion, optical corrections and classical orders. Building types viz., temples, amphitheaters, circus, aqueducts etc.
MODULE 3: Early Christian and Romanesque Architecture
Study of architectural character, evolution of Church form, building typologies, and building elements, polymath architecture, baptisteries, early basilicas, churches; Development of early Christian Church from Roman Basilica. Settlement planning and fortification systems. Development of Romanesque architecture from early Christian architecture.
MODULE 4: BYZANTINE AND GOTHIC ARCHITECTURE
Contribution of Byzantine architecture in the development of structural system dome construction over square plan. Adoption of Greek cross in church layout. Use of mosaic and mural in interiors. Development of Gothic church and its new elements: pointed arch window, cluster column and intersecting vault roof, clerestory window, flying buttress, glazed window, stone and metal trellis, flamboyant window and rose window.
MODULE 5: RENAISSANCE TO CONTEMPORARY ARCHITECTURE
Introduction to Renaissance, Baroque and Rococo architecture. Contribution in structural system, e.g., ribbed dome, lantern dome, etc. Revival of classical order, Neo-Classicism. Modern architects and their works.
Course Outcome
With the successful completion of the course student should have capability <ol style="list-style-type: none"> To understand of how different architectural styles evolved within the restraints imposed by prevalent social and cultural environment, availability of materials, climate and geography. How various architectural solutions were arrived at within the above mentioned restraints? The development of construction technology in that period Architectural ornamentation of that period.
References
<ul style="list-style-type: none"> Fletcher, History of Architecture Nuttgens, The Story of Architecture Gideon, Space, Time And Architecture Watkin, A History of Western Architecture

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0203S	BUILDING MATERIALS AND CONSTRUCTION - 1	1	4	Studio	5	7
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> Building materials and basic structural systems, their properties and applications, and their intrinsic relationship to structural systems and environmental performance. Application of Basic Building Materials in simple situations 						

MODULE 1: Building Materials
Study of basic building materials like brick, stone, cement, lime, sand and mortar with respect to their classification, composition and general idea about their chemical properties, physical properties, structural strength, aesthetic qualities, manufacturing processes. Introduction to building materials as described in Indian architectural texts. Emphasis should be on developing understanding about making choice of appropriate building materials in a given situation.
MODULE 2: Brick Construction
Elementary construction methods explaining basic principles of load bearing structures. Types of bricks, bats and closers etc. English and Flemish brick bonds, stopped ends, quoins, piers, junctions, jambs for various thicknesses. Jointing, pointing and copings.
MODULE 3: Stone walls
Stone masonry, dressing of stones. Types of rubble masonry walls like Random Rubble, Coursed Rubble, Ashlar, etc., stone coping, jointing and pointing.
MODULE 4: Foundation and Plinth
Need for foundations, preliminary design criteria. Details of brick and stone footings for load bearing walls of various thicknesses. Plinth filling details, Damp Proof Course, timbering to trenches.
MODULE 5: Arches and corbelling
Concept of span and its application in creating openings in masonry walls with lintels and arches. Structural difference in the behavior of lintel and arches. Elementary principles of arch construction, terminology and types of lintels, corbelling and arches with their materials for construction.
Course outcome:
With the successful completion of the course student should have capability to: <ol style="list-style-type: none"> 1. Identify and differentiate types of bricks, stones etc. 2. Type of foundation and load bearing masonry 3. Principles behind lintels and arches and their application 4. Analyze a design decision situation and come up with correct material choice and construction specification.
References:
<ul style="list-style-type: none"> • W.B. Mc Kay, Building Construction Volume 1 to 4 • R. Barry, Building Construction Volume 1 to 5 • Francis Ching D.K., Building Construction Illustrated • S.K. Sharma, Civil Engineering construction Materials • Sushil Kumar, Building Construction

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0204S	ARCHITECTURAL DRAWING – 2	1	4	Studio	5	3

<p>The objective of the subject is to enable students to learn techniques and develop skills for realistic representation of objects by:</p> <ul style="list-style-type: none"> • Perspective projections. • Sciography: shade and shadow
<p>MODULE 1: Perspective View: Solids</p> <p>Introduction to basic terms, principles, types and techniques of perspective drawing. One, two and three point perspectives of simple objects. One point and two point perspective drawing of solids and complex composition of solids.</p>
<p>MODULE 2: Sciography</p> <p>Introduction to Sciography, principles of shade & shadow, shadows of lines, planes & simple solids due to near & distant sources of light, shadows of architectural elements. Sciography of two dimensional objects in plan and elevation. Sciography of three-dimensional objects in plan and elevation and views (isometric, axonometric and perspective).</p>
<p>MODULE 3: Perspective View: Building Exterior</p> <p>Drawing one and two point perspective view of the exterior of the building with understanding of the basic human proportion and scale. Introduction to three point perspective.</p>
<p>MODULE 4: Perspectiveview: Building Interiors</p> <p>Construction of one and two point perspective grids. Construction of one and two-point perspective of different room interiors.</p>
<p>MODULE 5: Rendering Techniques</p> <p>Architectural rendering techniques for building exteriors and interiors using pen & ink, color, values, tones, etc. Architectural representation of trees, foliage, human figures, cars, symbols etc.</p>
<p>Course outcome:</p> <p>With the successful completion of the course student should have the capability represent realistically interior and exterior views of buildings.</p> <ol style="list-style-type: none"> 1. Understanding the principles of perspective drawing 2. Understanding principles of sciography
<p>References</p> <ul style="list-style-type: none"> • Francis D. K. Ching, A Visual Dictionary of Architecture. • Dinsmore, Analytical Graphics. • Halse, Architectural Rendering; the Techniques of Contemporary Presentation. • Holmes, Applied Perspective. • Narayana, K. L. and Kannaiah, Engineering Graphics. • Norling, Perspective Drawing. • Robert, Perspective: From Basic to Creative

Subject Code	Subject Name	Instruction Hours		Theory / Studio Lab	Weekly Contact Hours	Credits
		Lecture	Studio			

ARC - 0205S	ARCHITECTURAL SKETCHING AND MODEL MAKING	-	4	Studio	4	2
<p>The objective of the subject is to</p> <ul style="list-style-type: none"> • Prepare the students for better eye- mind- hand coordination • Equip them with various model making techniques 						
MODULE 1: Preliminaries for Sketching						
<p>Explanation of fundamentals of drawings and its practice. Object drawing, studies in light and shade of simple, natural and geometric forms. Study built environment, light and shade pattern, surface texture, scale and proportion.</p>						
MODULE 2: Indoor Sketching						
<p>Sketching exercises along with inputs of light, shade, proportion and scale including but not limited to objects such as Pen, Television, Flower pot, Tea-pot, Cups etc., Human figures / Postures, Furniture. Enclosed Spaces in courtyards, Plazas, Chowks, Buildings, Canteen& Restaurant etc.</p>						
MODULE 3: Out Door Sketching						
<p>Architectural representation of the following on drawings: trees, hedges, foliage, human figures in different postures, cars, Elements of nature, etc. Outdoor sketching of simple building. Outdoor sketching of gardens, fiver fronts, water sports etc.</p>						
MODULE 4: Sculpture Making						
<p>Introduction of sculpture –Sculpture using various materials such as clay, plaster of Paris, Paper mashie, wire etc.</p>						
MODULE 5: Building Models						
<p>Introduction to model making and its need. Role of scale-models in design. Essentials of model making such as understanding of various tools and machines employed. Survey of various materials available for model making such as papers, mount boards, wood, plastics, films, plaster of Paris, acrylic, Styrofoam, wax, metals, glass, etc. and exploring their potential in model-making.</p> <p>Introduction to the use of different types of tools and different types of joints used in carpentry, Joinery details which are commonly used in timber construction.</p>						
Course outcome:						
<p>With the successful completion of the course student will be able to</p> <ol style="list-style-type: none"> 1. review various tools and techniques for model making and design 2. model for real life situation 						
References						
<ul style="list-style-type: none"> • Alkin, Urbelleth and Lione, Pencil Techniques in Modern Design • Caldwell Peter, Pen and Ink Sketching • Criss. B. Mills, Designing with Models • Bernald S and Copplence Myers, History of Art • Krier Rob, Element of Architecture • Gill, Rendering with Pen and Ink • Wenninger, Spherical Models • John W. Mills, The Technique of Sculpture 						

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0206T	STRUCTURAL MECHANICS	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> Principles of structural mechanics Behavior of engineering materials subjected to different types of forces. 						
MODULE 1: Properties of Building Materials						
Introduction to characteristics and strengths of natural and manmade building materials like stone, clay, brick, terracotta, cement and aggregate. Advantages and disadvantages of structural materials; choice of structural material for domestic, industrial, tall buildings and long span buildings.						
MODULE 2: Centre of Gravity and Moment of Inertia						
Understanding of forces along equilibrium of concurrent forces. Definition of centre of gravity, centroid, moment of inertia. Computing center of gravity of regular and complex shapes such as steel sections like C, T, L, I and compound sections. Definition of parallel axis theorem, perpendicular axis theorem, radius of gyration.						
MODULE 3: Stresses and Strains						
Introduction to different types of stresses and strains. Principal planes and principal stresses. Methods for determining stresses on oblique section. Elasticity and elastic limit, Hooke's law, Young's modulus, factor of safety, etc. Analysis of bars of varying sections, uniformly tapering circular rod, rectangular bar. Thermal stresses, elongation of bar due to its own weight.						
MODULE 4: Supports and Loads						
Definitions of supports and reactions offered by simple, fixed, hinged and roller support. Beams classified as simply supported, cantilever, over hanging, propped cantilever, fixed and continuous. Load classification - U.D.L, point load & varying load. Loads classification - dead, live, wind, snow, seismic. Introduction to densities of material and calculation of dead loads on a beam.						
MODULE 5: Shear Force and Bending Moment						
Understanding of shear force and bending moment diagrams of different types of beams such as simply supported beam, cantilever beam, fixed end beam, etc. with different types of load such as eccentric point load, point load, uniformly distributed load, uniformly varying load, etc. Sign conventions and important points for shear force and bending moment diagram.						
Course outcome:						
<p>With the successful completion of the course student should have capability to</p> <ol style="list-style-type: none"> Understand structural strength of natural and manmade materials and their applicability to different building types Understand the concept of force, moment, stress, strain and their calculations. Calculate and predict behavior of structural members under different loads and end conditions as a basis for designing of RCC and steel structures in subsequent years. 						
References						
<ul style="list-style-type: none"> D.S. Bedi, Strength of Materials D.S. Bedi, Engineering Mechanics Bansal, Strength of Materials Khurmi, Strength of Materials Khurmi Engineering Mechanics 						

- Salvadon and Heller, Structure in Architecture
- Dongre, Strength of Materials
- Ramamrutham, Strength of Materials

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0207L	PERSONALITY DEVELOPMENT	-	-	Self-Learning	-	-
<p>The purpose of this course is to build confidence and inculcate various soft skills and to help Students to identify and achieve their personal potential</p>						
<p>Special Lectures and presentations on Student's self-learning activities such as Self-analysis, Time management, Creative chain storytelling, Vocabulary games, Attitude, Motivation, Article review, Team building exercise, Critical Thinking, Leadership Qualities, Puzzles, Movie Clip review etc.</p>						
Course outcome:						
<p>The student develops</p> <ol style="list-style-type: none"> 1. A sense of Confidence and a broader outlook of his personality. 						

THIRD SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC-0301S	ARCHITECTURAL DESIGN - 3	1	6	Studio	7	10
<p>The objective of the subject is to enable students to understand concepts of:</p> <ul style="list-style-type: none"> Principles of grouping of units or buildings. Role of built (mass) and open spaces (void) in the overall design configuration 						
Keywords: Cluster; mass and void						
<p>Understanding user generated factors for grouping; security, segregation, convenience, privacy, sharing, user-density etc. Study of mass and space within a cluster; length: width: height ratios of built mass and open spaces and their relationship. Proportion systems in Indian architectural treatises</p> <p>Design (form and space) for multi-unit cluster like primary school, health center, SOS village, old-age homes, small resort etc. The student should apply the knowledge gained in previous semesters in subjects like construction, history, architectural drawing, model making and architectural design.</p>						
Course outcome:						
<p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> Comprehend when and how the analysis of a design brief would result in clustering of buildings and creation of open spaces. Formulate a design process for architectural design for a specific use by a group Demonstrate the same in the form of a design proposal. 						
References:						

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0302T	HISTORY ARCHITECTURE - 2	2	-	Theory	2	2
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> How different architecture solutions were evolved within the restraints imposed by prevalent social and cultural setup, available building materials, climate and geography of particular region Insight of the evolution of architecture in Indian subcontinent and orient. 						
MODULE 1: Harappan and Vedic Architecture						
<p>Architecture and town planning of Harappan civilization such as towns of Lothal, Mohenjo-Daro, Dholavira, Kalibanga etc. Understanding of Vedic architecture, and settlements.</p>						

<p>MODULE 2: Buddhist and Jain Architecture</p> <p>Architectural examples of Mahayana and Hinayana Buddhism; Rock-cut and free standing. Study of caves, stupas, and viharas of places like Sanchi, Amravati, Karle, Ajanta etc. Medieval Jain temple architecture of western India.</p>
<p>MODULE 3: Hindu Architecture</p> <p>Study of chronological development of religious and secular Hindu architecture and settlement planning; Early examples of monolithic and rock-cut architecture of South India. Development of Nagara and Dravidian temple architecture under different dynasties; such as like Cholas, Vijaynagar, Chandels, Hampi, Tanjavur, Khajuraho. Characteristic features of East, South, Central, West, and North Indian temple architecture for plan, <i>shikhara</i>, pillars, decoration, sculpture, etc. Theoretical base of Indian Architecture; examples from treatises like Mayamatam, Manasara, Samarangana Sutradhara etc.</p>
<p>MODULE 4: Islamic Architecture</p> <p>Introduction early Islamic architecture in India. Characteristic features of Islamic architecture; minarets, domes, gardens, geometrical and calligraphic decorations. The buildings of different dynasties of Delhi, Agra, Deccan, Gujarat etc.</p>
<p>MODULE 5: Colonial to Contemporary Architecture</p> <p>English, French, Dutch and Portuguese Colonial architecture in Indian subcontinent. Architectural literary research work of scholars like Ram Raz, P.K. Acharya etc. Post-Independence architecture and planning; New city planning: Chandigarh, Gandhinagar etc. Modern foreign and Indian architects and their works in India.</p>
<p>Course outcome:</p> <p>With the successful completion of the course student should have capability</p> <ol style="list-style-type: none"> 1. To understand of how different architectural styles evolved within the restraints imposed by prevalent social and cultural environment, availability of materials, climate and geography. 2. How various architectural solutions were arrived at within the above mentioned restraints? 3. The development of construction technology in that period 4. Architectural ornamentation of that period.
<p>References</p> <ul style="list-style-type: none"> • Percy Brown, Indian Architecture (Buddhist and Hindu period) • Brown Percy, Indian Architecture (Islamic Period). • Satish Grover, The Architecture of India (Buddhist and Hindu period) • Satish Grover, The Architecture of India (Islamic) • Nath – History of Mughal Architecture • Banister Fletcher, History of Architecture

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0303S	BUILDING MATERIALS AND CONSTRUCTION - 2	1	4	Studio	5	7
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> aspects of materials and construction components/elements for building envelop and interiors 						
MODULE 1: Timber as Building Material						
<p>Timber as a building material, its physical properties and uses, defects, seasoning, decay and preservation. Industrial timbers such as ply wood, hard board, block board, particle board, etc. with their properties and uses. Introduction to timber as described in Indian architectural treatises.</p>						
MODULE 2: Metals and man-made Building Materials						
<p>Use of Iron in building industry such as pig iron, wrought iron and cast iron their properties and uses. Steel as building material, its definition, properties, Manufacture, casting, heat treatment, mechanical treatment process of steel, market forms of steel, corrosion ant treatment. Aluminum and aluminum alloys their manufacturing, properties, durability, and uses. Study of aluminum products and other non-ferrous metals such as copper, lead, zinc etc. Study of protection to non-ferrous metals and products such as anodizing, powder coating, painting, chromium plating, varnishing, melamine treatments, etc. Paints and surface finishes their composition, properties and methods of application of different types of paints such as oil, synthetic enamels, acrylic and other plastic emulsions and formulations, interior and exterior grade paints. Cement based paints.</p>						
MODULE 3: Timber joinery						
<p>Carpentry and joinery: Terms defined, mitring, ploughing, grooving, rebating, veneering, various forms of joints in wood work, such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon, etc. Jamb-casing. Timber joints as described in Indian architectural treatises.</p>						
MODULE 4: Doors						
<p>Types of doors based on operation such as swing door, revolving door, sliding door, sliding-folding door. Details of Wooden Doors their definition of terms, types of doors such as ledged, ledged and braced, paneled, flush doors, glazed doors etc. Hinged, single and double shutters. Z section doors, pressed steel and box section doors. Rolling shutters, collapsible gates. Complete aluminum swing, Sliding, sliding folding, and revolving doors. PVC / UPC Doors</p>						
MODULE 5: Windows						
<p>Types of windows based operation and location – fixed window, Casement window, Sliding window, pivoted window, louvered window, bay window, clerestory window, corner window – gable and dormer window, etc. Details of Timber windows and ventilators such as ordinary casement, top and bottom hung, pivoted and sliding sash with fixtures, locks, hinges, fastenings, etc. Z section window, pressed steel and box section windows. Aluminum casement and sliding windows. PVC / UPC windows</p>						
Course outcome:						
With the successful completion of the course student should have capability to:						

1. Identify and differentiate types of timber, their joinery, finishes, etc.
2. Understand the properties and uses of manmade and natural materials.
3. Understand and differentiate between various types of openings
4. Analyze a design decision situation and come up with correct material choice and construction specification.

References:

- W.B. Mc Kay, Building Construction Volume 1 to 4
- R. Barry, Building Construction Volume 1 to 5
- Francis Ching D.K., Building construction illustrated
- S.K. Sharma, Civil Engineering construction Materials
- Sushil Kumar, Building Construction

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0304S	COMPUTER APPLICATIONS – 1	-	4	Lab	4	2

The objective of the subject is to enable students to understand and apply:

- Basic computer skills to enhance and present idea in a better and professional manner.
- Data processing using spread sheets.

MODULE 1: Introduction to Computers

Historical background of computer. Computer terminology and its operating principles, introduction to hardware and software. Use and types of printers, scanner, plotter, etc. Basic knowledge of operating systems: Windows, Unix, Linux etc. Brief description of various hardware and software used in architecture.

MODULE 2: Report Writing Including Word and Data Processing

Use of different software for word processing with emphasis on report writing. Application of data processing software for performing calculations and analyzing data. Use of spreadsheet for various mathematical calculations. Preparations of templates for regular repetitive functions.

MODULE 3: Presentation and Image / Photo Editing

Use of different software for making presentations / slide shows. To present data and information by using text, images, diagrams with animations, transitional effects and audio movie input, etc. Understanding bit-map images and vector graphics, image size and resolution. Basic tools for editing and creating graphics. Photo editing software to manipulate or enhance digital images. Use of different layer styles, non-destructive filters, curves and levels, blending modes, etc. to enhance image.

MODULE 4: Video Editing

Learning features for color manipulation, titles and basic visual effects, tools for editing and mixing audio synchronized with video image sequence. Video editing techniques.

MODULE 5: Practical Work

Making presentation and report for any one of the topics of the subject studied in previous semesters such as architectural design, history of architecture, building construction etc. the presentation should include word processing, image processing, data processing and video clips for better explanation of the topic.

Course outcome:
With the successful completion of the course student should have capability to <ol style="list-style-type: none"> 1. Make presentation 2. Prepare reports 3. Scan small and large size documents and take printouts / plots in a professional manner.
Software for References
<ol style="list-style-type: none"> 1. MS Office 2. Open office 3. Paint Brush 4. Adobe Page Maker 5. Photoshop 6. Corel 7. AVS Video Editor 8. Adobe Premiere Elements 9. Final Cut Pro
Books for References
<ul style="list-style-type: none"> • V.K. Jain, Multimedia and Animation • WebTech Sol., Mastering Photoshop

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0305T	STRUCTURE -1	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand</p> <ul style="list-style-type: none"> • RCC codes and practices • Design simple RCC structural members 						
MODULE 1: Introduction to RCC Design						
Introduction to RCC design, characteristics of RCC, assumptions, nominal mix, design mix, neutral axis; balanced, under and over reinforced sections.						
MODULE 2: Design of RCC Beams						
Theory and design of singly reinforced simply supported and cantilever beams with different end conditions using limit state method along with bending moment and shear force diagrams. Theory and design of continuous beams using Calyperon's theorem along with bending moment and shear force diagrams.						
MODULE 3: Design of RCC Columns						
Concept of axial and eccentric loads on columns. Concept of effective length –Slenderness ratio combined bending and axial load – Euler's and Rankine formulae for columns simple problems. Design of RCC axially and eccentrically loaded short and long columns. Square, rectangle and circular RCC columns.						

MODULE 4: Design of RCC Slabs
Concepts of different types of slabs spanning in one direction, two directions, continuous slab, cantilevered slab, circular slab and flat slab. Theory and design of RCC one way slabs.
MODULE 5: Design of RCC Foundations
Types of foundations – raft, pile etc. Design of foundation for RCC structure –foundation at different levels - piles, pile cap and pile load test. Design of isolated square and rectangular footing in depth frame consideration of bending moment one way shear, and two way shear area of reinforcement, design examples.
Course outcome:
With the successful completion of the course student should have capability to: <ol style="list-style-type: none"> 1. Understand RCC as structural material 2. Understand the behavior of RCC structural members 3. Be able to design simple structural members.
References
<ul style="list-style-type: none"> • D.S. Bedi, Strength of Materials • Bansal, A Text Book on Strength of Materials • Punmia, SMTS-I, Strength of Materials • Popov, Mechanics of Solids • Ramamrutham and Narayanan, Strength of Materials • Vazirani and Rathwani, Design of Steel Structures • Shrikant B. Vanakudre, Ashish A. Yaligar, Prestressed Concrete • Negi, Design of Steel Structures • Khurmi, R.C.C. Design

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0306T	CLIMATOLOGY	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand and apply</p> <ul style="list-style-type: none"> • Concept of climate as a significant determinant of built forms. • Concept of thermal and visual comfort. • Architectural design for buildings in different climatic zones. 						
MODULE 1: INTRODUCTION TO CLIMATOLOGY						
Introduction to concept of climate, climate and weather, elements of climate. Effect of climate on habitat, shelter and environment. Classification of tropical climates and climate balanced architecture. Study of climatic zones and their effect on building design.						
MODULE 2: THERMAL COMFORT FOR HUMANS						
Concepts of thermal comfort, human heat balance, human comfort and physiological comfort. Relationship of climatic elements like solar radiation, humidity, air-movement with thermal comfort. Elaborate bioclimatic requirements. Explanation of thermal stress index, bio-climatic chart, effective temperature and corrected effective temperature histogram and their uses.						

MODULE 3: SUN PATH AND BUILDING ORIENTATION
Understanding the movement of sun across the sky, solar chart, its importance. Importance of understanding the optimum orientation of building its form with respect to sun. Concept and design of shading devices. Basic principles of heat transfer and solar radiations. Solar radiations-position of sun in the sky dome and method of recoding it, radiation gains on various materials. Thermal properties of building materials and elements. Concepts of day-lighting and its calculations based on Indian standards.
MODULE 4: WIND AND BUILDING ORIENTATION
Wind movement in general, air flow pattern within and around buildings. Effect of surrounding elements. Understanding of ventilation techniques, air movement, stacks effect and thermally induced air currents. Importance of understanding the optimum orientation of building, its form with respect to wind, guidelines for designing airy buildings.
MODULE 5: PROJECT AND ARCHITECTURAL APPLICATION
Project work on design of horizontal and vertical shading devices, solar heat gain, day lighting, ventilation, air flow etc. Application of tools such as Mahoney table, lux grid chart etc. and software applications like Eco-tech.
Course outcome:
With the successful completion of the course student should have capability to design climate responsive buildings in terms of thermal and visual comfort. <ol style="list-style-type: none"> 1. Understand climate and climatic zones 2. Understand the effect of the elements of climate on building design
References
<ul style="list-style-type: none"> • Koenigsberger, Manual Of Tropical Housing And Building – Part I – Climatic Design • Evans, Housing Climate & Comfort • Givoni, Man, Climate And Architecture • Kukreja, Tropical Architecture • O.P Jahkar, Energy Conservation in Building • Callwey, Building in the Tropics

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0307S	SURVEYING	1	4	Lab	5	3
<p>The objective of the subject is to enable students to understand and apply:</p> <ul style="list-style-type: none"> • Basic principles and theories of topographic features, basic skills of landform and built form analysis through map and field observation. • Use of various survey tools and equipment • Documentation and analysis of physical profile and features of land and built form 						
MODULE 1: Introduction to Surveying						
Introduction to surveying, its practicality in the profession. Classification of various survey instruments, techniques & equipment. Reading of survey maps, understanding of features and undulations of ground. Scaling of survey measurements and errors in surveying. Concept of trigonometry, traversing & tachometry in surveying.						

MODULE 2: Measurements
Measurements in horizontal plane, linear measurements with chain & tape, setting-out & survey stations, survey accessories, survey lines, open & closed traverse, chaining & offsetting, direct & indirect ranging, log-books, field boundaries, field area estimation. Chain Surveying: Principles of survey, equipment required selection of station, methods of taking offsets. Compass Surveying: The prismatic compass, its construction and uses and other types of compasses.
MODULE 3: Basic Surveying Techniques
Plane table surveying (equipment, methods, advantage & disadvantage, errors etc.), Theodolite Surveying (temporary & permanent adjustment, measuring of magnetic bearings, horizontal & vertical angles and Theodolite traverse & balancing closing error). Tachometric surveying (general instruments, different systems of tachometric measurements, stadia method).
MODULE 4: Advanced Surveying Techniques
The concept of total station survey and its multi-functioning in surveying. Introduction to Use of DGPS, automated & digital surveying, G.P.S, Aerial Photography, etc.
MODULE 5: Contours and Slope Analysis
Contouring methods & equipment, contour intervals, direct & indirect methods of contouring, block contour surveys, profile levelling, longitudinal & traverse cross sections, and gradients. Measurements along sloping landforms, principles, definitions, methods, instruments required for simple & differential leveling.
Course outcome:
With the successful completion of the course student should have capability to <ol style="list-style-type: none"> 1. Interact technically with surveyors 2. Be able to prepare and interpret survey drawings 3. Be technically soundness in contour analysis.
References:
<ul style="list-style-type: none"> • Duggal, Surveying • Punmia, and Jain, Surveying And Surveying (Volume I & II) • Ghosh, Elementary Engineering Surveying • Singh, Surveying And Levelling for Architects • Miller and Westerback, Interpretation of Topographic Maps. • Online Latest Manual On Application Of Land Surveying Instruments, i.e. Total Station Survey, DGPS etc.

FOURTH SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0401S	ARCHITECTURAL DESIGN – 4	1	6	Studio	7	10
<p>The objective of the subject is to enable students to focus on use of:</p> <ul style="list-style-type: none"> • Climate in design development process. • Site contours as a design opportunity. • Local materials and construction techniques. 						
Vernacular architecture, Climatology, Contours						
<p>Understanding vernacular architecture as an appropriate demonstration of climate, geography and culture responsive architecture. Using tools like Mahoney’s Tables for arriving at building and detail design solutions. Study of traditional designs and practices and upgrading same for use in contemporary situations.</p> <p>Design of a simple building for public activity, in a non-urban setting, (i.e. without urban regulatory controls) such as <i>Panchayat Bhawan</i>, rural school, primary health center, <i>anganwadi</i>, community training centres, small forest resort, etc. The focus will be on the design response to climate and site contours apart from other factors like vernacular architecture of the region.</p>						
Course outcome:						
<p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> 1. Design climate, site and topography responsive buildings. 2. Design according to the context of vernacular architecture 3. Come up with a design process and solution for imple public buildings. 						

SECOND YEAR – FOURTH SEMESTER						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0402T	BUILDING SERVICES (WATER SUPPLY AND SANITATION)	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand and apply:</p> <ul style="list-style-type: none"> • Fundamentals of water supply, drainage, sewerage system and solid waste disposal. • Water distribution systems and its requirements at different scales such as building, site, neighborhood, etc. • Sanitation and its layout requirements at different scales such as building, colony and neighborhood • Calculations and disposal of rainwater and solid waste disposal. 						
Module 1: Introduction						
<p>The need and importance of building services. Historical overview of water supply, plumbing and sewerage systems in India and worldwide. Sources of water, standards of purity, impurities in water and its treatment. Recycling of waste water and sewage treatment plants.</p>						

MODULE 2: Water Supply
Water distribution system at city and neighborhood from treatment plant to individual unit. Types of water distribution networks, pipes for water distribution, joints, fixtures and valves, water meters, etc. Water storage tanks, their capacity and location. Terminology such as flow, pressure, head, etc. and principles of water supply in buildings (low-rise, multi-storeyed). Cold and hot water supply network and connections. Calculation of water consumption and designing of water supply for buildings based on Indian standards.
Module 3: Sanitation
Sanitation systems like dry, wet carriage systems, etc, at various urban scales. Types of sewers and location of manholes etc. Terminologies like self-cleaning velocity, gradient, invert level, section area etc. Layout and calculations for design of sanitary networks at neighborhood scale. Design calculations of septic tank, soak-pits, cesspools, aqua-privy, leeching pits etc. Study of details of types of traps and chambers (inspection chamber, disconnecting chamber, intercepting trap, S-trap, P-trap, gully trap, grease trap etc; and sanitary fixtures (washbasins, WCs, bathtubs, urinals, flushing cistern, etc. Types of pipes and joints. Design principles of sanitary layout (location and ventilation of chambers, traps, fixtures). Building sanitation systems (separate, combined, single stack, one pipe and two pipe, etc.).
MODULE 4: Storm Water and Solid Waste Disposal System
Surface area division for rain water disposal. Details of collection point/ <i>Khurra</i> . Conveyance network for rain water (catch basin, gully traps, etc). Calculation for rain water quantity, gradients, section of drains etc. Concepts of rain water harvesting. Types of solid waste, quantity of waste generated, collection and segregation of municipal solid waste. Recycling techniques for solid waste.
MODULE 5: Drawing and Market Survey
Market survey for pipes, fittings and fixtures, traps etc. To prepare water supply and sanitary design project for a small building such as residence, primary school etc. Output for water supply design will be in the form of water quantity calculations, flow calculations and pipe diameter calculations. Water supply layouts from municipal supply to storage tank. Also design network for hot and cold water supply in the selected building in the form of plans and sectional elevations. Output for Sanitary design will be in the form of gradient and pipe diameter calculations. Layout design with details of all chambers and traps for building and site in the form of plans and sectional elevations.
Course outcome:
With the successful completion of the course, student should have capability to <ol style="list-style-type: none"> 1. Interact technically with water supply and sanitation experts. 2. Design efficient water supply layouts with detail calculations. 3. Design sanitation layouts 4. Design rain water disposal and rain water disposal drawings
References:

- Rangwala, Water Supply and Sanitary Engineering
- Kshirsagar, Water Supply and Sanitary Engineering
- Shah, Water Supply and Sanitation
- Patil, Plumbing Engineering
- Indian Code Council, International Plumbing Code
- P.N. Khanna, Indian Practical civil Engineers' Handbook

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0403S	BUILDING MATERIALS AND CONSTRUCTION - 3	1	4	Studio	5	7
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • PCC and RCC material components and construction specifications and steps. • Indian standards for RCC work, reinforcement detailing etc. 						
MODULE 1: Building Materials						
Concrete; types, grades, mixing and setting process, workability and other tests, admixtures and additives. Plain and reinforced. Steel section, steel bars, properties, manufacturing process Indian standards, strength, joining, fabricating.						
MODULE 2: Foundation and Column						
Reinforcement and details of R.C.C. pad foundations, combined foundation, eccentric foundations. Reinforcement details of R.C.C. square, rectangular and circular columns.						
MODULE 3: Beam, Slabs, Lintels						
Reinforcement and details for lintels and projections (<i>Chajja</i>). Reinforcement and details of R.C.C. beams: simply supported, rigid, continuous and cantilevered. Reinforcement and details for one-way and two-way slabs with fixed continuous and cantilever end conditions.						
MODULE 4: Staircase						
Types of staircases, calculations for riser and treads, reinforcement and details for various types of staircases.						
MODULE 5: Formwork, Shuttering, Scaffolding						
Formwork for square, rectangular and circular columns. Scaffolding. Shuttering and centering beams, slabs and staircase. Shoring such as raking shores, flying shores and dead shores. Underpinning.						
Course outcome:						
<p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> 1. Understanding the method of executing of framework, shuttering and scaffolding. 2. Understand what type of details would be needed for a particular RCC/PCC work and make drawings for the same. 3. Understand planning and execution of staircase 						
References:						
<ul style="list-style-type: none"> • W.B. Mc Kay, Building Construction Volume 1 to 4 						

- R. Barry, Building Construction Volume 1 to 5
- Francis Ching D.K., Building Construction Illustrated
- S.K. Sharma, Civil Engineering construction Materials
- Sushil Kumar, Building Construction

Subject Code	Subject Name	Instruction Hours		Theory / Studio Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0404S	COMPUTER APPLICATIONS – 2	-	4	Lab	4	2
<p>The objective of the subject is to enable students to understand and apply:</p> <ul style="list-style-type: none"> • Basic CAD skills to create simple and complex two dimensional geometric forms. • CAD skills to create technically correct and presentable drawings. 						
MODULE 1: Introduction to 2d Drafting						
Introduction to computer aided 2-D drafting. To develop and understand basic set up and menu bars for computer aided drafting. Screen Layout- status bar, tool bar, graphics area, labeled buttons, drawing editor, file handling commands (utility commands). Setting units and scale.						
MODULE 2: 2D Drafting Tools						
Drafting simple and complex geometric shapes such as squares, circles, triangles, lines, curves, poly lines and their combinations etc. Application of various toolbars and their sub tools including draw, edit, modify, view, file, dimension, parametric, etc.						
MODULE 3: 2D Drafting of Building						
Preparation of two dimensional architectural drawings (including plans, elevations and sections) incorporating layers, line-weights, texts, scale, dimensioning and formatting of drawings for taking prints and plots.						
MODULE 4: 2D Presentation Drawings						
Preparation of two dimensional architectural presentation drawings (including plans, elevations and sections) incorporating human figures, plants, car etc. Preparation of two dimensional architectural presentation drawings (including plans, elevations and sections) incorporating grid, column, dimensioning, legend and architectural elements details with proper line weight etc.						
MODULE 5: Practical Work						
Making 2 dimensional architectural plan, elevation and sections for any one of the architectural design assignments studied in previous semesters with submission in the form of printouts in scale.						
Course outcome:						
<p>With the successful completion of the course student should have capability to</p> <ol style="list-style-type: none"> 1. Grasp 2 D CAD drafting 2. To transform sketches and manually drafted drawings into CAD drawings. 3. Prepare presentation drawings with the help of computer softwares 						
Software for References						
1. AutoCAD Student Version						

<ol style="list-style-type: none"> 2. Sketch-Up. 3. DraftSight 4. FreeCAD 5. LibreCAD
Books for References
<ul style="list-style-type: none"> • AP Gautam, Pradeep Jain, Engineering AutoCAD

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Labs	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0405T	STRUCTURE – 2	1	2	Theory	3	2
The objective of the subject is to enable students to understand RCC codes and practices and design RCC structural members.						
MODULE 1: Determinacy and Indeterminacy						
Determinate & indeterminate structures. Fundamental criteria of strength, stiffness, economy, durability & compatibility. Three-moment theorem (fixed & continuous beams).						
MODULE 2: Design of RCC Beams						
Concept and design of doubly reinforced beams. L and T beams						
MODULE 3: Design of RCC Slabs						
Two way and cantilever slabs						
MODULE 4: Design of Foundations						
Combined and eccentric footings						
MODULE 5: Design of Staircase						
Concepts and design of different types of staircases. Design of dog legged stair; calculation of tread and riser, different bonding, thickness of waist slab / bending of slab.						
Course outcome:						
With the successful completion of the course student should have capability to <ol style="list-style-type: none"> 1. Design RCC structural members likes beams, slabs etc. 2. Design RCC combined and eccentric footings. 3. Design RCC structures. 						
References						
<ul style="list-style-type: none"> • Bhavikutti, Structural Analysis III • Pillai & Menon, Reinforcement Concrete Design • Arumanikyam, Design of RCC Structures • Bhavikathi, Design of RCC Structural Elements • Punmia, Soil Mechanics and Foundation Engineering • Punmia, RCC Designs • Punmia, Limit State Design of Reinforced Concrete 						

SECOND YEAR – FOURTH SEMESTER						
Subject Code	Subject Name	Instruction Hours		Theory / Studio / Labs	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0406S	SITE PLANNING	2	2	Studio	4	3
<p>The objective of the course is to understand the</p> <ul style="list-style-type: none"> • Importance of site and its characteristics in architecture. • Determining factors which govern the siting of a given project. • Appropriate site analysis techniques and methodology of preparing a site analysis diagram. • To learn the planning of site services and utilities. 						
MODULE 1: Introduction						
Definitions - plot, site, land and region, units of measurements. Introduction to methods of site surveys; Modern surveying Instruments and their application. Need for surveying. Reading a technical drawing of site plan.						
MODULE 2: Site Analysis						
Need of site analysis; Understanding topography, hydrology, soils, vegetation, climate, surface drainage, accessibility, size and shape, infrastructures available (a basic analysis of natural, cultural and aesthetic factors on and around a site). Reading and preferably preparing site analysis drawings and diagrams.						
MODULE 3: Detailed Analysis						
Contour analysis (ridges and valleys), slope analysis, grading process and criteria, functional and aesthetic considerations. Selection criteria for the siting of various types of building typologies.						
MODULE 4: Site Context and Regulations						
Contextualization of a site - existing surrounding land uses for cities. The possible effect of a project on its surroundings. Suitable case studies of the same.						
MODULE 5: Site Layout And Development						
Exercise requiring siting of a given building typology, its planning for vehicular and pedestrian circulation; planning of site utilities, drainage and sewage disposal with consideration to topography and other site features.						
Course outcome:						
<p>With the successful completion of the course the student should develop the capability to:</p> <ul style="list-style-type: none"> • Do site analysis • Utilize site analysis for planning for architectural projects • Plan better managed site services. 						
References:						
<ul style="list-style-type: none"> • Ian Mcharg, Design with Nature • Kevin Lynch, Site planning • Edward. T. Q, Site Analysis 						

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0407T	THEORY OF DESIGN	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • A critical body of knowledge in the theoretical domain of built environment • How to appreciate the built environment and develop a critical evaluation in different social, cultural and environmental contexts. 						
MODULE 1: Introduction to Architectural Design						
Definition of architecture, elements of design backed by need and followed by fulfillment of need.						
MODULE 2: Architectural Space , Mass and Aesthetics						
Mass and space, visual and emotional effects of geometric forms like hemisphere, cube, pyramid, cylinder, cone, etc. and their derivatives. Proportion, scale, balance, rhythm, symmetry, hierarchy, pattern, axis with building examples. Aesthetics principles in Indian and western cultures.						
MODULE 3: Organization of Forms and Spaces						
Spatial relationships; space within space, interlocking space, adjacent space, space linked by common space.; influencing factors for spatial organization and their types; centralized, linear, radial, clustered etc.						
MODULE 4: Application of Colour in Architecture						
Effect of colour in architecture , colour symbolism in various cultures						
MODULE 5: Character and Style in Building						
Factors influencing the character and style in buildings, study of examples in contemporary architecture (including modern and postmodern)						
Course outcome:						
<p>With the successful completion of the course the student is expected to :</p> <ol style="list-style-type: none"> 1. To understand the relationship between need and design 2. Appreciate the aesthetics of built environment 3. Use the learnt principles and elements in his design exercises. 						
References:						
<ul style="list-style-type: none"> • Francis D.K.Ching, Form, Space and Order • Jaxtheimer, How to Paint & Draw • Gill Robert: Rendering with Pen and Ink 						

FIFTH SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0501S	ARCHITECTURAL DESIGN – 5	1	6	Studio	7	10
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • How to design in developing urban areas. • Characteristics of a public building 						
<p>Key words: Multi-user building, Urban setting,</p>						
<p>Understanding dynamics of public buildings; activities of visitors and regular users. Providing for daily/regular, monthly, annual events and activities. Relating space and individual; human scale and urban scale. Societal aspirations for aesthetics and form. Role of climate, building services, construction methods, bye-laws, codes (NBC etc.) on building and site design.</p> <p>Exercises on studies for grouping of activities in a public building. Design (form and space) for multi activity public facility like District Collectorate office, Degree College, Residential School (<i>navodayavidyalaya</i>), corporation office, shopping complex, <i>dharamshala</i>, inns, motels, budget hotels, etc. in small and medium towns.</p>						
<p>Course outcome:</p> <p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> 1. Design for multiple groups of users with due consideration to site, climate, services, bye-laws. 2. Understand the relationship between design and urban setting. 3. Derive a design process and design solution for a public building. 						

Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0502T	BUILDING SERVICES – 2 (ELECTRICAL SERVICES)	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand and apply:</p> <ul style="list-style-type: none"> • Basic laws and terminologies related to electrical services in buildings. • Electrical requirements for given situation, its calculations and design. • Artificial Illumination and its application in buildings. 						
<p>MODULE 1: Introduction to Electrical Services</p>						
<p>To understand the need and importance of electrical services and artificial illumination in buildings. Principles of electricity, units and basic terminology. Brief introduction to generation of electricity; types of power stations, power distribution system in city; function of sub stations; locational guidelines for substations, land and other infrastructural requirement for substation; power distribution system in locality.</p>						
<p>MODULE 2: Electrification</p>						

<p>Calculation of electrical load for residential and non-residential buildings. Types of wires and electrical wiring systems, electrical installations in a building from the supply company mains to individual outlet points including meter board, distribution board, and layout of points with load calculations. Electrical control and safety devices such as switches, fuse, circuit breakers, earthing, lightning conductors etc. Norms and standards for site level transformers and layout of substations. Types of distribution networks at site level. Solar energy integrated electrical design of buildings and smart buildings. Strategies for low power consumption.</p>
<p>MODULE 3: Illumination</p>
<p>Light and its characteristics, terminologies such as luminous flux, candle, solid angle, illumination, utilization factor etc. Types of illumination schemes such as ambient, task, focal and decorative, etc. Illumination standards for different activities and numerical on design calculations for illumination schemes. Types of luminaries such as direct, indirect and diffused. Discharge lamps such as incandescent, high and Low pressure lamps, CFLs, LEDs etc. Principles of luminous efficiency. Understanding natural illumination and integrating it with artificial illumination.</p>
<p>MODULE 4: Advance Electrical Services</p>
<p>Knowledge of essential electrical component related to firefighting system (fire detection systems, alarm systems, fire extinguishing systems, smoke control etc. Introduction to essential electrical component of security systems like installation of CCTV, surveillance, etc. and of vertical transportation system like elevators, escalators, etc. Factors guiding their placement and layout in a building envelope.</p>
<p>MODULE 5: Electrical Drawing And Market Survey</p>
<p>Market survey for Materials, apparatus, joints, fixtures, breakers and luminaries such as recessed, mounted, spot, decorative, etc. To prepare electrical design project for a small building such as residence, primary school etc. Output will be in the form of load calculation sheets, circuit diagrams and layout drawings. Illumination calculations and design for a space for the selected building.</p>
<p>Course outcome:</p>
<p>With the successful completion of the course, student should have capability to</p> <ol style="list-style-type: none"> 1. Interact technically with electrical and illumination experts 2. Design efficient electrical layouts with their circuit diagrams 3. Design efficient illumination levels for various activities and spaces.
<p>References:</p>
<ul style="list-style-type: none"> • Catalogues of leading Audio equipment's companies • National Building Code of India: National Electrical Code. • Kothari and Nagrath, Basic Electrical Engineering • O.P. Gupta, Energy Technology • John Mathew, Introduction to the Design and Analysis of Building Electrical System • Gondzik, Mechanical and Electrical Equipment for Building • Raina & Bhattacharya, Electrical Design Estimating and Costing. • Keyoumars Ehteshami, Handbook of Fire Protection and Safety • Kelly & Connell, Interior Lighting Design - A Student's Guide.

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0503S	BUILDING MATERIALS AND CONSTRUCTION - 4	1	4	Studio	5	7
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • Large span truss components and construction details. • Use of materials like steel, aluminum, glass, gypsum in interiors and exteriors; their construction and to enable them to represent same through technical drawings. 						
MODULE 1: Steel Trusses & Roofing						
Types and fixing details of steel trusses – saw tooth, roof truss with north light glazing, simple trusses in steel, and ways of fixing and connections (to foundations, steel stanchions, and beams etc.). Space frames (single, double & triple layered tubular space frames with globe connections). Types of materials and details of industrial buildings, warehouse and other building typologies.						
MODULE 2: Partitions, Grills and Panels						
Study of various types of aluminum and wooden partitions, its extrusions and fixing details. Different types of wooden, aluminium panels, cladding components for various types' buildings and structures. Aluminum, glass and steel grill modules.						
MODULE 3: False Ceilings						
Types and fixing details of various materials for suspended ceilings and false ceilings using aluminum and other material sections). Construction details for providing thermal insulation in cold storages. Types of insulation materials and fixing details of materials like glass wool, insulating boards, gypsum boards, plaster of paris, and various kinds of perforated boards.						
MODULE 4: Glass						
Various techniques to use glass and glass blocks with fixing details (structures like pavilions, greenhouses, staircases, multi storied buildings –curtain walls, roofing, panels).						
MODULE 5: Wall treatments and finishes						
Types and fixing details of sound absorbing materials such as acoustic plastic, acoustic tiles, wood, partition board, fiber board, cork, quilts and mats spun glass foamed glass, gypsum, plaster of Paris, hydride gypsum properties, its properties (porous, baffle and perforated materials) and applications (vapor barriers, rigid insulations, blanket, poured and reflective insulation). Study of relevant IS codes, Study of damp-proofing materials such as Bitumen felts, etc. chemicals for W.P.C. &O.P.C etc.						
Course outcome:						
<p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> 1. Make a decision which type of construction detailing will be required for a given type of roofing depending on interior and exterior situation and make drawings for the same. 2. Understand design and execute false ceiling with different materials. 3. Understand and execute glass as material. 4. Understanding different wall treatments and prepare detail drawings. 						
References:						
<ul style="list-style-type: none"> • S.P. Arora & Bindra, A Text Book of Building Construction 						

- J. Jha & S.K. Sinha, Building Construction
- M.S. Shetty, Concrete Technology
- Dr. B.C. Punmia, A Text book of Building Construction
- T.D. Ahuja and G.S. Birdie, Fundamentals of Building Construction
- S.P. Arora and S.P. Bindra, A Text Book of Building Construction

Subject Code	Subject Name	Instruction Hours		Theory / Studio Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0504S	COMPUTER APPLICATIONS – 3	-	4	Lab	4	2
<p>The objective of the subject is to enable students to understand and apply:</p> <ul style="list-style-type: none"> • Basic CAD skills to create simple and complex three dimensional geometric forms. • CAD skills to create technically correct and presentable three dimensional building models. • Skills to render and animate building models. 						
MODULE 1: Creating Three Dimensional Geometry						
Introduction to computer aided 3D drafting. Understand tools, command and basic set up for 3D. Introduction to 3D-modelling technique and construction planes, drawing objects, 3D surfaces setting up elevation thickness and use of dynamic projections. Application of various toolbars for three dimensional modeling. Creating and editing simple and complex geometric meshes, surfaces and solids with their combinations etc.						
MODULE 2: 3D Model Of Building						
Understanding and converting plan, elevation and section of drawing to three dimensional building model using three dimensional tools. Creating building models using building elements and then converting model to orthographic projections.						
MODULE 3: Photo Realistic Rendering						
Making models photorealistic using materials, lighting, texture, background, etc. Creating new materials and environment attributes.						
MODULE 4: Walk Through of Interior/Exterior						
Create interior walkthroughs for small spaces such as bedroom, office etc. by adding scenes, furniture, texture, finishes with lighting effect and camera angles. Create building exterior walkthroughs by adding scenes, trees, human figures, cars, sun light effect and camera angles.						
MODULE 5: Practical Work						
Making Three- dimensional photorealistic rendered architectural models for any one of the architectural design assignments completed in previous semesters and to create walkthrough of the same.						
Course outcome:						
With the successful completion of the course student should have capability to						
<ol style="list-style-type: none"> 1. Visualize building / transform sketches and 2 dimensional CAD drawings to 3 dimensional building models and walkthrough. 2. Execute photo realistic rendering of the building project 						

3. Prepare walkthroughs
Software for References
<ol style="list-style-type: none"> 1. AutoCAD Student Version 2. Autodesk Revit 3. Sketch-Up 4. Paint 3D 5. 3D Max 6. 3D Home architect 7. Archi-Cad 8. Maya
References:
<ul style="list-style-type: none"> • Pradeep Jain & A.P. Gautam, Engineering AutoCAD

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
ARC - 0505T	STRUCTURE – 3	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand</p> <ul style="list-style-type: none"> • IS codes for steel and timber • Design steel` and timber structural members 						
MODULE 1: Design of Timber Structures						
Properties, strength and types of timber used as structural components in timber construction – permissible stresses in timber, design of timber columns and beams as per IS codes.						
MODULE 2: Introduction to Steel Structures						
Introduction to steel structures: steel structural shapes, introduction to IS 800; rivets, understanding of design in steel with various components, their functions and interrelationships. Design of structural steel tension, compression and bending members. Concepts of connections, design of riveted and welded connections like beam end connections. Design of steel beams and columns. Concepts on structural design of column bases (slab base and gusseted base) and grillage foundations. Concepts of plate girders.						
MODULE 3: Design of Steel Beams						
Design of laterally supported and unsupported beams. Beams subjected to bi-axial bending, built-up beams - design concepts with flanged plates.						
MODULE 4: Design of Steel Columns						
Theory of columns, slenderness ratio, design of axially loaded steel columns, design of built-up lacing and battened columns.						
MODULE 5: Frames And Trusses						
Introduction of trusses as a building element and its important. Analysis and design of tension and compression members of roof truss. Exercises on perfect and imperfect frames, redundant members. Analytical and graphical solutions of frames.						
Course outcome:						
With the successful completion of the course student should have capability to						

<ol style="list-style-type: none"> 1. Design basic steel and timber structural members. 2. Understand steel truss
References
<ul style="list-style-type: none"> • Arya and Ajamani, Design of Steel Structures, • Duggal, Design of Steel Structures • Handbook of Typified Designs for Structures with Steel Roof Trusses • Desch, Timber: Structure, Properties, Conversion, and Use • Kermani, Structural Timber Design

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0506T	ACOUSTICS	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand and apply:</p> <ul style="list-style-type: none"> • Basic laws and terminologies related to Acoustics, Acoustical requirements of a given activity, its calculations and designing of the space. • Urban noise control and its application at site and building level. 						
MODULE 1: Introduction to Acoustics						
<p>To understand the need and importance of acoustics in various building typologies, the history of acoustics, works of pioneers. Understanding of terminologies, definitions of key concepts such as propagation, reflection, absorption, diffusion, velocity, intensity, and intensity levels etc. Introduction to properties of sound, decibel scale, directionality and sound sources, hearing noise effects, diffraction and reflection resonance, echo and reverberation.</p>						
MODULE 2: Behavior of Sound in Free and Enclosed Spaces						
<p>Inverse square law, numerical calculations for intensity, intensity levels decibel scale. Studying absorptive and reflective materials, their effect on reverberation time etc. Understanding near field, free field and reverberant field. Design considerations for good acoustical design such as shape, size, occupancy, purpose, geometry etc. Acoustical defects such as echo, creep etc. and their remedies.</p>						
MODULE 3: Noise Control						
<p>To understand noise, its transmission (air borne and structure borne), insulation and transmission loss. Understanding of psychological and physiological effects of noise. Identification of various sources of indoor noise and methods of sound insulation for control of mechanical noise and vibrations and its control measures. Sources of outdoor noise such as traffic noise levels and planning and design for outdoor noise. Material types for hollow and composite wall construction, floors and ceilings.</p>						
MODULE 4: Sound Reinforcement Systems						
<p>Characteristics and components of a good Sound reinforcement system, public address system. Study and understanding of sound system equipment available in market, manufactured by various brands e.g. amplifiers, microphones, speakers, etc.</p>						
MODULE 5: Acoustical Design Principles and Factors						
<p>Case studies and at least one design exercise of an auditorium or other sensitive enclosures which require acoustical sensitivity meant for speech, music, lecture, etc. Selection criteria for</p>						

cases and design exercise - Site selection and planning, shape, dimensions, occupancy and seating arrangements, treatment of interior surfaces, desired reverberation time and amplification systems. Exercise output would be in the form of plan, section, construction details and calculation sheets.

Course outcome:

With the successful completion of the course student should be able to

1. Understand the basics of acoustics
2. Develop capability to apply the fundamentals of acoustics in the design of building
3. Communicate with technical accuracy in a professional and an academic environment.

References:

- Catalogues of leading Audio equipment’s companies
- Egan, Architectural Acoustics
- Kandaswamy, Architectural Acoustics and Noise Control
- J.E. Moore, Design for Good Acoustics and Noise Control.
- National Building Code 2005
- Templeton, D., Acoustics in the Built Environment.
- A.B. Wood, A Text book of sound.
- Yarwood, T.M., Acoustics.

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0507S	QUANTITY SURVEYING AND SPECIFICATIONS	2	2	Studio	4	3

The objective of the course is to enable students to :

- To develop a real-time judgment of the quality and quantity of materials, quantity and classes of skilled and unskilled laborers and tools and plants required for the project
- To develop skill for precise and approximate estimations.
- To be able to estimate and specify quantities of various items of material and work involved in an architectural project.

MODULE 1: Introduction to Specification

The need for specification. Types of specification. Specification writing. Classification of specification, Brief specification and detailed specification- excavation, plain cement concrete, RCC, brickwork, DPC, Flooring, doors, windows frames and shutters, plastering, etc.

MODULE 2: Estimation

The various types & purposes of estimation, approximate estimate, bill of quantity, considerability of factors, rationale for measurement and billing, measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work. Estimate abstract and Cost estimation (types and approaches to construction estimates). Estimate of list of quantities. Operating costs.

MODULE 3: Detailed Estimation

Detailed quantity estimates for various items of work of a building (earthwork excavation, brick work, PCC, RCC, plastering, flooring, woodworks, iron works, painting, etc.

MODULE 4: Budgeting and Valuation

The role of budgeting, financing and phasing in a project and its significance in estimation. Significance of time in cost-effectiveness. Introduction to valuation types, sinking fund, year of purchase, depreciation and their types, methods and purpose of valuation.

MODULE 5: Project

Preparing specifications and estimating cost for small building including brief specifications, calculating quantities for labor and materials, costing based on CPWD / PWD documents.

Course outcome:

With the successful completion of the course the student should develop the capability to:

1. Write specifications for building construction.
2. Prepare approximate estimates of building projects
3. Prepare detailed estimates for a building project.

References:

- I.S. 1200-1968 Methods of measurements of Buildings and Civil Engineering Works.
- PWD Standard Specifications
- Rangwala, Estimating, Costing and Valuation (Professional practice)
- B.W. Dutta, Estimating & Costing

SIXTH SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0601S	ARCHITECTURAL DESIGN – 6	1	6	Studio	7	10
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • How to design closed environment buildings in urban areas. • Interior comfort for activities and movement with artificial means; air-conditioning, lighting, lifts, etc. • Service oriented building types 						
Keywords: MEP, Building Rating, Comfort and efficiency						
<p>Understanding essentials for closed environment public buildings; interior comfort for activities and movement with artificial means; air-conditioning, acoustics, lighting, lifts etc. Building envelope design, materials and finishes for energy efficiency and green rating (GRIHAECBC etc.). Exploring structural system alternatives.</p> <p>Exercises on studies of closed environment buildings. Design (form and space) for multi activity closed environment facility like hospitals, hotels, corporate office, IT office, call-centers, cinema hall, small convention centers etc.</p>						
Course outcome:						
<p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> 1. Design closed environment buildings for a specific purpose for a multiple group of users. 2. Understand and design for energy efficiency. 3. Produce a design process and design output for a specialized building type. 						

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0602T	BUILDING SERVICES – 3 (MECHANICAL SERVICES)	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand and apply:</p> <ul style="list-style-type: none"> • Overview and introduction to heating, ventilation, and air conditioning focusing on different HVAC systems. • HVAC requirements for given situation, its calculations and design. • Lift, escalator and travelator requirements for given situation, its calculations. • Introduction to building automation systems. 						
MODULE 1: Introduction						
<p>To understand the need and importance of mechanical services. Basic principles, laws and terminologies related to HVAC such as solar angles, U-values, psychrometric charts, etc. Evaporative cooling systems of air conditioning, refrigerant cycle and its reversal. Components of mechanical vapour compression and refrigeration systems. Natural and artificial ventilation.</p>						

MODULE 2: Psychrometry
Thermal comfort parameters. Understanding psychrometric chart for HVAC design. Heat load calculations.
MODULE 3: Air Conditioning Systems
To understand types of air conditioners such as window, split, packaged, direct expansion, central etc. Their selection criteria, design, structural considerations and energy requirements. To understand passive heating and cooling systems and integration with active systems.
MODULE 3: Building Automation and Management System
Concept and application of Building Automation and Management system. Design issues related to building automation and its effect on functional efficiency Components of building automation system; modern security system, alarm system, fire-protection, inter-communication, monitoring devices, mechanical means of vertical and horizontal transportation etc.
MODULE 4: Vertical Transport
Elevators, escalators and travelators - Types of elevators-traction, sky lobby, lift lobby, provision of elevators for a building, planning considerations - location in building, recommendations of the National Building Code, etc. Safety features and codes. Service requirements: calculations for quality and quantity of service, time, passenger handling capacity, space and physical requirements, machine room spaces and their typical layout. Design of typical lift banks, escalators, (application - location and arrangement in buildings), space requirement (travelators).
MODULE 5: Mechanical Drawing And Market Survey
Market survey of mechanical equipments. The understanding of mechanical needs for different building like residential commercial, etc. project work: To calculate AC load for small space such as committee room, conference hall etc. Calculation of lift requirements for high rise buildings.
Course outcome:
With the successful completion of the course, student should <ol style="list-style-type: none"> 1. Understand principles for designing of large scale mechanical services 2. Understand BMS and their execution in building projects 3. Have capability interact technically with MEP experts
References:
<ul style="list-style-type: none"> • Sadhu Singh, Refrigeration and Air Conditioning • National Building Code 2005 • Grondzik, Kwok, Stein, Mechanical and Electrical Equipment for Buildings • Ananthanarayana, Basic Refrigeration and Air Conditioning

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0603S	BUILDING MATERIALS AND CONSTRUCTION - 5	1	4	Studio	5	7

The objective of the subject is to enable students to understand:

- Large span truss components and construction details.

MODULE 1: Modular Co-ordination, Systems
Modular space grid. Modular dimensioning and modular drawing. Modular dimensioning according to Ancient Indian Treatise. Preferred sizes for horizontal and vertical coordinating and controlling dimensions. Controlling dimensions for widths of building components. Controlling dimensions for heights of building components. Floor heights & room heights. Analysis of building elements / components for introduction of prefabrication in India context. Classification of prefabricated components.
MODULE 2: Space Structures
Skeleton frame works (space frames) - single layer grids (two-way, three way & four way) and double layer grids (lattice grids & true space grids). Offset grids and differential grids.
MODULE 3: Advanced Use of Concrete
Concrete shell roofs of various types and folded plates construction techniques, its strength and durability. Study on different forms& shapes of shell structures (its construction details and materials). Study of prefabricated commercially available systems (Space Deck System, Triodetic System, Mero System & Nodus System, Geodesic Domes).
MODULE 4: Precast and Prestressed Construction
Design and detailing of concrete used in advanced construction such as Precast concrete, pre stressed concrete, folded plates, shell structures, vaults, domes, decorative concrete, insulated concrete forms (ICF), Concrete for Seismic design
MODULE 5: Digital and Tensile Materials
Types of materials and its constitution –manufacturing, construction technology and requirement for 3D printed buildings structure and extraterrestrial printed structures. Tensile fabric structure by digital printing - translucent fabric, thin-film photovoltaic, texlon foil, PVC (poly vinyl chloride) coated polyester cloth and poly tetra fluoroethylene, coated glass cloth etc.
Course outcome:
The students develop an understanding of <ol style="list-style-type: none"> 1. Understand modular coordination 2. Modern construction systems and techniques used in large scale buildings and other architectural projects. 3. Understand design and use of tensile structures
References:
<ul style="list-style-type: none"> • Makowski, Analysis, Design and Construction of Double - Layer Grids • K.Heki, (ed.), Shells, Membranes and Space Frames • Material Architecture: Emergent Materials for Innovative Buildings and Ecological Construction • Blaine Brownell, Trans material 2

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0604S	COMPUTER APPLICATION – 4	-	4	Lab	4	2

<p>The objective of the subject is to enable students to understand and apply:</p> <ul style="list-style-type: none"> • Skills and information to build comprehensive Building Information Models (BIM) using appropriate Digital software and Media.
<p>MODULE 1: Introduction to Fundamentals</p>
<p>Key concepts of BIM - reading and manipulating the software Interface - navigating within views - selection methods - the importance of levels and grids- create walls, doors, windows, and components - working with essential modification commands and load family. Creating floors, ceilings, and stairs - working with type and instance parameters – importing drawings - understanding the project browser and type properties palettes - adding sheets -inserting views onto sheets - adding dimensions and text to the mode and plotting.</p>
<p>MODULE 2: Advanced Modeling – Family Types and Topo Surface</p>
<p>Modeling - Creating curtain walls, schedules, details, a custom family, and family types - “flex” a family with family types and work with reference planes - creating rooms and an area plan – tag components - customize existing wall styles. Create and edit a topo-surface, add site and parking components - draw label contours - work with phasing - understand groups and links-work with stacked walls - and learn the basics of rendering and create a project template.</p>
<p>MODULE 3: Rendering and Material Application</p>
<p>Choosing material for buildings- Creating custom walls, floors, and roofs - keynoting – working with mass elements - enhancing rendering with lighting - producing customized materials -Using sun and shadow settings - Walkthrough technique - adding decals - working with design options and work sets - and calculating energy analysis - managing revisions.</p>
<p>MODULE 4: BIM For Building Energy Simulation</p>
<p>Energy simulation for conceptual BIM models using massing- Detailed modeling using design elements- Rapid energy modeling and simulation with software. Conceptual Energy Analysis features to simulate performance. To produce energy consumption, carbon neutrality and renewable potential reports.</p>
<p>MODULE 5: BIM for Cost Estimating, Project Phasing and Administration</p>
<p>Introduction and theoretical information on the following topics- Model based Cost Estimating- Challenges in cost estimating with BIM - Cad geometrics verses BIM element description- Visual data models - Material substitutions and value engineering- detailed estimates and take- off sheets- XML and automated cost estimate- project phasing and management- 4D modeling - BIM for project lifecycles.</p>
<p>Course outcome:</p>
<p>Students gain knowledge on</p> <ol style="list-style-type: none"> 1. The implementation of BIM concepts 2. Understanding lifecycle of a building from planning, design, construction and operations. 3. About BIM for building energy performance, simulation, construction and administration.
<p>References:</p>
<ul style="list-style-type: none"> • BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors • Building Information Modeling For Dummies

- BIG BIM, little BIM: The Practical Approach to Building Information Modelling
- The BIM Manager's Handbook: Guidance for Professionals in Architecture, Engineering, and Construction

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0605T	STRUCTURE – 4	1	2	Theory	3	2
<p>The objective of the subject is to enable students to understand</p> <ul style="list-style-type: none"> • Concepts for structural design with advanced building structure technologies. 						
MODULE 1: Introduction To Pre-Stressed Concrete						
Introduction to pre-stressed concrete, difference in pre and post tensioning systems, advantages. Analysis of pre stress and bending stress, resultant stress, thrust line, concept of load balancing, various losses of stresses, stresses behavior at anchorage zone simple numerical problems. Testing equipment, destructive and non-destructive testing, cube testing on UTM.						
MODULE 2: Introduction to Structural Forms						
Introduction to various structural forms, viz. vaults, domes, shells, coffer slabs, folded plates, and foundations like raft, pile and retaining walls with an understanding of structural behavior through force diagrams. Classification and advantages of arch, barrel shells hyperbolic paraboloid. Shell, vaults and domes: structural concept and classification and application in architecture.						
MODULE 3: Advanced Structures						
Concepts and introduction to structural design of water tanks, circular tanks with flexible and rigid bases, rectangular and square tanks resting on ground.						
MODULE 4: Modern Structures						
Introduction to concepts of structural design of modern structures like highrise buildings, auditorium, stadium, railway station, airport by use of large span roofing systems (tubular truss, cantilevered truss, north light truss, monitor roof truss) composite structure (steel with RCC), tensile membrane, precast and pre stressed structural components etc. Pre-fabricated construction & pre-engineered building. Cold form sections, FRP.						
MODULE 5: Seismic Structure Design						
Earthquake-resistant construction practices and design. Behavior of structures during earthquake. Retrofitting of buildings.						
Course outcome:						
<p>With the successful completion of the course student should have capability to</p> <ol style="list-style-type: none"> 1. Understand advanced and complex structural systems 2. Understand and design earthquake resistant structures. 3. To interact structural consultants. 						
References						
<ul style="list-style-type: none"> • Anand and Arya, Masonry and Timber Structures Including Earthquake Resistant Design • Ching, Building Structures Illustrated: Patterns, Systems, and Design • Dayaratnam, Prestressed Concrete Structures 						

- Pillai and Menon, Reinforced Concrete Design
- Schuller, High Rise Building Structures
- Otto, Tensile Structures; Vol-II, Pneumatic Structures,
- Subramaniam, Cable Structures Principles of Space Structures
- Libby , Prestressed Concrete Design and Construction
- Krishna Raju, Prestressed Concrete
- Vandakudre, Prestressed Concrete

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0606S	WORKING DRAWING	1	2	Studio	3	2
<p>The objective of the course is</p> <ul style="list-style-type: none"> • Develop and transform design intent to a technically sound plan. • Communicate the architectural vision of a given project to the contractors through a set of drawings and documents. 						
MODULE 1: Preliminary Stage						
Design of a small project like residence, guesthouse etc. in an urban situation; making presentation drawings. Developing a set of corporation drawings following local byelaws.						
MODULE 2: Development						
Architectural design development and resolving issues in plan, section and elevation. Making structural drawings for foundation, plinth beams, floor beams and slabs and coordinating the architectural design drawings with structural drawings. Making site layout drawings.						
MODULE 3: Space Detailing						
Detailing specific activity spaces; making plans, sectional elevations, details for toilets, kitchen, staircase etc.						
MODULE 4: Services And Site Development						
Making sheets for electrical layout, TV, telephone etc. lines, internal plumbing and sanitation. Site plan, sanitation and water supply drawings.						
MODULE 5: Element Detailing						
Making drawings of Door, window, ventilator details. Woodworking, grills, main gate, railings, boundary wall etc. detail sheets. Schedule of finishes.						
Course outcome:						
<p>With the successful completion of the subject the student should be able to :</p> <ol style="list-style-type: none"> 1. Understand the design intent of the architect 2. Develop and convert the design intent into a set of good for construction drawings. 3. Be able to read working drawings 4. Communicate with consultants and construction team 						
References:						
<ul style="list-style-type: none"> • Francis D. K. Ching , Architectural Graphics 						

- Charles George Ramsey, Architectural Graphics Standard
- Dennis J. Hall, Architectural Graphics Standard for Residential Construction
- Travis Kelly Wilson, Drafting & Design: Basics for Interior Design

SEVENTH SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0701S	ARCHITECTURAL DESIGN – 7	1	6	Studio	7	10
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • How to include socio-economic demands in design. • Parameters like role of population density, user-satisfaction, participative architecture 						
Keywords: Resource maximization, Population density, Built density						
<p>Understanding land-use, land as a resource, high-density high-rise design; socio-economic factors, population density distribution, open space-built space ratio, firefighting, vertical movement. Interpreting bye-laws and area calculations; built-up area, constructed area, carpet area for maximization of built resource. Exercises on studies of high density housing projects. Design in cities for high density housing campuses with support facilities like clubhouse, crèche etc., depending on the total population. Design of mixed-use; commercial-residential projects.</p>						
Course outcome:						
<p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> 1. Design buildings campuses for a specific purpose for a large group of users in a city 2. Understand other parameters of architectural design like socio economic demand, population density, user satisfaction, inclusive design etc. 3. Come up with design process and design solution for large scale urban project 						

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0702T	BUILDING ECONOMICS AND SOCIOLOGY	3	0	Theory	3	3
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • Basic principles of building economics at macro and micro levels • Understanding society and it's issues 						
MODULE 1: Understanding building economics						
<p>Brief introduction of general economics through an introductory survey of concepts in micro and macroeconomics as applicable to building industry. Micro Economics: The market, budget constraint, choice, demand and supply, uncertainties, equilibrium, technological constraints, profit maximisation and cost minimization, monopoly and oligopoly, production welfare and public good.</p>						
MODULE 2: Micro economics						
<p>Macroeconomics GNP, NNP, demand and supply, inflation, interest rate, employment, saving and investment, monetary and fiscal systems and policies, General discussions on various economic issues such as public versus private participation, Equity, labour intensive versus capital intensive projects.</p>						

MODULE 3: Economics and building projects
General economics of the basic inputs into building construction, land, labour, capital and Materials, financing for projects, sources costs and utility in financing, agencies and institutions directly and indirectly influencing economic aspects of project.
MODULE 4: Society and architectural design
Family as the basic unit of 'Society', Differences in life styles due to regional background, religion, caste, income group etc. and their implication in architectural design of the housing units, Sociological aspects in the history of the evolution of housing/shelter forms.
MODULE 5: Understanding sociology
Sociological problems (interaction, isolation, privacy, accessibility, conflict, alienation related to the planning and design of different buildings with the references to the people of different age group / population groups. Power structures in society (local self-government, administrative structures, structure of decision making processes related to building projects at various government and private organizations levels).
Course outcome:
With the successful completion of the course student should have capability to: <ol style="list-style-type: none"> 1. Basic economics 2. Grasp the fundamental economics of the Indian society 3. Understand and apply economic principles in building construction projects
References:
<ul style="list-style-type: none"> • Premvir Kapoor, Sociology and Economics for Engineers • Amos Rappoport, House Form and Culture • Wallis Wilson D and Willey MM, Text Book of Sociology • Charon Joel M, The Meaning of Sociology • Thio Alex, Sociology: A Brief Introduction • Schaefer Richard, Sociology: A Brief Introduction • P.A. Stone, Building Economy, Design Production and Organisation: A Synoptic View • Koutsoyiannis, A Modern Microeconomics • Nobbs Jack and Hopkins Ian, Economics – A Core Text • TeckHoonHian, Economics: Theory and Applications • K.K. Dewett, Modern Economic Theory

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0703S	LANDSCAPE ARCHITECTURE	2	2	Studio	4	3
<p>The objective of the subject is to enable students to understand:</p> <ul style="list-style-type: none"> • Landscape design as an allied field of architecture • Process of landscape design for small and large buildings. 						
MODULE 1: Introduction to Landscape Design						
Introduction to Landscape Architecture its Importance for human beings, Need & scope of landscape architecture. Its influence on physical & visual environment. Study of Landscape						

elements such as land, vegetation, water, earth & climate, Natural & manmade elements, etc. Principles of landscape design such as unity, simplicity, variety, balance, proportion, sequence, etc. Social and economic factors. Psychological considerations of spaces and enclosures.
MODULE 2: History of Landscape
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 China, Japan, Europe, Italy, France, England, Persia, Egypt, Greece, Rome. Study of landscape architecture in Medieval period in India such as Mughal. Modern & Contemporary Landscape architecture.
MODULE 3: Hardscapes & Softscapes
Hardscapes - pergolas, garden furniture, fences, rocks, masonry, paving & surfacing, roads & parking lots, walks & plazas. Softscapes such as plantation, turfing, water features. Design criteria for landscape design such as visual, functional, micro-climatic, ecological and aesthetic. Basic horticultural idea about plants, plant selection, planting design and care of plants.
MODULE 4: Landscape Design and Services
Macro and micro-climatic considerations in landscape architecture. Effect of climate on landscape and various components of landscape on the microclimate. Cultural aspects of the landscape architecture with contextual understanding. Landscape Services & Sustainability: Introduction; Outdoors lighting, surface water drainage, irrigation, soil management techniques.
MODULE 5: Landscape design exercise
One exercise as study oriented work involving studying use of outdoor spaces by different user groups, landscape elements, street furniture, etc. Another exercise on Design for outdoor spaces with details of various elements & components.
Course outcome:
With the successful completion of the course student should have capability to: <ol style="list-style-type: none"> 1. Understand concepts of landscape architecture 2. Study and analyze site in relation to landscape design 3. Able to design and detail landscape projects
References: <ul style="list-style-type: none"> • J.O. Symonds, Landscape Architecture • J.O. Symonds, Earthscape • J.O. Symonds, Architecture-A manual of site planning and design • Theory in Landscape Architecture: A Reader (Penn Studies in Landscape Architecture). • Landscape as Urbanism: A General Theory by Charles Waldheim • Cliff Tandy, Handbook of Urban Landscape • John I. Motloch, Introduction to Landscape Design • J. E. Ingels, Landscaping – Principles and Practice • Walker and Theodore, Planting Design • M. Bring, Japanese Gardens: Design & Meaning,

Subject Code	Subject Name	Instruction Hours		Theory / Studio/ Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0704S	INTERIOR DESIGN	-	4	Studio	4	2

<p>The objective of the course is to introduce the students to:</p> <ul style="list-style-type: none"> Basics of interior design such as interior spaces, its types and various components, treatments, finishes, etc. Indoor lighting, furniture design materials selection for different environments. 						
MODULE 1: Introduction						
Definitions, concepts, themes and types of interior spaces. Behavioral psychology, perception and the related role of interior spaces.						
MODULE 2: History						
A historical overview of the influence of various design movements on interior design. Interior decoration and crafts of various indigenous tribes and communities of the sub-continent.						
MODULE 3: Elements of Interior Design - Interior Treatment and Finishes						
Treatment methods, finishes, material selection, design options for floor, ceiling, walls, staircase, openings, interior services elements, etc. in order to achieve certain functional and/or aesthetical demands of the space.						
MODULE 4: Elements of Interior Design-Lighting and Interior Landscaping						
Study of interior lighting; types, fixtures, enhancement accessories, selection for different contexts. Interior landscaping elements and significance in enhancing environment visuals and inducing moods; rocks, plants, water, flower, fountains, paving, artifacts etc.						
MODULE 5: Furniture Design & Interior Layouts and Planning						
Human comfort, lifestyle aspirations, and function as context to design of furniture, interior spaces. Office and residential interior design layouts and furniture. Interiors and furniture of various age groups like schoolchildren etc.						
Course outcome:						
<p>With the successful completion of the course student should have capability to</p> <ol style="list-style-type: none"> Understand the intricacies of interior space planning and its historical background Understand the modern trends in the field Carry out small and medium sized interior design projects 						
References:						
<ul style="list-style-type: none"> Francis D.K.Ching, Interior Design Illustrated Syanne Slesin and Stafford Ceiff, Indian Style Gary Gordon, Interior Lighting For Designers Steprt Devan Kness, Logan and Szebely, Introduction to Interior Design Ahmed Kasu, Interior design 						

Subject Code	Subject Name	Instruction Hours		Theory / Studio/ Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0705T	PROJECT	3	-	Theory	3	3

MANAGEMENT
<p>The objective of the subject is to enable students to:</p> <ul style="list-style-type: none"> • Understand the importance of project management for architects. • Be in a better position while preparing for post-graduation in project management
<p>MODULE 1: Introduction</p> <p>Chronological development of management studies. Principles, theories and approaches to management such as classical, neo classical, systems, functional etc. Managerial roles and skills required by managers.</p>
<p>MODULE 2: Project Cycle</p> <p>Feasibility studies, project proposals, detailed project reports, acquiring of project, stages in project, project monitoring and control. Financial facilities.</p>
<p>MODULE 3: Planning Techniques</p> <p>Need of planning techniques. Types of planning techniques like Bar charts, Networks; CPM and PERT. Calculation of total project time, floats etc.</p>
<p>MODULE 4: Financial Management</p> <p>Importance of cash flow forecasting and analysis, preparing cash flow statements. Lifecycle costing and assessment, time value of money.</p>
<p>MODULE 5: Organization and Staffing</p> <p>Purpose and principles of organizing and organization structures. Human resource management; factors influencing productivity and motivation.</p>
<p>Course outcome:</p> <p>With the successful completion of the course student should have capability to:</p> <ol style="list-style-type: none"> 1. Communicate with project management consultant 2. Prepare bar charts, CPM and PERT networks 3. Prepare cash flow statements and basic financial management calculations. 4. Understand organization structure and human resource management
<p>References:</p> <ul style="list-style-type: none"> • L.S. Srinath, PERT and CPM – Principles and Applications • Harris Mchfer, Modern Construction Management • S.V. Deodhar & S.C. Sharma, Construction Engineering & Management • Harold Skoontz, Management • Courtland Bouvee, Management • Prasanna Chandra, Projects Planning Analysis • Premvir Kapoor, Principles & Practices of Management

Subject Code	Subject Name	Instruction Hours		Theory / Studio Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC-0706T	INTRODUCTION TO TOWN PLANNING	4	-	Theory	4	4

<p>The objective of the syllabus is to give an introduction and overview of urban planning and its dynamics with architecture. The various aspects involved in the planning and development of cities and regions.</p>
<p>MODULE 1: Introduction to Town Planning</p>
<p>Urban Areas – characteristics, categories of a town, classification of settlement based on form, use, scale etc., densities of a town.</p>
<p>MODULE 2: Process of Urban Planning</p>
<p>Brief overview of process of urban planning and development. Surveys in planning, Physical characteristics, land use, utilities, infrastructure, population, employment and industry, housing, commercial and transportation with suitable cases.</p>
<p>MODULE 3: Concepts In Urban Planning</p>
<p>Introduction to various models of urban plans. Contributions of Patrick Geddes, Patrick Abercrombie, Daniel Burnham, Soria Y Mata, Frederick Olmstead, Henry Wright, Ebenezer Howard, Clarence Perry, Clarence Stein, CA Doxiadis, Le Corbusier, Frank Lloyd Wright, etc. towards present town planning approaches.</p>
<p>MODULE 4: Types of Urban Development Plans</p>
<p>Introduction to types and delineation of regions. Regional plan, Master plan, Zonal Development plan, Structure plan and Transportation plan. Land use plan, local area development plans and their components such as ward area plans, etc.</p>
<p>MODULE 5: Urban Institutions, Schemes & Regulations</p>
<p>The various urban institutional bodies their role and functions (Urban Development Authorities, Municipal authorities). The various acts, schemes and regulations in urban development and renewal (eg. Land Acquisition Act, 74th Amendment, Coastal Regulation Zone Act, SEZ, JNNURM, Sustainable regional planning principles, forest zones, etc.).</p>
<p>Course outcome:</p>
<p>A successful completion of the course should enable the student to:</p> <ul style="list-style-type: none"> • Have a basic understanding of urban processes involved in urban planning and development. • Understand the various development plans and their preparation • Use his understanding of various, acts, regulations and schemes in his design exercises.
<p>References:</p>
<ul style="list-style-type: none"> • Burn, Stanly & Williams, Cities of the world – World Regional Urban Development • Lewis Keeble, Principles of Town and Country Planning • John Ratcliffe, An Introduction to Town and Country Planning • S.C. Garg, City Planning • Arthur B. Gallion and Simon Eisner, The Urban Pattern – City Planning and Design • Ashok Kumar Jain, Housing for All • Ashok Kumar Jain, Town Planning • L.R. Kadiyali, Transportation Engineering • N.V. Modak, V.N. Ambedkar, Town and Country Planning and Housing

EIGHTH SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0801S	ARCHITECTURAL DESIGN – 8	1	6	Studio	7	10

The objective of the subject is to enable students to understand:

- Role of urban design and planning principles and other factors influencing campus layout and design.

Keywords: Campus design, Urban design

Understanding role of planning principles, population and built density distribution, traffic and planning controls urban design, site analysis visual experience, place making, landscaping, site services including rain water harvesting in urban scale projects.

Exercises on studies of urban design scale. Design of university campus, business districts (place), cultural/convention centers etc.

Course outcome:

With the successful completion of the course student should have capability to:

1. Design a large campus for a specific purpose for a large population of multiple groups of users.
2. Produce a design process and a design solution to an urban design problem

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0802S	Entrepreneurship skills for architects	1	4	Studio	5	3

The objective is giving the students an exposure to deal with a comprehensive real-time (small-scale) residential project.

Comprehensive Architectural Project formulation

The student is given an opportunity to apply the knowledge gained to a real life architectural project. The student will have to identify and acquire a small live project (such to as a residence, dispensary, play school, small shopping complex, etc.) and perform all professional obligations like preparing sanction drawings, presentation drawings, technical drawings, working drawings, specifications and detailed estimates. The student would also make structural drawings and detailed building services drawings with respective estimates. The student will have to identify a professional mentor; either a practicing architect and/or an architect from the architecture department of any government /semi-government/public sector undertaking. Also there shall be a faculty member(s) to coordinate, guide, and mentor the progress of the student.

Course outcome:

After successful completion of the course student develops an understanding in

1. The entire process of designing from design brief to preparation of good for construction drawings including meeting with client

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -0803S	DISSERTATION	1	2	Studio	3	2

The objective of dissertation to enable the student to

- Acquire a strong theoretical foundation, clarity of thought and also to orient the students to structured research in a focused manner.
- Develop research capabilities and individual scholarly attitude.
- Develop analytical, synthesizing and interpretive skills and be able to present the same in standardized and systematic academic formats.

Dissertation

Students may choose a topic related to architecture and allied subjects with emphasis on critical understanding, logical reasoning and structured writing. Students may be encouraged to select the topic which may eventually culminate in the Thesis. Students can thus utilize this as an opportunity for pre-thesis study, amounting to literature review and relevant case studies which are otherwise required for Thesis.

By the end of the semester, students are expected to submit a written paper of approximately 3500 words. Standard referencing conventions and technical writing norms must be adhered to. Students are expected to present the progress of the study at various stages of the semester. Final assessment of the students' work may be based on written Paper as well as oral communication. The process of study shall enable students to conduct in depth analysis and objective research on a topic of their interest. Students may be encouraged to select the topic which may eventually culminate in the Architectural Design Thesis in the subsequent semester.

Study in dissertation should include research questions warranting scholarly research pertaining to the identified area and explored in-depth through an extensive theoretical and methodological framework of reading and writing on extant literature - besides precise and specific areas pertaining to the chosen area of study are examined, interpreted, compared, analyzed from diverse perspectives to build an evidence-based, cogent and coherent body of analysis and answers. Typically the dissertation would be sectioned, besides the introduction to the topic, literature review of the subject area, methodology to structure the study, findings/ analysis and conclusion of the study.

Course outcome:

After successful completion of the course student Learns to

1. Systematically abstract, analyze, synthesize and interpret existing literature.
2. Develops a specialized knowledge in a subject area which maybe an extension to the prescribed coursework.
3. Builds his his/her capacity to work independently and methodically in a variety of intellectually demanding contexts.

NINTH SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 0901S	PROFESSIONAL TRAINING / INTERNSHIP	-	-	Studio	-	26
<p>The objective is to give a professional exposure to the students and an opportunity to learn in a professional environment. The student is</p> <ul style="list-style-type: none"> • Introduced to fundamental processes of designing of real buildings on real sites. • Develops confidence in interacting with various key players in building design and construction processes. • Develop an understanding of contemporary issues and techniques of building construction. 						
Professional Training						
<p>During the course of a minimum period of 16 calendar weeks (4 months or 100 working days) the students should would intern in architectural firms as a fulltime trainee. The trainee must ensure the supervising architect under whom he/she is interning is a registered architect with Council of Architecture, Delhi (for international firms prior permission and due process has to be followed) and has been practicing for a duration of minimum five years.</p> <p>The student should involve herself/himself in various aspects of work in an office like</p> <ul style="list-style-type: none"> • Designing and detailing of project along with discussion with clients, and consultants. • Office experience in respect of preparation of working drawing, detailing drawings, perspective, preparation of architectural models, study of filing systems of documents, drawings, ammonia prints, plotting and preparation of tender document. • Site experience, in respect of supervision of the construction activity, Observation, layout on site, study of the staking methods of various building, materials, taking the measurement and recording. <p>After completion of training, every student will have to submit a detailed report with a set of drawings on at least two projects on which she/he has worked during the training period.</p>						
Course outcome:						
<ol style="list-style-type: none"> 1. The student gets a real-time exposure of how architectural projects are carried out. 2. Office management and team-work to enhance the employability of the student. 						

TENTH SEMESTER

Subject Code	Subject Name	Instruction Hours		Theory / Studio / Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC - 1001S	DESIGN THESIS	-	10	Studio	10	15

Objective of the thesis project is to provide an opportunity to the students to do study and handle a project of his / her choice. It is a compilation and judgment of the knowledge gained by the student through various stages of study. It allows a student to learn intricacies of procuring a project, to be aware of probable clients, independent handling of the project and presentation of the same to a client to procure the project.

The study must be design oriented with detailed investigation, logical analysis and thoughtful synthesis to enrich the knowledge. The work may include original or compilation and analysis of the information already available in the realm of architecture but should conclude with the related architectural design proposal.

Design Thesis

Thesis is a culmination of the five-year course. It is a project chosen by the student and approved by the thesis panel. The project will include the complexities demanding site observations, understanding of regional climate, local resources, historic and socio-economic context, feasibility of project, sustainability and significance. The project will involve site visits, case studies, interviews, observations, documentation, literature studies and research methodologies to investigate and formulate program and requirement, exercises in formulation of detailed program and area statement etc., site planning digital Drawings and detailing of cluster of buildings (if large site) sustainability of design and climatic responses - passive and active.

The process of thesis project can be divided in three distinct stages:

- Stage – I Data collection, case studies, site analysis and preliminary Design
- Stage – II Pre final design
- Stage – III Final design, report and viva voce

Stage – I: Data collection, Site Analysis, Preliminary Design

Basic Data collection:

Students are required to collect data / information related to topic through literature review should include:

- Anthropogenic data such as human scale and monumental scale
- Information regarding space requirements, area calculations and standards on the related topic
- Dimension of equipment and their area requirements with dimensions of supporting facilities
- Building bye laws, land-use, FAR, ground coverage, height restrictions, setbacks and other applicable laws.

Case studies:

The candidate has to conduct two case studies. Idea of the case study is to form a base for student's own design. The projects selected for study should be similar in size and facilities as

the thesis project. The purpose of case study is for the finalization of the project requirements and understanding the functional interconnectivity of spaces. The salient points to be covered in the study as below:

- Planning, circulation and functions of the building including architect's objective and concept of design, style of architecture (if any), development of form and shape, space organization and the type of correlations between different spaces, function distribution – horizontally and vertically and their interdependency.
- Area requirements for different spaces, circulation within and outside the site and buildings, site planning, climatic and physiographic response in the building design and site planning.
- Structural system, materials for construction, non-conventional construction technology used (if any), service details and their location.
- Parking, number of parking provided (4 wheelers and 2 wheelers), adequacy or deficiency, circulation and ventilation system in case of basement parking, segregation of parking spaces and flow of vehicles on the site.
- Landscape including scheme and hierarchy of open spaces, soft and hard areas, type of plantation, furniture, light fixtures, signage, etc, used and their placement.
- Air-conditioning system including type, capacity, location, maintenance, size of machine room for centralized one, size of AHU and mode of function.
- Water supply and sanitary services including quantum of supply, overhead & underground tanks – their capacity, size and structural considerations. Layout of sewer line, manholes and inspection chambers, location of septic tank and connection with city main sewer. System for use of recycled water, if any.
- Fire protection including type, capacity and location of firefighting equipment, detector system involved and process involved for automatic / semiautomatic sprinklers, location of refuge area / fire-fighting staircase and its width.
- Electrical layout including location of transformer, DG set, metering room, HT breaker, LT / HT panels, electrical shafts, electrical rooms, MCB, etc. and their space requirements.
- Solid waste disposal system including process involved, linkage with kitchen etc.
- Security system: Type of security systems installed their space requirements, preferred locations and applications.
- Others Services such as acoustical services, lighting and illumination, vertical transportation systems, etc. depending on the nature of the project.
- Inferences drawn from the case study when compared with various standards and byelaws.

Site Analysis:

The purpose of the site analysis is to record and evaluate information on the site and its surroundings and to use this evaluation in the design response. The site analysis should identify issues that will influence the design of a development in order to make a considered response to both site opportunities and constraints. A list of important points to be considered during site analysis is as follows:

On-site Considerations includes:

- Orientation, direction, dimensions, area, shape, contours etc.
- Trees and other significant vegetation
- Buildings and any other notable features, landmarks or characteristics on the site.
- Major and Minor Roads, Access points, boundaries and easement
- On-site drainage and other services like water supply, sewage, electricity and sanitation.

- Geotechnical investigation – type of soil, bearing capacity, water table, etc.
- Off-site Considerations includes:
- The location and use of surrounding buildings
 - The surrounding road networks, connectivity and traffic movement patterns
 - The difference in levels between the site and surrounding properties
 - The built form, scale and character of surrounding and nearby development
 - Major and significant vegetation on surrounding properties
 - Nallas, streams and other water bodies nearby
 - Service layouts around the site.
 - Climatic conditions and its interpretation:
 - Basic climatic data like temperature, rainfall, humidity etc.
 - Prevailing wind direction and speed
 - Sun path diagrams, comfort zones
 - Local factors affecting the microclimate of the site
 - Solutions regarding orientation, fenestration, sunshades and other corrective measures to be needed.

Preliminary Design:

The students have to express their ideas generated on the basis of the studies conducted so far in the form of conceptual drawings, sketches and models. The emphasis during this stage should be on the basic concept explaining the principal ideas / thought process in terms of planning, built form and massing leading to the design through sketches /3D images / block models etc.

Concept / Preliminary design should include

- Site plan showing zoning of different activities (horizontal / vertical) and their interaction, location of different building blocks, along with pedestrian / vehicular movement pattern.
- Schematic floor plans for all the buildings under the scope. This may be a single line plan (with proper scale), showing layout of different activity spaces mentioning the size and their connectivity.
- Schematic elevations and sections in the same scale as plans
- Conceptual visualization of the built form in terms of sketches, views, etc.
- Block Model of the conceptual design with site.

Stage – II: Pre final design

Pre final design should include the following drawings

- **Site Plan:** Showing overall dimensions of site, major and minor roads, internal road and footpath layout with their widths, details of parking, organization of open spaces including basic landscape, building blocks with dimensions and sciography, land-use statement in the tabular form, etc.
- **All floor plans:** all floor plans including basement plan (if any) including entrances and sub entrances, nomenclature and sizes of rooms, furniture layouts, etc. ground floor plan should also include roads, landscape, organization of open spaces and area statement. Upper floor plans should include percentage of circulation area, terrace projection, lines of floor below etc. Terrace plan should include water tank with its capacity, machine rooms, staircase tower, slopes, rainwater spouts etc.
- **Structural Grid Plans:** Showing floor wise layout of all structural members with size and dimensions along with structural schedule.
- **Elevations:** As many numbers of elevations to explain all the aspects of building

- including sciography, material, texture, trees, human figures etc.
- **Sections:** As many numbers of sections to explain the scheme with at least one section passing through staircase.
- **Perspective view and Block model**

Stage – III: Final Design, Report, Model and Viva voce

Preparation of following drawings along with drawings of all previous stages with improvements.

- **Working Drawings:** Working drawing of any one important part of building such as entrance foyer, main staircase, reception, etc.
- **Construction details:** Construction details of any two elements of the building such as entrance canopy, staircase, partitions, ceilings, cladding, paneling, curtain walling, doors, windows, roof light, etc.
- **Electives:** Any two of the following
 - **Air conditioning:** Plan showing plant room, machine layout, methods for taking in and out for repairs, vertical and horizontal ducts, details of ducts and room inlet / outlet, calculations to workout load, sizes of duct etc.
 - **Electrification:** Plans showing electrical services such as substation, distribution boards, switch boards, fan lights, power points, etc. Load calculations should also be given.
 - **Sanitation and water supply (Hot and Cold):** Plans showing GT, IC, DC, piles, slopes, inverted levels and storm water drainage. Typical detail of one toilet consisting of plan, elevations, sections, specifications. Details of pipe systems and septic tanks. Main water line, suction tanks, overhead tank, rising mains and down take pipes, Total water consumption for gardening, firefighting, cleaning, washing and drinking etc.
 - **Acoustics:** Plan elevations and sections showing calculations, materials, and details of fixing etc. Determination of sound level in relation to activities.
 - **Interiors:** Furniture, fittings and finishes of any typical unit with complete drawings, specifications and properties of materials used, with constructional detail. Views and sketches showing total composition, color scheme, illumination level etc.
 - **Landscape design:** plans and sketches showing organization of open spaces. Study of trees, shrubs and flower plants, with their botanical names. Diagram showing full details such as trunk, foliage, and flowering season. Color of boom, salient features etc.
 - Other electives can be added as per the expertise available in the institution

Course outcome:

With thesis project the student is able to:

1. To use all the skills acquired in the duration of preceding academic courses.
2. Methodically self-direct effort by choosing the project of choice, builds capacity to work independently and methodically in a variety of intellectually and professionally demanding contexts.
3. Learn to make an original and individual, creative contribution to the academic discipline and/or the professional field in some cases.

Subject Code	Subject Name	Instruction Hours		Theory / Studio Lab	Weekly Contact Hours	Credits
		Lecture	Studio			
ARC -1002T	PROFESSIONAL PRACTICE	3	-	Theory	3	3
<p>The objective of the course is introduce the student to</p> <ul style="list-style-type: none"> • The architectural profession and its regulatory and statutory bodies. • Develop an understanding of legal liabilities and obligations as an architect and the importance of code of conduct and ethics in professional practice. 						
MODULE 1: Introduction to the Profession and its Ethics						
<p>Architectural Profession and the larger role of architects in society. Importance registration. Setting up an Office and management (organizational structure, required skills, infrastructure, skills, elementary accounts, tax liabilities). Architects Act 1972 (intent, objectives, provisions with regard to architectural practice). Role of the Council of Architecture and Indian Institute of Architects. Ethics, code of conduct, punitive actions.</p>						
MODULE 2: Architect's Services, Scale of Fees						
<p>Scope of work. Modes of architect's engagement with a project (comprehensive, partial and specialized services-Schedule of services). Scale of fees (Council of Architecture norms). Mode of payment, terms and conditions of engagement, letter of appointment.</p>						
MODULE 3: Tender & Contract						
<p>Definition with types and conditions of Tender. Process of tendering; Tender notice, documents, submission, scrutiny, analysis, recommendations, work order, etc. Contracts; definition, agreement, contents. Responsibility and changing role of architects in project execution in the context of new trends like BOT, BOO, DBOT, BOLT, etc.</p>						
MODULE 4: Legal Aspects						
<p>Arbitration (definition, advantages of arbitration, role of architect), sole and joint arbitrators, umpires, clauses in contract agreement (exceptions). Copyrights and patenting, Consumer Protection Act (responsibilities of an architect).</p>						
MODULE 5: Important Legislations and Current Trends						
<p>Regulations of a Master Plan. National Building Code (suitable case). Corporation rules (suitable case). Regulated and protected zones.</p>						
Course outcome:						
<p>With course completion the student is expected to :</p> <ol style="list-style-type: none"> 1. Understand his role, responsibilities and code of conduct as an architect 2. Develop an understanding of the role of professional and statutory bodies. 3. Learns how to setup and run office 						
References:						
<ul style="list-style-type: none"> • Publications of Council of Architecture-Architects (Professional conduct) Regulations; 1989. • Madhav Deobhakta, Architectural Practice in India • Architects Act; 1972. • Roshan Namavati, Professional Practice 						

9. SYLLABUS OF ELECTIVE SUBJECTS

Following are the highlights of the proposed syllabus of various Elective subjects.

About 75 elective subjects are proposed after refereeing curriculum of various institutions. Elective subjects are broadly divided in 2 categories. Theory based and studio based. Syllabus of the elective subjects is indicative of their contents and can be modified as per the availability of expertise in the department.

Syllabi of the elective subjects are as follows:

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0001S	IDEATION	3	2	Studio	5	4
Objective:						
To understand the creative process involving design research & thinking, prototyping, technology, business etc. in order to generate ideas for architecture, art and design. Students will explore the various design research skills, strategies, form, and processes.						
Contents:						
The course structure should be exercise based such that it ideally explores various formal aspects of design resolution methods, understanding of new ideas in various product designs in context to human and his habitation, environmental concerns, materiality, formal and cultural aesthetics. The following is a prescribed structure for an ideation exercise: Inspiration for design - using our senses -seeing, hearing, touching, tasting, smelling, feeling and collecting, obsessing, hoarding, re-appropriating, re-contextualizing and remixing. Research / Brainstorming - asking and listening, researching (visual, materials, user /ethnographic, systems activity, primary, scholarly), brainstorming, game-storming, ideation. Representation and Organization of information (Sketching / Mapping) - visualizing, drawing, sketching, planning & mapping techniques, grouping, clustering, comparing, contrasting, organizing and designing, reorganizing and redesigning, shaping and forming, discerning and revealing, connecting and disconnecting. Prototyping - making, building, creating, rapid prototyping, iterating, Selection and edition, breaking then repeating the whole exercise with a new strategy. Marketing / Pitching of the design idea - Storytelling, engaging, communicating, selling, etc.						
Course outcome:						
<ol style="list-style-type: none"> 1. Development of creative process of ideas, themes for understanding, of architecture, and design. 2. Initiation of space for creativity and hypothesis for conceptualization and idea formation. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0002T	DISASTER MANAGEMENT	2	2	Theory	4	3

Objective:
To create awareness about natural disasters, reasons of their occurrence and have basic knowledge of disaster management, mitigation and techniques for post disaster monitoring and design.
Contents:
Disaster its definition, types such as natural, man-made, industrial, etc., characteristics, their causes. Earthquake -Seismology, seismic waves, magnitude intensity, and epicenter and energy release, characteristics of strong earthquake ground motions, Earthquake occurrences in the world, plate tectonics, faults, earthquake hazard maps in India. Building Codes and practices - building shapes, architectural features and design of building in seismic zones. Cyclone - India cyclone profile, causes, characteristics, past occurrences, regulations and code and bye-laws. Flood - India flood profile, types, characteristics, strategies, development regulation and bye-laws for flood prone areas. Fire - Causes and precautions for fire safety in different type of building. BIS code for fire safety. Disasters Management issues, mitigation through capacity building, legislative responsibilities of disaster management, disaster mapping, assessment, pre-disaster risk and vulnerability reduction, post disaster recovery and rehabilitation. Case Studies to understand disasters National as well as International disasters occurred in past and their inferences. Understanding of Disaster management, mitigation and preparedness; techniques along with brief report.
Course outcome:
<ol style="list-style-type: none"> 1. Development of understanding of various types of occurrence of disaster and their mitigation through design interventions. 2. To develop understanding of post disaster recovery and rehabilitation.
References:
<ul style="list-style-type: none"> • S.C. Sharma, Disaster Management

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0003T	CULTURAL EXPRESSIONS IN ARCHITECTURE	2	2	Theory	4	3
Objective:						
Appreciate and understand architecture as manifestation of a broader cultural and intellectual milieu to which it belongs and evolves from. To understand the social, economic, and political underpinnings of works of architecture. To able to relate architecture with the epochal events, movements, social mores etc. of history.						
Contents:						
An introduction to how culture is expressed in arts, crafts and architecture with suitable example such as belief and notions of universe (cosmos) and ideal man during Vedic times was codified into VastuShastra system which developed the principles of city planning, buildings siting and orientation, spatial layout etc. A historical overview of various cultural developments such as philosophy, schools of thoughts, social norms, beliefs, propaganda, etc. and how cultural development influenced the distinctive evolution of building styles, motifs, scale, monumentality, symbolism, of works of architecture through suitable examples. Examples can be two different schools of thought in Buddhism such as Hinayana and Mahayana giving rise to two distinct architecture forms in terms of their styles, motifs, spatial planning etc. Similarly Church used as an instrument to spread particular beliefs, propaganda etc. during different times - theological and political underpinnings of Gothic style, revival of classicism to counter Protestant Christianity, etc. Development of Indo – Saracenic style as a political move to						

integrate with the Indian society by British, etc. An overview of modern art movements and their philosophical motivations such as Cubism, futurism, Constructivism, Postmodernism, De-constructivism, Arts & crafts movement, etc. with suitable examples.

Course outcome:

1. To develop understanding of cultural expression in architecture as resultant of socio-economic and political roots of society.
2. Appreciation of various art movements resulting into manifestations of architectural forms.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0004S	PRODUCT DESIGN	3	2	Studio	5	4
Objective:						
To develop an understanding the methods and techniques involved in furniture and product design with focus on integration of the marketing, design, and manufacturing process and awareness of tools and methods for product design and ability to coordinate multiple, interdisciplinary tasks in order to achieve a common objective.						
Contents:						
A brief introduction to product designing and its various elements. History of product design, role of product designers. Introduction to applied anthropometry, human activities, their nature and application of human factors data. Understanding of product development cycle and phases. Information input and processing. To understand the visual display, process of seeing, visual discrimination, quantitative and qualitative visual display, Alphanumeric and related displays, Visual codes and symbols. To understand form, color, symbols, user specific criteria, material, technology, recyclability and packaging. Multiple utility oriented approach to product design. Design of household elements kitchen racks, cabinets, furniture like chairs/computer table, etc. To design industrial products- watch, automobile headlights etc.						
Course outcome:						
1. Ability to comprehend human dimensions and body movement to arrive at a usable product.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0005T	VERNACULAR ARCHITECTURE	2	2	Theory	4	3
Objective:						
To understand vernacular architecture as diverse from other historical & contemporary styles of architecture to understand that it is site responsive and an outcome of native techniques and various social, economic and mythical values of the society.						
Contents:						
An overview of the various theories related to Vernacular architecture, the background and need for a vernacular approach. An overview of important pioneers such as Hasan Fathy, Geoffrey Bawa, Laurie Baker etc. The determining factors of vernacular architecture - social,						

cultural, geographical, climatic, material, economic, symbolic, construction technology. Evolution of settlement and building typologies with changes in the above mentioned factors by referring suitable cases such as temples and houses from various part of India like north to south and east to west. Study of religious practices, beliefs, culture & rituals influencing the building typologies and spatial layout in a community. Case studies of vernacular settlements / building typology from various regions in India like in Kerala Nair houses (Tarawads) and Muslim houses (Mappilah), in Tamil Nadu Toda Huts and Chettinad Houses, in Karnataka – Gutthu houses (land owning community) and Kodava ancestral home (Aynmane), in Andhra Pradesh Kaccha buildings, in Rajasthan Havelis, mohallas and chowtries and Bhungas (Circular Huts) and Havelis (Pukka houses), Pol houses of Ahmedabad, Primitive forms, Symbolism, Color, Folk art etc. in the architecture of the deserts of Kutch & Gujarat state, Kashmir Ladakh houses, Himachal Pradesh Kinnaur houses, Bengal AatChala houses, Nagaland Naga houses and Vernacular architecture of Goa, Uttar Pradesh, etc.

Course outcome:

1. Development of significant contribution of vernacular architecture of place in fabric of that city or region.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0006T	ADVANCED THEORY OF DESIGN	2	2	Theory	4	3
Objective:						
To impart knowledge about the various theories in design and to understand the various design processes and practices that have developed and apply in the process of architectural design.						
Contents:						
Understanding of design, nature of good design and evaluation of design, types of design classifications, role of designer. Historical overview of theories of design, design as a profession. Design process, stages in the design process, different considerations, and different ideas of design methodology. Different approaches to design, problem solving or intuitive, formulation of problems, nature of creative design problems, goals in design. Understand creativity, imagination, etc. Theories on thinking such as convergent and divergent thinking, lateral and vertical thinking, creative techniques like checklists, brainstorming, syntactic, etc. Design puzzles and traps, blocks in creative thinking. Various approaches to generate ideas for architectural design like types of concepts, personal philosophies and strategies of design, channels that encourage creativity in architecture.						
Course outcome:						
1. Development of understanding of various theories of design and formulation of approaches to generate conceptualization of ideas and creativity in architecture.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE -	EARTHQUAKE RESISTANT	3	2	Studio	5	4

0007S	ARCHITECTURE					
Objective:						
To make students have basic knowledge of seismic forces and the safety aspects for earthquake prone areas and considerations for building design.						
Contents:						
Introduction to seismology - Historical experiences, earthquake occurrence in the world, plate tectonics, faults, earthquake hazard maps of India & and the world. How earthquakes are caused - seismic waves, magnitude, intensity, epicenter and energy release, characteristics of strong earthquake ground motions. Impact of Earthquake - on ground, soil rupture, liquefaction, landslides and social & economic consequences. Study of behaviors of various types of buildings, lifelines and collapse patterns at earthquake (torsion, appendages, staircases, adjacency, pounding). Study behavior of structural (column, beam, slabs, foundation) and Non-structural elements (infill walls, fixtures, mountings, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, services) along with an overview of behavior with soil stabilization, retaining walls, under-ground and overhead tanks, staircases and isolation of structures. Introduction to responsive seismic design principles - site selection, site development, building forms, building configuration in plan & vertical irregularities horizontal & vertical eccentricities, mass and stiffness distribution, soft storey, long-column short-column effects, redundancy & setbacks. Traditional practices - merits and demerits of traditional regional building techniques. Building Codes - IS Code provisions for the buildings:- IS:1893-2002, IS:4326-1993(horizontal & vertical seismic coefficients, valuation of base shear, distribution of shear forces in multi-storey building), Seismic detailing of masonry buildings (IS:4326), Seismic designs & detailing of RC & steel buildings (IS: 1893 - 2002; IS: 13920 - 1993; IS: 456 - 2000; IS:800 – 2004). Special reinforcement and connection details in structural drawings.						
Course outcome:						
1. To develop matured approach in architectural design and form to resist earthquake forces and development of earthquake resistant building stock in urban habitat.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0008T	GREEN BUILDINGS	2	2	Theory	4	3
Objective:						
To create awareness for the conservation of energy consumption and basic knowledge of creating environment friendly and energy-efficient architecture.						
Contents:						
The need for green buildings, the application of passive and active use of renewable energy, materials and waste through the sustainability concepts. Introduction to water consumption and conservation, rainwater-harvesting techniques and waste water treatment methods such as physical, chemical and biological methods like <i>root zone</i> treatment, etc. Passive Heating techniques - general principles, direct gain systems, glazed walls, bay windows, attached sun spaces etc. indirect gain systems such as trombe wall, water wall, solar chimney, transwall, roof pond, etc. and Isolated gain systems such as Natural convective loop etc. Active Heating Systems - solar water heating systems etc. Relevant case studies on buildings designed with passive and active heating techniques. Passive Cooling Techniques -general principles, evaporative cooling, nocturnal radiation cooling, passive cooling, induced ventilation, earth sheltering, berming, wind towers, earth air tunnels, curved roofs & air vents, insulation, etc. Active Cooling Techniques - Air coolers. Case studies on buildings designed with passive cooling						

techniques. Study use of environment friendly materials, embodied energy of materials, bio-degradable materials, recycling and reuse of steel, aluminum and glass; innovative materials like phase changing materials, light sensitive glass, etc. Solar energy -BIPV, solar powered street elements. Green building methods and techniques - vertical landscape, green wall, green roof. orientation to sun and wind land form & orientation, vegetation & pattern, water bodies, open space & built form, plan form & elements, roof form, fenestration pattern & configuration with relevant cases (eg. CII buildings). Green buildings rating system such as LEED, GRIHA, BREEAM, CASBEE.

Course outcome:

1. Development of energy conscious architectural design, strategies and built forms.
2. Futuristic vision of urban habitat.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0009S	URBAN HOUSING	3	2	Studio	5	4
Objective:						
To create awareness about the causes of housing problems and to Understand the various issues involved in urban housing and have a knowledge about the planning and design solutions for low income groups.						
Contents:						
Understanding of the types of housing standards, spatial standards, safety standards, standards for amenities. Housing demand and need. Social factors influencing housing design – identity, safety, convenience, access, amenities etc. Economic factors - affordability and its relationship to house income, incremental housing concept, slum upgrading and sites and services schemes, prefabrication techniques for housing (modular house, panelized and precast homes). Emergence of sustainable housing practices (zero energy home, eco-friendly home, green homes). Policy and guideline agencies for housing – HUDCO, TERI, GRIHA. Types of Housing - traditional housing, row housing, cluster housing, apartments and high-rise housing, service apartments, gated community, government housing. HUDCO financed project for economically weaker section. Study various stages and tasks in project development like feasibility study, detailed study. Understand National Housing policy of 2007, Housing agencies, housing resources, role of banks in housing finance. Study methodology of formulating standards, UDPFI guide lines, standard and regulations, DCR performance standards for housing, TCPO, new norms and amenities for housing.						
Course outcome:						
1. Conscious and rational approach for urban housing. Need assessment of targeted housing stock in urban areas and strategies for alternative housing typologies in development of urban areas.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0010S	SET DESIGN	3	2	Studio	5	4
Objective:						
To introduce and provide exposure about the design potential in set design To inculcate the						

ability to translate the requirements of the script to physical demonstration according to the traditions followed in the theatre, television and cinema industry.

Contents:

Course outcome:

1. To be able to apply principles of visual composition and spatial placement of objects to arrive at need based thematic set proposals.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0011T	ENVIRONMENTAL PLANNING	2	2	Theory	4	3
Objective:						
To understand the impact of man's activities on the environment & knowledge about the methods to ameliorate the negative impacts and to have knowledge of the methods of impact assessments on the environment, the legislations and mitigation methods.						
Contents:						
Understanding of the Man, biosphere, ecosystems, resource identification and its implications for development -soil, water, land, plants, animals, renewable energy and nonrenewable energy. Preparation and analysis of resource inventories of energy. Methodologies and techniques of environmental impact assessment. Significance of law and its relationship to urban development, evolution of planning legislation. National environmental policy. Essence of good planning, integration of environmental assessment and planning options, Priorities and strategies for development on urban, coastal and hilly ecosystems. Cost benefits analysis, planning balance sheet and goal achievement matrix.						
Course outcome:						
<ol style="list-style-type: none"> 1. Understanding of ecological concerns in society. 2. Development of environmental assessment approach and its application for environmental conscious solutions. 						
References:						
<ul style="list-style-type: none"> • S.C. Sharma, Environmental Engineering 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0012T	ADVANCED STRUCTURAL SYSTEMS	2	2	Theory	4	3
Objective:						
To introduce the basic concepts of pre-stressing, conceptual approach to design of pile foundations and tall structural systems, shells and folded plates and tensile structure for the large span constructions.						
Contents:						
Understanding of Soil Exploration. Study of types of pile foundation and its construction techniques, design of end bearing piles, design of under-reamed pile foundation for apartment buildings as per National Building Code. Introduction to pre-stressed concrete materials, methods of pre-stressing, comparison between RCC and pre stressed concrete. Understanding tall buildings structural systems, rigid frames, braced frames, shear wall. Wall frame buildings,						

tubular buildings, tube-in tube buildings, outrigger braced system with outline of their behavior and their applicability for various heights. Understand Shells types. Folded plates types, Comparison with shells applicability. Understand arches types, and analysis of three hinged arches. Definitions of single, double & multilayered grids – two way & three way space grids, connectors, domes and its various forms, geodesic domes, suspended-cable structures, types of cable network systems, shapes of cable suspended systems, examples of tensile membrane structures, types of pneumatic structures.						
Course outcome:						
1. Conceptualization of large span constructions.						
ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0013T	INDUSTRIAL BUILDING SYSTEMS	2	2	Theory	4	3
Objective:						
To have basic knowledge about the necessity and techniques of pre-fabricated building components used for construction, exposure to various types of pre-fabricated systems and to recognize the importance of modular coordination in industrialized building systems.						
Contents:						
Introduction to Feasibility of using industrial building system in different types of buildings, manufacturing of building components. Technology requirements for industrial building system and use of industrial building system as an alternative for disaster mitigation. Understand concept and definition of Modular dimensional discipline. Understand advantages and limitations of modular principle; components of residential buildings and precast elements. Understand purpose and need for off-site, on site prefabrication elements and construction joints with architectural and technical limitations. Introduction to the equipment used, manufacturing processes, transportation of components assembly and finishing Structural, social and economic issues related to industrial building system.						
Course outcome:						
1. Conceptualization of large span constructions.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0014T	SERVICES IN TALL BUILDINGS	2	2	Theory	4	3
Objective:						
To have knowledge about the special service requirements of tall buildings and to introduce the present systems, equipment and materials that are commonly employed in high rise buildings.						
Contents:						
Introduction to the various special services required in tall buildings. Introduction to passenger elevator, local elevators, sky lobbies etc. Study of elevator equipment, control systems and spatial requirements, escalators and capsule elevators stairways & amp; ramps. Understanding the Designing for fire safety with NBC code for high-rise buildings - fire alarm systems, smoke detectors, firefighting support systems, fire rating of materials, fire escape stairs & r amp and other safety regulations such as lightning protection, earthing, etc. Basic planning for water supply - calculation of capacity for sumps and water tanks, skip stage pumping etc., rainwater harvesting methods, sanitation arrangements in high rise structures, service floors, ducts and						

vertical shafts, waste treatment etc. Planning transformer & amp, generator rooms, etc. Preparation of electrical layouts for tall buildings like spatial requirements of electrical rooms, ducts, etc. Introduction to intelligent systems for electrical and illumination. Calculation for heating and cooling loads. Selection of suitable HVAC system, special equipment and systems for heating and cooling, spatial requirements for HVAC plants design of duct layouts etc.

Course outcome:

1. Conceptualization of large span constructions.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0015S	SUSTAINABLE BUILDING DESIGN	3	2	Studio	5	4
Objective:						
To introduce the students to the theoretical and practical aspects of sustainable design and the various technologies involved in executing them. To familiarize the student with some of the acclaimed sustainable buildings with various tools, design methodology, resource optimization and innovative approaches to eco-design within the past decade.						
Contents:						
Introduction to sustainable design strategies and approaches - sustainable design innovation, trans-disciplinary collaboration in design, life cycle design and life cycle assessment, Understanding the various sustainable approaches to Land use planning, smart growth and urban design, transportation policy and design, environmental site design; site assessment and selection; brown-field redevelopment strategies and infill development, eco-design, socially responsible design. Case studies of projects with renewable and alternative energy, best practices with respect to green building materials, energy & water conservation, and creating safe, healthy indoor and outdoor environments.						
Course outcome:						
1. Conceptualization of large span constructions.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0016S	FURNITURE DESIGN	3	2	Studio	5	4
Objective:						
To understand fundamental aspects and cultural considerations of Furniture Design from Ancient to modern times.						
Contents:						
Introduction to Furniture Design styles- antique, traditional, modern, contemporary, classical etc. Study of Furniture Design Style to exemplify the method to understand the art form and appreciate them in the context of culture, Understand ergonomics and human anthropometrics. Current trends in furniture design. Types of furniture like built-in (cabinetry etc.), modular, manufactured, custom-made for seating, storage, sleeping, street furniture and office furniture. Study of materials in furniture – timber, plywood, bent wood, bamboo/cane, metal, plastics, polyurethane and glass. Upholstery materials – leather, natural and synthetic fabrics. Study type of finishes like laminate, veneer, lacquer, varnish, stains, polish and						

adhesives. Understanding selection of furniture, cost and longevity. Study of technology, wood joinery, sections, framework, detailing. Design furniture using found object. Design project like furniture layout, relationship to context and design of furniture.

Course outcome:

1. Use of furniture to reinforce interiors and to develop additive interest among students.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0017S	ADVANCED BUILDING CONSTRUCTION AND TECHNOLOGY	3	2	Studio	5	4
Objective:						
To enhance technical skills in the field of construction technology through an understanding of specialized applications and processes						
Contents:						
Advanced materials in construction -tensile fabrics, metal lattice structures, special structural envelopes, smart materials, etc. Concepts behind pre-stressed, post-tensioned concrete, pre-cast concrete structures. Study of large span structures, multi-storeyed buildings, marine structures, special application steel structures, special technologies such as tunneling. Material handling equipment and machinery management, transit mixers, ready mix concrete systems, guniting equipment, cranes, hoists, concrete mixers, choice of equipment for different kinds of works. Study Rehabilitation of old buildings, retrofitting of structures, strengthening of structures. Construction planning, scheduling and control, inventory management, quality control, safety management, introduction to construction project management. National Building Code references. Environmental issues in construction, disaster management technologies, emergency structures, cost reduction technologies for mass construction.						
Course outcome:						
1. Development of construction technology and innovative techniques as tools to address demand to mass construction.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0018S	MODULAR COORDINATION	3	2	Studio	5	4
Objective:						
To equip the students with tools for basic research, development and real life applications of dimensional and functional coordination of modular systems.						
Contents:						
An introduction to conventional modular principles and practices in the West in the early, medieval, industrial and post-industrial phases - additional input on the vernacular theories of modular principles in India, modules in nature. Study of modular components in civil construction through an understanding of various components, relationship between the analytical methods of building technologies and the synthetic process of architectural design. Modules in interior design, space utilization in an interior envelope, modular applications in commercial spaces, furniture design, relationship between utility zones and circulation. Study						

Modular philosophy in electrical systems, air-conditioning, electronic systems, industrial products and applications. Study Industry examples in modular coordination –prefabrication, production systems, etc.
Course outcome:
1. To develop understanding of modular coordination approach to design and construction of built form.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0019S	REMOTE SENSING AND GIS	3	2	Studio	5	4
Objective:						
To introduce application of remote sensing and GIS for object identification, identification of land use and base map preparation.						
Contents:						
Study of GIS platform and sensors. Basic principal of GIS. Methods of photo interpretation and techniques of data collection through satellite data. Classification techniques using satellite data, Digital image processing, enhancement techniques in urban information extraction. Aerial photography as a tool for collection of data and preparation of maps, its application in planning and preparation for a project, orientation concept and methodology transformation and adjustment techniques. Experiments in lab, Instruction for making overlays, computation of photo scale, orientation of a stereo pair under a mirror stereoscope. Recognition on aerial photograph of objects indicated on ground photographs. Detection, identification and description of defined objects. Use of auxiliary features for object identification. Systematic scanning of a photograph, and object identification. Identification of land use with a given classification. Monitoring urban changes and Mosaic preparation. Base map preparation, elementary data analysis using satellite data. Experiments in lab and instruction for making overlays. Study Classification, interpretation and delineation of various land use on satellite data. Study GIS techniques and their application in planning field.						
Course outcome:						
1. Usage of remote sensing and GIS as analytical tool for study of urban area and land use identification and forecast.						
Suggested readings:						
<ul style="list-style-type: none"> P.K. Garg, Principles and Theory of Geoinformatics (ISBN: 978-93-86173-706) 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0020S	ARCHITECTURAL JOURNALISM	3	2	Studio	5	4
Objective:						
To introduce the skills relevant to the professional journalism and enhance writing skills and architectural critique.						
Contents:						
Study of journalism – nature, objectives, scope with emphasis on architectural journalism,						

research, reporting, writing, editing, photography, columnists, public relationships and criticism. To understand issues such as copyright, public art policy, the arts and urban redevelopment. Photojournalism and the contributions of photography to the professional practice of architecture. Introduction to software needed in journalism and photography, video coverage. Understanding the individual demands in the context of newspapers, radio, film, and television. Documentation of environment, social change, persuasion including interviewing techniques, argument and debate technique in the investigation of social problems. Evidence, proof, refutation, persuasion and training in argumentative speaking. Regional, national and international discussion forums. Changes in contemporary and historical design practices. Discussions on topics needed in an architectural journal and current issues - types of journals, works of key architectural journalists, public discourse on the internet, mass media and public opinion – critique on selected pieces of journalism. Role of the editor, editing of articles, features and other stories, editing for online newspaper and magazines, text preparation, mode of presentation, standards and guidelines for documentation, code of ethics, basic knowledge on press laws, Press Council of India, multimedia/online journalism and digital developments.

Course outcome:

1. Usage of skills of journalism to enhance documentation, analytical ability and develop effective architectural critique and specialized career option.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0021T	CONTEMPORARY BUILDING MATERIALS	2	2	Theory	4	3
Objective:						
To introduce and to know the categories of new materials currently used in any building site and also the modern products used in architecture, building and finishing like eco – friendly, composite, durable, advanced, smart.						
Contents:						
Study the needs ultra-performance materials in building design as a substitute for special performance, thermal/sound/moisture protection, fitting, equipment and furnishing. The properties of the contemporary materials (multidimensional, repurposed, recombinant, intelligent, interfacial, etc.). The types of advanced concrete - bendable concrete, light transmitting concrete, translucent concrete, pervious concrete, eco-cement etc. and types of reinforcement materials, properties and performance in concrete reinforcement. Aramid fibers, bio-steel, Carbon / Graphite Fibers and fiber-glass etc. Types, terminology and classification of composite of materials such as particle reinforced, fiber reinforced and structural boards. Use of composite materials namely Polymer Matrix Composites (PMCs), Fiber Reinforced Polymers (FRPs) along with cement, steel, aluminum, wood, glass for thermal insulation, fire protection, coating and painting and structural monitoring etc. Introduction to types of Nano-materials such as carbon nano tubes etc. their properties, performance and application. Nano composite used with cement, steel, wood, glass, for thermal insulation, fire protection, coating and painting and structural monitoring etc. Tensile fabric structure by digital printing (translucent fabric, thin-film photo voltaics, texlon foil, PVC (poly vinyl chloride) coated polyester cloth and PTFE (poly tetra fluoroethylene), etc.						
Course outcome:						
1. Building awareness for application of innovative building materials for appropriate purpose and performance to have efficient buildings.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0022S	DIGITAL ART	3	2	Studio	5	4
Objective:						
To introduce video, image and vector editing using editing software. Enable students the creation of interactive patterns by introducing scripting, synchronization of sound with patterns generated and presentation using voice over.						
Contents:						
Experimenting with sequencing, cutting trimming, speed manipulation of movie, filters, transitions, output settings, saving the output with the help of video editing software. Image editing, text formatting, color overlays, etc. Importing files using standard and linking options. Using scripts and behaviors, understanding stage, cast and time line, using cast library. Exercise to import movie file in the editing software and overlap 2D animation film creation. Synchronize the sound and create a perfect blend of AVI and 2D Animation film.						
Course outcome:						
1. Development of multimedia communication skills.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0023T	ENTREPRENEURSHIP SKILLS FOR ARCHITECTS	2	2	Theory	4	3
Objective:						
To introduce set up for business as an architect, to develop the creative and leadership skills for the same and to develop the confidence and skills in preparing business plans and to propose and sell ideas to potential clients and investors.						
Contents:						
Introduction to leadership skills, creativity, self-motivation, administration, time management, marketing, finance management, people skills and starting a business. Understanding of future-oriented decision-making principles to increase the organization's innovative and competitive qualities, re-definition of problems, user experience, rapid prototyping, multidisciplinary entrepreneurship skills, and risk-taking financial, social and environmental risks. Understanding of job procurement, cash flow, costing, risk assessment and employee management. Study of branding, use of social media, and advertising, public-speaking, and human resource management. Study of industry organizations – private, government, NGO's. Design and make presentations on a strategic business model for a design and innovation challenge in the context of the current design and social situation. Design and develop business plans and to propose ideas to potential clients and investors.						
Course outcome:						
1. To make an effort to develop personality of the individual as a pragmatic and forceful professional.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			

ARE - 0024T	GLASS ARCHITECTURE AND DESIGN	2	2	Theory	4	3
Objective:						
To provide the students with the latest & recent trends in architecture and to understand the selection and usage of glass for appropriate purposes and for improving the building performance using glass.						
Contents:						
Study evolution & importance of glass in modern architecture - applications of glass in buildings (facade / interior applications). Understand the production and properties of glass, value additions such as coating technology its importance and necessity. Processing - concepts on tempering, heat strengthening, laminated, ceramic fritting. Different types of glass - mirror, lacquered, fire-resistant and modern glass with different applications. Glass for segments such as hospitals, green homes, airports, offices and other buildings. Understanding glass & human safety compliances, fire-safety considerations. Role of glass in Acoustics. Study theory of electromagnetic radiation, internal & external reflections, day-lighting in buildings. Introduction and basic concepts on solar control and thermal Insulation (SF, UV, SHGC). Need for Green Buildings – energy-efficient buildings, benefits of going green, achieving energy-efficiency using glass. Performance parameters (Energy codes and Green ratings- ECBC, IGBC, GRIHA. Case study Green Building Designed predominantly with energy efficient materials. Calculations involving basic factors in Glass Design, Optimization of Glass for wastage reduction and standardization of design.						
Course outcome:						
1. Application of glass as a versatile material for appropriate use and improved building performance in outdoors as well as indoors.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0025T	REAL ESTATE DEVELOPMENT	2	2	Theory	4	3
Objective:						
To understand land as a scarce and valuable resource, exposure to real-estate development process and awareness of the various instruments available to develop a property.						
Contents:						
Study of fundamental concepts of real estate development process, real-estate properties, developers, and the role of other professions. Modeling sequential events in real estate development process - site evaluation, land procurement, development team assembly and market study. Study of basis of cash flow, basic calculations for time value of money in real estate, calculation for direct capitalization, calculations for discounted cash flow, mortgage basics (mortgage calculations and decisions). Process of identification of a project, getting the financing - sources of commercial equity and debt, social and community desirability – how it will work, financial feasibility, approval procedures, the entitlement process, collaborating, public-private partnerships and the expanding role of local governments. Understanding aspects like finalizing a deal, legal commitments and obligations, construction, work management, and making it worthwhile creating value. Various types of real-estate properties such as multi-family, student housing, affordable housing, senior housing, mixed use, transport oriented development, smart growth, brown field development, etc., In house sales promotion, franchisee system, joint venture and sharing issues, procedure and laws relating to transfer of completed project.						
Course outcome:						

1. Broadening of knowledge base and pragmatic understanding of real estate properties and process of urban development.
2. Exposure to market forces and real life situation to become to become competitive in profession.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0026T	STEEL ARCHITECTURE AND DESIGN	2	2	Theory	4	3
Objective:						
To introduce the design potential of steel as an important material in modern construction and familiarize the students with the structural merits and limitations of steel.						
Contents:						
Study of materiality of steel, structural properties of steel, advantages of steel in construction. Overview of history of metal in construction and technological development from iron to steel, study industrialization and mass fabrication of steel. Various industry-manufacture steel- hollow structural sections, hot rolled steel shapes, various hollow structural sections. Understanding of various typologies of high tech movement – extruded, grid/bay, arched / curved structures, tensile. Comparison of diagrid structures with standard-frame structures. Study of curved steel – creating curves in steel buildings, limitations in curving steels. Study of evolution of AESS (architecturally exposed structural steel) through high-tech movement, its connection types (bolted, welded and cast connections), member types (tubular and standard sections). Various steel frame designs, basic connection strategies, basic understanding of steel floor systems, truss systems and braced systems. Introduction to steel as a sustainable material - recycled, reuse, adaptive reuse of steel and glazing systems, support systems for glazing. Study of technical aspects of combining steel with glass, various steel and glass envelope systems (curtain wall system, wind braced support systems, spider steel connections with structural glass, simple and complex cable systems, handling curves and lattice shell construction). Study of advanced framing system, low carbon design strategies, transformations of architectural design into fabricated elements, use of steel in temporary/ exhibit buildings. Need for corrosion and fire protection, various finishes and coating systems of steel. Detailed study corrosion protection and fire protection systems.						
Course outcome:						
<ol style="list-style-type: none"> 1. To develop the application of steel as structural material and its use in buildings of simple and complex nature. 2. Understanding of advance applications of steel in buildings. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0027T	HUMAN RIGHTS	2	2	Theory	4	3
Objective:						
To create awareness about universal values of human rights and to have an understanding of various social movements, laws, legal channels as well as individual and collective roles in modern society etc.						
Contents:						

Introduction to human rights - meaning, origin, nature, scope and development. Theories pertaining to human rights – liberal, Marxist, social theories and classification of rights such as natural, moral and legal rights, civil and political rights, economic, social, religious and cultural rights. Overview of events such as Magna Carta – Geneva Convention of 1864, Universal Declaration of Human Rights of 1948. Human Rights in India Constitutional Provisions / Guarantees and Statutory bodies such as National Human Rights Commission (NHRC), State Human Rights Commission (SHRC), National Commission for Women (NCW), National Commission for Minorities (NCM), etc. Human rights movements for disadvantaged people. Various international human rights agencies and watch dogs– various UN agencies for monitoring and compliance, Amnesty bodies, etc. Role of Constitution, judiciary, NGOs, media, educational institutions, and others in India.

Course outcome:

1. Sensitivity towards all humans without any prejudice.
2. Understanding role of institutions in universal implementation of human rights.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0028S	PAINTING	3	2	Studio	5	4
Objective:						
To introduce students to painting as a primary medium for artistic expression, develop ability to verbalize ideas and processes in art making and develop an understanding of history, major styles and contemporary issues in painting.						
Contents:						
Color Theory - Color wheel (primary/secondary, complementary), transparency/opacity, hue, value (intensity, brightness), chroma (saturation, purity), temperature (warm/cold) and color contrast. Attributes; interaction, harmony, psychology/mood, culture & expression and color schemes such as monochromatic, analogous & complementary. Composition; bounded composition, out-of-frame composition, space, movement, balance, asymmetry, rhythm, shapes, proportion & lighting. Media Characteristics & Surfaces; acrylic and oil, paper; wood & canvas (primed/unprimed). Painting techniques - brush strokes and textures. Introduction to various artistic styles and traditions – personal style, regional style, period style, etc. in Indian context. Genres of Painting – portraits, religious, landscape, still life, abstract, etc. Overview of historical and modern art movements and works of famous artists of India and abroad.						
Course outcome:						
1. Developing paintings as a medium of artistic expression and infusion of painting art in architecture.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0028S	GRAPHIC DESIGN	3	2	Studio	5	4
Objective:						
To understand various aspects of design in graphics. Understand presentation skills, logos and ad making with Computer graphics.						

Contents:
Study fundamentals of graphic design, history, career options, works of prominent designers & the graphic design process. Study overview of design basics color, harmony, rhythm, balance, proportion, etc. Study visual perception & graphical thinking. Study of tools of graphic expression. Study of styles of expression, developing manual presentation skills. Computer graphics. Study overview of current packages, their potentials & applications such as 3DStudio Max, adobe series, Corel draw, flash etc. Study printing, lettering & typography. Exercises on design of books, posters, promotional materials, stationery, trade marks & corporate logos. Evolve comprehensive corporate identity program Developing environmental graphics / signage Brand promotion, packaging design & ad making for both the print & electronic media.
Course outcome:
1. Develop use of graphics as tool of presentation and 3D visualization in architectural works.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0030T	EKISTICS	2	2	Theory	4	3
Objective:						
To develop an understanding of evolution of settlement planning, to study role and contribution of the planners towards contemporary town planning.						
Contents:						
Study of meaning and scope in relation to town planning and architecture. Study of evolution of settlement patterns and their principles from early to modern periods of history; Study of changing form and pattern of human settlements in ancient, medieval, colonial and modern India. Role and contribution of the pioneers towards contemporary town planning thought - Patrick Geddes, Patric Abercrombie, Daniel Burnham, Soria Y Mata, Frederick Olmstead, Ebenezer Howard, Clarence Perry, Clearance stein, CA Doxiadis, Le Corbusier, Frank Lloyd Wright. Introduction to urbanization, globalization and its impact on cities, SEZs, emergence of new forms of developments, self-sustained communities, transit development and integrated townships. Scope and Content of Master plan, planning area, land use plan and Zoning regulations, Study need of zonal plan linkage to master plan and land use plan, planned unit development (PUD), applicability and development regulations. Definition and explanation of the concepts of density, FAR, land use and zoning. Study urban renewal plan, redevelopment, rehabilitation and conservation. Study of emergence of the metropolitan phenomenon; planning problems of cities and solutions, rural –urban dynamics, rural and regional systems. Case studies of projects like JNNURM, RAY, etc.						
Course outcome:						
1. Distinct understanding of regulated urban development in cities.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0031T	HILL ARCHITECTURE	2	2	Theory	4	3
Objective:						

To impart a comprehensive knowledge of architecture suited for hilly regions and to develop an understanding of historical and environmental responsiveness for building up on the hills.

Contents:

Study of historical perspective of hill architecture and its unique attributes and concerns. Study of unique topographical, ecological and hydrological features of hilly regions with suitable examples. Study major hill settlements in various regions of the world (settlements of Nagaland, Arunachal Pradesh and other North-eastern region of India) Understand traditional hill architecture of India, medieval European settlements and other places. Study Constraints of climate, topography and availability of materials. Case study of vernacular hill architecture of Himachal Pradesh like building types, techniques and materials. Design factors such as access, circulation, gradients, slope analysis, grading and interpolation of contours. Study of structural aspects, environmental and ecological aspects of modern buildings and necessary safeguards at hills.

Course outcome:

1. Inclusive understanding of development of hilly areas and associated environmental and ecological impact of such development.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0032T	RESEARCH METHODOLOGY	2	2	Theory	4	3
Objective:						
To appreciate the process of research and make the students aware of its potential in the field of architecture.						
Contents:						
Study research in architecture nature, purpose and scope. Study Basic and applied research. Technical and behavioral of oriented research. Science and scientific method – various steps in scientific method: hypothesis, research design, data collection & analysis, conclusion and implications with special reference to architectural research. Study methods of conducting research, Selection of topics and its relevance, Identification and formulation of problem. Compiling and analyzing existing research database. Research design, research instruments, analysis and presentation of results. Study evaluation of findings, conclusions and recommendations. Understand techniques of research – report writing.						
Course outcome:						
1. Research process as effective tool of study, formulation of idea, data collection, analysis, synthesis and conclusion culminating into report writing as documented academic resource.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0033T	BUILDING MAINTENANCE	2	2	Theory	4	3
Objective:						
To understand building types and their maintenance needs and a basic knowledge of standard practices, to develop an understanding of maintenance as a substantial contribution towards						

adequacy of design and suitability of materials.
Contents:
Need and importance of building maintenance, its economic and social significance. Categories of maintenance -planned maintenance, preventive maintenance, running care-taker maintenance, CPWD/state PWD pattern of maintenance. Maintenance Generators - climatic conditions; usages, defects in original design/construction, changing standards and tastes. Study of organization of maintenance- managing maintenance, financing & budgeting for maintenance, etc. Understanding of technology and techniques involved in building maintenance. Introduction to execution of maintenance work, controlling costs, information systems in maintenance. Inspections - annual, periodical, special, checklist and proformas. Creating database for maintenance, maintaining building registers, inventories, inspection reports, records, user complaints. Understanding building defects & ailments, examining symptoms of various types and patterns of buildings disease and ailments, structural, non-structural finishes, stains, services ailments, leakages & dampness, corrosion protection, sulphate attacks. Diagnosing & determining causes, prescribing effective remedial action.
Course outcome:
1. Developing concept of maintenance as continuous phenomena and preventive approach for longevity of buildings.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0034T	INTELLIGENT BUILDINGS	2	2	Theory	4	3
Objective:						
To understand intelligent building systems and its relevance in modern times and to develop an understanding of automated buildings systems and sensors.						
Contents:						
Study origins and characteristics of the Intelligent buildings Concept with brief history and contemporary concepts. Study of automated buildings, responsive buildings. Introduction to facility management. Study of management of facilities, planning and operational techniques in various models of building intelligence. Study development of various control systems, computer-integrated building (from single function systems to integrated solutions). Use building intelligence in energy management. Case study of intelligent building systems in India with issues related to site, shell, skin, services and technology, intelligent design and construction, effective space utilization, expectations of user, effective communication of architectural concepts to user, locating people and information						
Course outcome:						
1. Understanding of approach for effective energy management in building through automated systems and sensors.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0035T	LOW COST BUILDING DESIGN AND TECHNIQUES	2	2	Theory	4	3
Objective:						

To understand the various low cost design systems and to understand use of materials, construction and execution techniques in design of low-cost buildings.

Contents:

Need and demand for low-cost buildings, and the related issues and challenges. Study of low-cost buildings, construction techniques. Low-cost building construction systems, methods & techniques. Introduction to low-cost buildings, building components influencing cost of buildings. Study Modular coordination in building design, prefabrication- total and partial, and impact of prefabrication on employment. Understand Building construction detailing for cost reduction, cost control techniques, research and development by various organizations in the country and foreign countries to reduce the cost. Case study of low-cost building projects in India with issues related to site, material, services, technology, and construction, and expectations of user. Post-occupancy evaluations of such projects

Course outcome:

1. Development of construction technology and innovative techniques as tools to address demand to mass construction.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0036T	LITERARY ARCHITECTURAL HERITAGE OF INDIA	2	2	Theory	4	3
Objective:						
To familiarize the students with the available literature on Indian system of architecture (<i>Stapathya</i>) and to understand complex system of designing architectural marvels of the past.						
Contents:						
Classification of literary heritage specially Nagra and Dravida texts. Understanding commonalities and exclusiveness of texts and overall structure of texts. Contents of texts such as study of site selection, system of measurement, mandalas, components of buildings like pillars, base, etc. Building type such as pavilions, temples, houses, etc. study of town planning, village planning and fort designs. Visual interpretation of buildings described in such texts like Mayamatam, Manasara, Samarangana Sutradhara, etc. Documenting and understanding of constructional practices and building materials. Intangible and mystic information in text. Relevance of information in these texts in contemporary scenario.						
Course outcome:						
<ol style="list-style-type: none"> 1. Become aware of the literary architecture heritage. 2. Understand the relevance of these texts to present day construction. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0037S	PHOTOGRAPHY	3	2	Studio	5	4
Objective:						
To give exposure to photography as means of documentation and medium of expressions.						
Contents:						
Study basic instruction in Photojournalism. Equipment - cameras and lenses, techniques -film speed, lighting, exposure, measurement, grey scale, photo-finishing and editing digital images.						

Perspectives: Single Point, Two- Point. Development process -contemporary equipment, films, paper and chemicals. The content of this subject includes: Study darkroom practice, contemporary equipment, films, paper and chemicals, BM' film processing and printing. Photography practical on - Simple objects and subjects, lighting, still life composition with the play of light and shadow. Historical and modern buildings with surrounding landscape. Architectural details such as staircases, brackets, cornices, louvers columns, inlay design, Indoor/outdoor sculptures, murals etc. Understand preparation of BM' slides. Introduction to modern photography tools and techniques such as digital camera, photo-editing software, etc.

Course outcome:

1. Development sense of composition and timing for photography.
2. Acquiring technical knowledge and usage of photography equipment.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0038T	APPROPRIATE TECHNOLOGY	2	2	Theory	4	3
Objective:						
To give exposure to the concepts of appropriate building technology and services suitable in Indian context, its applicability in both rural and urban applications. Enrich the conventional knowledge with alternative material and construction techniques.						
Contents:						
Study alternative materials and construction techniques developed in recent past. Study soil & its composition & properties, suitability of soil for mud walls, soil composition test, plasticity test, test for optimum water content, soil stabilization, Wattle & daub walls, rammed earth walls, adobe walls, etc. Walls, vaults, domes using soil cement, compressed mud blocks, Nubian arch roof. Use bamboo as building material its properties, available in country. Burnt clay tile roofing, ferro-cement roofing units, doubly curved tile roofing, pre-cast joists. Site visits of appropriate building technology projects in India with issues pertaining to site, material, services, technology, and construction.						
Course outcome:						
1. Strengthening of appropriate technology and its significant contributions in Indian context.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0039S	HIGH RISE BUILDINGS	3	2	Studio	5	4
Objective:						
To understand basic design concepts and emerging technologies of high rise buildings and acquire a comprehensive base of knowledge required to apply the principles, techniques and relevant guidelines for planning and design of high rise buildings.						
Contents:						
Study of high rise buildings in urban environment, physical planning considerations. Architectural design considerations for high rise buildings, space planning and design standards, building byelaws and codes. Understand structural systems in RCC and steel for high rise						

buildings, composite structural system considerations for wind loads and earthquake loads. Understand building services for high-rise - mechanical, electrical, firefighting and protection, vertical transportation, HVAC, BAS and parking, codes for these services. Study of construction planning and management, phasing, equipment and construction techniques, materials for cladding, prefabrication. Understand the various approaches to sustainable and green high rise buildings - concepts of zero-energy habitat. Case studies of high rise building projects in India with issues related to site, material, services, technology, and construction.

Course outcome:

1. Understanding of inclusive approach to design of high rise buildings through planning, construction techniques and incorporation of building services.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0040T	RESEARCH TECHNIQUES IN ARCHITECTURE	2	2	Theory	4	3
Objective:						
To understand importance of research in architecture and the theoretical and practical significance of research and exposure to software for analysis and formatting of report.						
Contents:						
Study types of research in process of formulating a research plan, various methods of research, their applications, data and simple statistical analysis, interpret and infer from the data. Methods of technical writing and presenting a research report. Research design - components of research, literature study and research. Methods of research in architecture - interview techniques such as designing a questionnaire, face-to-face interviews, internet survey, etc. and visual techniques. Study content analysis, observations, activity mapping, accession / erosion trace observations, cognitive maps, data documentation and analysis. Understand areas of research in architecture (qualitative and quantitative paradigms). Introduction to Statistics - simple statistical methods frequencies / percentages mean / median / mode, correlation, chi square test – inferring from the data and interpreting the meaning of those inferences. Understand software for statistical data analysis of analyzing numerical data, statistical data analysis. Significance of literature study, different sources of information such as books, journals, newspapers, internet, magazines, audio-recordings, etc. Data Documentation and Analysis including understanding the nature of data collected and methods of analysis suitable for that data (graphical / numerical / descriptive). Understand Converting data into numerical form for data analysis. Techniques of presenting the numerical data – graphical (pie charts, bar charts, line graphs etc.), tabulations, verbal qualitative data, architectural drawings / maps. Understand Reporting the Research including different sections of a research report, technical writing and language. Referencing and documenting the bibliography						
Course outcome:						
1. Research in architecture as process for evolving in-depth understanding of specific area/subject through primary and secondary analytical techniques and presentations.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0041T	MASS HOUSING DESIGN STRATEGIES AND	2	2	Theory	4	3

STANDARDS						
Objective:						
To understand mass housing projects of various nature and issues related to design considerations to understand mass housing project for slum improvement schemes, transit accommodation for people affected by natural disasters like earthquake, refugees, etc.						
Contents:						
Study of special design considerations for the user, etc. Mass housing project for various income groups in urban areas. Density distribution, servicing, etc. Mass housing project for Slum Improvement schemes by government or private organizations, old age people. Rehabilitation / transit accommodation /camps for people affected by natural disasters like earthquake, floods, refugees, or other disasters. Case studies with analysis of the mass housing projects with respect to of the project considering socio-economic conditions. Government policies for promotion, development control, finance and pricing, technology and time constraints. Study of geography, local conditions and climatic conditions influencing the housing design decisions. Evolving design brief for the project, progress of construction and completion.						
Course outcome:						
1. Understanding mass housing as befitting response for diverse income groups in urban areas and equitable distribution of resources.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0042T	ANTHROPOLOGY AND ARCHITECTURE	2	21	Theory	4	3
Objective:						
To understand the relationship between society and the making of the built environment and to understand phenomenology and the role of meaning in built form.						
Contents:						
Study concepts of culture, society, politics and anthropology – relation between society and built environment. Understand cultural anthropology from the view of architecture. Architecture as a continuous process for kinship and house societies, perceptions of built form, conceptions of space, symbolism and technology. Study of conditions of modernity, fragmentation of society, Heidegger and notions of dwelling, Christian Norberg Schulz and concepts of genius loci. Rapoport and studies on the meaning of built environment. Study of Joseph Rykwert theories on the idea of house. Bollnow and the idea of space, Jan Pieper and the notions of sacred space. Understand Meaning of urban studies and urban anthropology, role of cities, urban ethnography, primary units, major components and units of integration, anthropology and contemporary urban issues. Case studies of traditional architecture in India to find impact of anthropological studies on contemporary architecture and design						
Course outcome:						
1. Broader understanding of correlation between concepts of anthropology on society and built form.						
ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0043T	ENVIRONMENTAL CODES AND ENERGY RATINGS	2	2	Theory	4	3
Objective:						

To understand emerging discourse on sustainability by study of UN frame work convention of climate change, Kyoto protocol, Earth Summit, national policies on sustainable and energy efficient development.

Contents:

Policy guidelines of sustainable architecture, mandatory requirements, 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. Study of guidelines of ECBC, The Indian Green Building Council and LEED, The Energy and Research Institute (TERI) and the GRIHA System. The Energy Conservation (Amendment) Act, 2010 - main amendments, energy efficiency measures as standard and labeling program, demand side management. Various government-led initiatives such as Bachat Lamp Yojana (BLY), Strengthening Institutional Capacity of State Designated Agencies (SDAs), State Energy Conservation Fund (SECF), Energy Efficiency in Small and Medium Enterprises (SMEs) and designated consumers, professional certification and accreditation, School Education Program, Indo-German Energy Efficiency Project, Energy Conservation Awards National mission for Enhanced Energy Efficiency (NMEEE), Perform, Achieve and Trade (PAT), Market Transformation for Energy Efficiency (MTEE), Energy Efficiency Financing Platform (EEFP), Framework for Energy Efficient Economic Development (FEEED), Partial Risk Guarantee Fund (PRGF), Venture Capital Fund for Energy Efficiency (VCFEE). The Environment (protection) Act 1986, rules to regulate environment pollution and Prevention, control and abatement of environmental pollution and institutional mechanism

Course outcome:

1. Broad understanding of environmental and energy regulations and its impact on efficient built forms.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0044T	HUMAN RESOURCE MANAGEMENT	2	2	Theory	4	3
Objective:						
To introduce human resource management and its significance in the running of an organization and to understand changing role of human resource in India as well as globalization, and impact on HR.						
Contents:						
Introduction to the Concept of Human Resource Management - its scope, history, function, role of executives. Process of Human Resource Planning - need for HR planning, HR information system HR forecasting techniques. Concept of recruitment - factors affecting recruitment, sources of recruitment, recruitment policy, selection, selection process, evaluation, and placement. Induction. - meaning of training, methods of training. Management development – its concept, methods, training, development, its evaluation etc. Employee Career Planning & Growth - employee growth concept (career planning, career planning program elements, succession planning. Concept and need for performance reviews, overview of types performance appraisal methods, wage and salary administration (managing wages, concept of rewards and incentives, benefits). Job Analysis and Design (process, methods, information, etc.) Employee Misconduct & Disciplinary Procedure (meaning, objectives, principles for maintenance of discipline, disciplinary policy guidelines, penalties and procedure for disciplinary actions). Grievance (causes, forms and effects, the grievance handling and redressal procedure). Employee Welfare and Working Conditions: (concept, measures, types, responsibility, business benefits). Emerging concepts in HRM in India - competency mapping, business process						

outsourcing, right sizing, flexi-time, talent management, employee engagement
Course outcome:
1. Human resource requirement to architectural profession and its understanding.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0045T	OFFICE MANAGEMENT	2	2	Theory	4	3
Objective:						
To familiarize students with the activities in a modern office and develop an understanding of its need and the due processes involved in the smooth functioning of an organization.						
Contents:						
Meaning of office, its importance, function, primary and administrative functions, its relation with other departments, types – virtual, back and front, etc. Office Management its definition and duties. Filing its importance, essential of good filing system, centralized and decentralized filing system. Study of types of office forms its advantages, forms controls, objectives, form designing, principles of forms designing and specimens. Study of office record management its importance, principles and types. Office machines and equipment. Office Safety and Security importance, its safety hazards and safety steps. Measurement of Office Work its importance, purpose, difficulty, ways of measurement, work standards and benefits. Office Manual its need, types and preparation. Office Communication its importance, process, objectives, effectiveness, forms for communication in oral, written, visual and audio-visual formats. Study Business Correspondence importance, qualities of good business correspondence. Structure and layout of business letters such as complaints, adjustments, circular letters and types such as enquiry, reply, status, credit enquiry, order placement, etc. Understanding confirmation, modification and non-acceptance of orders, Banking correspondence, Insurance letters. Employment related letters, Correspondence with public bodies/authorities, office meetings notice, agenda, resolutions, minutes and confirmation of the minutes. Abbreviations and terms used in Business Correspondence						
Course outcome:						
1. Familiarity with various aspects of functioning of architect's office and communication with other related organizations.						
References:						
<ul style="list-style-type: none"> Nasib Singh Gill, Handbook of Computer Fundamentals 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0046T	FINANCIAL ACCOUNTING	2	2	Theory	4	3
Objective:						
To make the student familiar with generally accepted accounting principles of financial accounting and their applications in business organizations excluding corporate entities.						
Contents:						
Financial Accounting - nature and scope, limitations, basic concepts and conventions. Accounting Standards - meaning, significance, generally Accepted Accounting Principles (GAAP).						

Accounting process - from recording of transactions to preparation of final accounts, rectification of errors and bank reconciliation statement. Study of Consignments - features, accounts treatment in the books of the consignor and consignee. Joint Ventures (accounting procedures, joint bank account, records maintained by covertures of all transactions, only his own transactions, memorandum joint venture account).. Study of Depreciation Accounting - meaning, causes, objects of providing depreciation, factors affecting depreciation, accounting treatment including provision for depreciation accounting. Methods of deprecation - straight line method and diminishing balance method. Analysis of financial statements, common size balance sheet, ratio analysis, cash flow statement
Course outcome:
<ol style="list-style-type: none"> 1. Understand general accounting principles 2. Be able to apply these to architectural practice.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0047T	EVOLUTION OF HUMAN SETTLEMENTS	2	2	Theory	4	3
Objective:						
To introduce the elements and principles of human settlements and to outline the origins, determinants of human settlements and their evolution through the course of history.						
Contents:						
Study characteristics of human settlements and the manifestation of settlements as expression of political and social aspirations. Elements and determinants of settlements, Evolution of settlements in the pre-historic period with relevant examples. Study growth of human settlements in the ancient river valley civilizations of Indus valley, Mesopotamia, Egyptian and Chinese. Settlements of Classical period- Greek and Roman civilizations with relevant examples. Medieval and Renaissance Periods with relevant examples. Origin of cities and theories on city planning. Study of city plans of Vienna, Amsterdam, Paris, etc. Study Medieval Indian cities, factors that led to their development, influence of Islamic period in the evolution of settlements planning India; influence of Colonial period - Imperialism in city planning examples such as New Delhi and cantonment cities such as Bangalore. Transitions to Industrial era, Post-industrial era. Utopian city concepts by Le Corbusier, F.L. Wright, Archigram, Metabolism and Paolo Soleri						
Course outcome:						
<ol style="list-style-type: none"> 1. Familiarize with the evolution of human settlements. 2. Compare historical human settlement planning to modern day city planning with reference to prevalent societal conditions. 						
ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0048T	URBAN DESIGN	2	2	Theory	4	3
Objective:						
To understand the scope and nature of urban design as a discipline, to introduce the components of a city and their interdependent roles, evolution of historic urban form and interpret the city in different ways and layers.						
Contents:						

Study Components of urban space such as blocks, density, neighborhood, streets etc. and their interdependencies - outline of issues/ aspects of urban space and articulation of need for urban design- scope and objectives of urban design as a discipline. Study of urban development throughout the globe. Morphology of early cities - Greek agora, Roman forum, Medieval towns, Renaissance place making, ideal cities. Industrialization and city growth- the American grid planning, anti-urbanism and the picturesque, radiant city. Imageability and townscape- Cullen, Lynch, concept of place and genius loci, collective memory historic reading of the city and its artifacts (Rossi). Social aspects of urban space - life on streets and between buildings, life style, gender and class (Jan Gehl, Jane Jacobs, William Whyte). Contemporary theories in Urbanism, New Urbanism. Contemporary issues of urban ecology in Asian context, its articulation and urban sustainability. Various tools through which an urban setting could be perceived - maps, sketches, photo documentations, reading, data collections, transects etc. City limits/boundaries, urban structure, urban architecture, typologies as well as public space and design guidelines. The critical role that transportation and infrastructure planning plays in structuring of the city. Evolution of urbanism in India (temple towns - Mughal city form, Colonial urbanism, urban spaces in modernist cities such as Chandigarh, Bhubaneswar and Gandhi Nagar)

Course outcome:

1. To understand the general morphology of urban space.
2. Be able to interpret the urban forms of the past and present.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0049T	SECURITY SYSTEMS	2	2	Theory	4	3
Objective:						
To understand basic design concepts and emerging technologies of modern buildings. Acquire comprehensive base of knowledge required to understand and apply the principles, techniques and relevant guidelines for planning and design of security systems in buildings.						
Contents:						
Study of Fire Alarm System - fundamentals, fire modes, history, components, and principles of operation. FAS Components - different fire sensors, smoke detectors and their types, fire control panels, design considerations for the FA system. Field components, panel components, applications. FAS Architectures, FAS loops: classification of loops, examples. Fire Standards - FAS Design procedure in brief, NFPA 72A, BS 5839, IS Concept of IP enabled fire & alarm system, design aspects and components of PA system. Access Control System - access components, access control system design. CCTV Camera - operation & types, camera selection criteria, camera Applications, DVR-based system, DVM, network design, storage design. Components of CCTV system like cameras, types of lenses, typical types of cables, controlling system. CCTV Applications. Perimeter Intrusion - concept, components, technology, advanced applications. Security Design - security system design for verticals. Concept of automation in access control system for safety, physical security system with components, RFID enabled access control with components, Computer System Access Control – DAC, MAC, RBAC. EPBX System - Design consideration of EPBX system and its components, integration of all the above systems to design BMS.						
Course outcome:						
1. Application of various security systems in building.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0050T	HOUSING FINANCE	2	2	Theory	4	3
Objective:						
To address the characteristics of housing finance, financing institutions and issues related to housing finance.						
Contents:						
Study characteristics of Housing Finance, policy for housing finance in national plans. Present trends and process of housing finance structure in India Sources of finance: Formal and Informal sector housing finance market specialized housing finance institutions. Study Public housing finance and instruments for channeling financial resource, mobilizing savings, taxation, saving schemes and bonds. Understand Public and private sector investment in housing. Finance in urban and rural sector Implications of long term and short-term financing, Fiscal aspects of subsidizing public and private housing. Domestic financing role of governments, banks, other financial institutions. Understand Mortgage financing system, mortgage insurance and secondary markets. Study Building societies, savings and loan associations. Understand Effect of consumer preference on the financing systems, Housing finance requirements of economically weaker sections, Conventional and nonconventional practices and methods for financing housing in developing countries. Understand role of micro financing and non-institutional financing etc., Saving and credit unions, traditional and informal ways of finance.						
Course outcome:						
1. Financing housing sector through financial institutions and related understanding.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0051S	TRAFFIC AND TRANSPORTATION PLANNING	3	2	Studio	5	4
Objective:						
To impart knowledge on understanding of urban transportation problems and objectives to serve as guiding factors in the planning process, identification of the causal factors influencing the demand for urban travel and development of relationship between the factors and the travel demand.						
Contents:						
Study importance of traffic & transportation planning in national development, urban & regional transport systems, features of urban forms and network patterns. Understand transport and socioeconomic activities, freight transportation, future developments. Transportation system and its framework of reference, technological characteristics of transport modes and systems, the nature of demand and supply of transportation modes, road user and the vehicle. Introduction to transport planning process (problem definition, solution generation, solution analysis, evaluation and choice, implementation, sequence of activities						

involved in transport analysis. trip generation, trip distribution, trip assignment, modal split and evaluation). Geometric design of roads and intersections, road traffic safety traffic signals, street lighting, and parking, urban traffic problems road capacity, hierarchy of roads, design of road layouts traffic and travel characteristics segregation of pedestrian and vehicular traffic. Norms and guidelines for highway landscape street lighting type standards and design considerations, National Transport Policy. Land use transportation models. Planning for public transport. Traffic safety and solutions - study traffic of surveys for land use, speed, and journey time and delay surveys. Traffic volume surveys as O.D. Survey, parking survey, Transportation survey etc. Comprehensive Traffic and Transport Study (CTTS) and Comprehensive Mobility Plan (CMP). Management of transport systems - Existing organizational and legal framework traffic and environment traffic noise, air pollution– its measures and standards accident reporting and recording systems factors affecting road safety and Intelligent Transport Systems.
Course outcome:
1. Exposure to basic understanding of transport planning and management in urban areas.
Suggested readings:
<ul style="list-style-type: none"> L.R. Kadiyali, Transportation Engineering (ISBN: 978-93-82609-858)

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0052T	RURAL PLANNING	2	2	Theory	4	3
Objective:						
To understand the importance of rural development in the national perspective and development, exposure to the validity of the various programs and problems faced in rural India, Rural Development as a prerequisite for regional and national development and quality of human life.						
Contents:						
Study national planning and rural development policies and program in India. Five year plans and agricultural development. Study factors influencing agriculture. Understand agricultural land use, farming systems, economic system and occupation, rural poverty, growth of productivity in agriculture, green revolution and its impact. Study rural development programs in India. Understand rural and urban development programs in other developing nations. Study of development inputs and its impact on social; economic changes. Rural Infrastructure Planning like power and water supply. School education and vocational training programs, health and sanitation. Study of rural energy, employment generation in rural areas. Rural industrialization, migration, rural institutions. Understand rural institutions and Organizations - rural banks, co-operatives, marketing mass media and communication, micro-finance, SHG and rural credit access. Case Studies						
Course outcome:						
1. Understanding of rural development and related issues in Indian context.						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0053T	ERGONOMICS	2	2	Theory	4	3

Objective:
To understand work physiology, human physical dimension concerns like human body structure and function.
Contents:
Study Anthropometry, body growth and types. Understand static and dynamic anthropometry, standing posture, squatting and cross-legged postures. Understand anthropometric measuring techniques. Human body- structure and function, posture and body supportive devices. Study of chair characteristics, vertical work surface, horizontal work surface, movement, work counter, behavior and perception. Study environments factors influencing human performance, ergonomic design process, ergonomics design methodology, ergonomics criteria/check while designing and design process involving ergonomics. Performance support and design intervention, occupational safety and stress at workplace in view to reduce the potential fatigue, errors, discomforts and unsafe acts. Design workstation design, furniture support, vertical arm reach and design application possibility. Study design and human compatibility, comfort and adaptability aspects and ergonomics in India.
Course outcome:
<ol style="list-style-type: none"> 1. Understanding of anthropometry and ergonomics. 2. Be able to design furniture, workstations and utility items according to ease of use and comfort.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0054S	ANIMATION	3	2	Studio	5	4
Objective:						
To familiarize the students with various approaches, methods and techniques of Animation Technology. To develop competencies and skills needed for becoming an effective animator, mastering traditional & digital tools to produce stills and moving images.						
Contents:						
Study applying laws of human motion and psychology in 2-D or 3-D characters. Understand programming languages, algorithm and flow charts, define symbols of flowchart, (Examples-HTML editing & viewing HTML files). Overview of terms used, types, skills, basic principles, drawing tools, rapid sketching & drawing and developing animation character. Study of anatomy & body language. Introduction to equipment required for animation and developing the characters with computer animation. Use 2D and 3D virtual drawing for animation, sequential movement drawing, Skills required for an animation artist (draw gestures, Basic proportions, rotation in arcs, key lines, perspective, mannequin, volume construction, balance, muscles, light & shape and action, hands & legs, foreshortening and facial expressions). Introduction pose sketching (action analysis), acting, modeling, sketching from acting and sketching from live models. Introduction to rapid sketching techniques, sketching from memory, live action. Digital editing and motion graphics, visual effects and V.F.X.-I. Exercise on suitable software						
Course outcome:						
<ol style="list-style-type: none"> 1. Be able to use digital tools representing design ideas. 2. Prepare animated presentations. 						
Suggested readings:						
<ul style="list-style-type: none"> • V.K. Jain, Multimedia and Animation 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0055T	COLOR THEORY AND APPLICATIONS	2	2	Theory	4	3
Objective:						
To understand various aspects of Color and its application. Study brush strokes and textures and effective use of different medium.						
Contents:						
Introduction to visual perception theories with emphasis on the role of colors. Study of Color theory, basic color terminology, Color systems and schemes. Color vision. Formal, Symbolic and Functional Aspects of Color in Design and Architecture and perception. Understand color interactions and contrasts, harmony of colors, color frames and compositions. Study of color planning and applications in design and architecture, environmental graphics, Develop color compositions to meet the formal, symbolic and functional design requirements. Analyze the design considerations related to color planning criteria. Propose architectural color design appropriate to the design considerations and requirements.						
Course outcome:						
<ol style="list-style-type: none"> 1. Understand the visual and psychological impact of colours. 2. To use colour effectively to enhance the aesthetic level of the design at hand. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0056T	LEADERSHIP DEVELOPMENT	2	2	Theory	4	3
Objective:						
To enable students to prepare themselves to become leaders of organizations and embark on paths of personal leadership development.						
Contents:						
Study of motivational capabilities, building support teams, purpose-driven, empowering leadership, and improving leadership effectiveness through style and use of power. Understand the leadership journeys of great leaders by reflecting upon and framing their life stories and experiences to date. To participate fully in open, intimate small-group discussions about the reflective exercises they have completed on their own. To gain clarity about their leadership principles, values, and ethical boundaries, and how they will respond under pressure when challenged. To understand what is motivating them, both extrinsically and intrinsically, and to find leadership paths that will enable them to utilize their motivated capabilities. To explore how to build support teams and lead an integrated life. To understand the purpose of their leadership and empower other leaders, while they are optimizing their leadership effectiveness. To create Personal Leadership Development Plans to guide them throughout their lives.						
Course outcome:						
<ol style="list-style-type: none"> 1. Motivate towards becoming leaders. 2. To develop team building qualities. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0057T	COMPANY LAW	2	2	Theory	4	3
Objective:						
To acquire knowledge and develop understanding of the regulatory framework of companies with reference to various provisions of Companies Act and its schedules, rules, notifications, circulars, clarifications there under including case laws and Secretarial standards.						
Contents:						
Introduction to Corporate Law. Study of its historical development in India. Basic concept of company its definition, meaning, nature, characteristics, nature and forms of business, company vis-a-vis other forms of business. Understand corporate personality, corporate veil, limited liability and citizenship, incorporation and its consequences, types of companies and their incorporation. Understand Promoters its meaning, position, duties, rights, responsibilities and liabilities. Formation of companies its procedural aspects, memorandum of association & articles of association and their alteration, contracts and conversion of companies, commencement of business, doctrine of ultra-vires, constructive notice, indoor management. Study of financial structure, sources of capital, classes and types of shares, equity shares with differential rights, issue of shares at par, premium and discount, forfeiture and surrender of shares, bonus issues, rights issues, issue of sweat equity shares, employees stock option scheme, private placement, preference shares and other forms of securities. Alteration of Share Capital– reduction of capital; buy–back of shares; misrepresentations and penalties, debt capital – debentures, debenture stock, bonds; recent trends and dynamics of corporate, debt financing; debenture trust deed and trustees. Study of membership in a Company – Modes of acquiring membership, rights, register dematerialisation and rematerialisation of securities, transfer and transmission of securities and nomination. Company Management - Directors (types, appointment, qualifications, disqualifications, role and responsibilities, powers and duties, loans, remuneration, office or place of profit, board of directors, committees and etc.) Investments, Loans and Deposits Law relating to making investments in and granting loans. Acceptance of deposits, renewal, repayment, accounts and audit, books of accounts, financial statements, profit and ascertainment of divisible profits, declaration and payment of dividend, treatment of unpaid and unclaimed dividend transfer and board’s report and disclosures contents and annexure to board’s report.						
Course outcome:						
<ol style="list-style-type: none"> 1. Become acquainted with the intricacies of rules, regulations and laws related to companies. 2. Apply acquired knowledge while setting up an independent practice. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0058T	NGO ADMINISTRATION	2	2	Theory	4	3
Objective:						
To provide an understanding of NGO Administration, develop practical skills, to address real-life problems in a participatory and interactive learning environment to enhance management capacity.						
Contents:						
Study of concept, functions, roles and establishment of NGO. Issues and Challenges in NGO Management, development issues, development indicators. Legal procedures for establishment of NGOs. Overview of Societies Registration Act, Indian Trust Act, Indian Company's Act, Charitable endowment Act and FCRA, Memorandum of Association and Bye laws, Tax Reliefs under various Acts. Study Results-Based Management and Project Cycle Management. Introduction and concept of Logical Framework analysis, SWOT Analysis. Designing and planning a project, Identifying and analyzing problems. Deciding the overall strategy, defining the response, strategic planning. Study of NGOs vis-a-vis development concerns of the community. Become familiar with results-based Management and learn the basics of project management. Learn about the process of internal assessments. Understand the selection process of marketing tools for fundraising and different criteria of donor agencies in supporting a project. Become familiar with the principles of good communication and negotiations and learn the basics of team work and conflict resolution. The success stories of NGO and other organization - international / national/ regional level.						
Course outcome:						
<ol style="list-style-type: none"> 1. Understand the working of an NGO. 2. Be able to participate in the working/help in setting up an NGO. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0059T	BUILDING CODES AND BYELAWS	2	2	Theory	4	3
Objective:						
To provide students insight of building codes and norms, their need and nature of building codes, standards and regulations.						
Contents:						
Overview of basic terminologies, nature and scope of building codes in special regions like heritage zones, environmentally sensitive zones, disaster prone regions, coastal zones, hilly areas etc. Study of building regulations. Overview of administrative processes for obtaining building permits at various stages. General land use, building classifications and permissible uses, norms for exterior and interior open spaces, setbacks and margins, norms for building projections in open spaces, considerations in FAR, guidelines for open green areas. Norms for vehicular areas - means of access, norms for access widths for various types of buildings, requirements of parking spaces, standards for turning radius, access to service areas, Norms for fire-protection - Overview of fire protection norms for various building classifications, norms for fire exit ways and building materials, concept of fire zoning, doorways, stairways, passages and corridors, fire escapes, etc. Norms for building services: Norms for lighting and ventilation, Introduction to basic terminologies, components of daylight factor, general principles of						

opening for good lighting, considerations in artificial lighting, general principles for natural and mechanical ventilation, overview of norms for acoustical and electrical installations. Requirements for parts of buildings: plinth, habitable rooms, kitchen, wet areas, mezzanine. store rooms, elevated parts like chimneys, parapets etc, Introduction to local building byelaws - study of local administrative provisions for obtaining building permits, architecture control and provision of building services, regulations for super structures, building height regulations, regulations for multi-storied buildings etc.

Course outcome:

1. Gauge the importance of building regulations and byelaws in development.
2. Apply these to actual building design.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0060T	BUSINESS ENVIRONMENT	2	2	Theory	4	3
Objective:						
To provide students insight of business environment, economic environment, natural and technological environment.						
Contents:						
Study of types of environment (internal, external, micro and macro environment), Competitive structure of industries, environmental analysis and strategic management. Understand managing diversity, scope of business, characteristics of business. Process and limitations of environmental analysis. Understand Economic factors-growth strategy, basic economic system, economic planning. Economic policies- new industrial policy, FEMA, monetary and fiscal policies. Understand Consumer Protection Act and competition law. Liberalization, privatization and globalization of Indian economy. Current trends and issues. Study Nature and impact of culture on business, culture and globalization, social responsibilities of business, social audit, business ethics and corporate governance. Innovation, technological leadership and followership, sources of technological dynamics, impact of technology on globalization, transfer of technology, time lags in technology introduction, Status of technology in India. Management of technology- features and impact of technology.						
Course outcome:						
<ol style="list-style-type: none"> 1. Get an insight into the business environment in India. 2. Understand the impact of technology in the business environment. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0061T	HOTEL PLANNING AND SERVICES	2	2	Theory	4	3
Objective:						
To develop a comprehensive understanding of the specialized nature of services, and infrastructure provisions required for a hotels and restaurant design and planning						
Contents:						
Study of comprehensive and specialized services, amenities and infrastructure provisions in restaurants and hotels. Study of Building bye laws, rules and code provisions for various Star of						

hotels and emerging concepts of smart hotels, etc. Study of spatial- planning for a hotel integrating all the services such as HVAC, sanitary, waste management, electricity / energy, surveillance systems, telecommunication, fire safety, parking; and site planning. Introduction to the hospitality industry and how hotel building projects have contributed in urban developments, raising the economic and the tourism profile of a locality or region. (Particularly how architecture and design in smaller scale have enhanced interest for single destinations with relevant case examples). A comprehensive design exercise which would involve design concepts, profitability considerations, planning /development strategy, regulations, construction and management, management including operational planning and service.

Course outcome:

1. Comprehend how hospitality industry functions.
2. Be able to effectively design a restaurant/hotel.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0062S	AUDITORIUM ACOUSTICS, SYSTEMS AND SERVICES	3	2	Studio	5	4
Objective:						
To develop a comprehensive understanding of architectural acoustics and the specialized nature of services, and systems, and acoustical considerations required for auditoriums, multiplexes and cinema halls.						
Contents:						
Brief introduction to sound engineering (sound measurement of sound, frequency, intensity, decibel scale, auditory range, etc.) Different types of Architectural acoustics - Room acoustics (acoustical environment, behavior of sound in an enclosed spaces, reverberation and reverberation time calculations, Sabine’s formula and its interpretation, dead and live room geometrical acoustics, acoustical defects in auditorium and their solution and relevant case examples of the same); Auditorium design (size, shape, sitting arrangement design criteria for speech and music, acoustical correction design and modification techniques, television & broadcast studios, classrooms, lecture hall, churches and relevant case examples of the same). Electro-Acoustics (various systems such as unidirectional, stereophonic, digital and surround-sound systems, various requirements for theatres, motion picture halls, multiplexes and multipurpose auditoriums, etc. and relevant case examples of the same). Open-Air Acoustics (behavior of sound in free field, absorption from air and other elements, barriers, landscaping elements, thermal and wind gradient, reduction of noise by screening, screening by planting and relevant case examples of design and planning of open-air theatres). A comprehensive design exercise involving the specialized services, amenities in an auditorium/multiplex, theatre hall/etc integrating services such HVAC, sanitary, garbage, acoustics design, electricity / energy, fire safety, telecommunication, surveillance systems, parking; and site planning; building byelaws, rules and code provisions.						
Course outcome:						
<ol style="list-style-type: none"> 1. Understand the fundamentals of auditorium acoustics. 2. Able to design an effective acoustic environment. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0063S	INSTITUTIONAL BUILDINGS & CAMPUS PLANNING	3	2	Studio	5	4
Objective:						
To develop a comprehensive understanding of planning of institutional campus and the specialized nature of services, amenities and infrastructure planning required for an institution.						
Contents:						
Introduction to various types of institutes such as educational, religious, cultural, etc. with focus on the particular site services and planning strategies required for each. Introduction to institution building design with emphasis on their services for water, sanitation, garbage, electricity / energy, telecommunication, parking and site planning along with emphasis on detailing of special requirements for areas like lecture halls, congregation spaces -conference, assembly halls, OATs, auditoriums, etc.. Study of building byelaws, rules and code provisions for institutional buildings also introduction to smart technologies for institution buildings. study of principles of a campus design, organic order, participation incremental growth, patterns diagnosis, campuses in India and abroad, planning process, site analysis, the building program, campus master plan, landscape design, road networking, parking, design of open spaces etc. related to campus design. Case studies and design exercises of campus planning with integration of services of institutional building services with site services, campus master-planning with focus on movement pattern, parking, housing, amenities, functional requirements and other context-specific services required. Design emphasis on detailing of spatial layout, site-planning and services, etc.						
Course outcome:						
<ol style="list-style-type: none"> 1. Grasp the complexities of campus planning. 2. Become adept in designing the services for large campuses. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0064T	ARCHITECTURAL CONSERVATION	2	2	Theory	4	3
Objective:						
To develop an understanding in heritage, its value and the theory and practice of architectural conservation and history of conservation in India and West.						
Contents:						
Introduction to Architectural Conservation (understanding of heritage values; definitions and degrees of conservation – preservation, restoration, adaptive reuse, etc., its need, various debates and purpose). History of Architectural Conservation (movements, agencies, various charters and the derived principles and ethics of conservation -ICCROM, ICOMOS, UNESCO, etc.) Conservation in India (Acts, Central and state government policies, legislations and initiatives, museum conservation monument conservation and the role of ASI, SDA, INTACH, and selected projects- such as Hampi precinct, Golconda, Humayun precinct, etc. Introduction to Conservation Methods and techniques (listing of monuments, documentation of historic structures, assessing architectural character, inventory preparation, investigation techniques and tools). Structure and Material Conservation (behaviour of historic materials and structures, weathering, ageing, problems with masonry, foundation, repair methods, traditional and modern methods, seismic retrofit and disabled access/ services additions to historic buildings,						

moisture & pollution problems, etc. Introduction to Urban Conservation & management (study of the issues of historic towns, historic districts and heritage precincts, financial incentives and planning tools such as TDR, urban conservation and heritage tourism, case studies of sites like Cochin, Jaipur, etc.)

Course outcome:

1. Develop a sensitivity towards heritage and its conservation.
2. Understand the materials and techniques to be used for conservation under various conditions.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0065T	HOSPITAL SYSTEMS AND SERVICES	2	2	Theory	4	3
Objective:						
To Study of comprehensive and specialized services, amenities and infrastructure provisions in Hospital Systems and Services. To understand various issues related to design of Hospital Systems and healthcare buildings.						
Contents:						
Study of comprehensive and specialized services, amenities and infrastructure provisions in hospital; design of hospitals integrating systems and services such as water, sanitation, solid waste, bio-medical waste management, electricity / energy, telecommunication, parking; and site planning; study of building byelaws, rules and code provisions for various types of hospitals; smart hospitals. Identification of various levels and its types, understand norms and standards, technical services for the various health facilities. Case studies of hospitals with its services. Conceptual design for health facilities with focus on movement pattern, parking, functional requirements and understanding of services required. Design emphasis on detailing of areas like OT Complex, wards, diagnostic facilities, emergency services, trauma center etc.						
Course outcome:						
<ol style="list-style-type: none"> 1. Resolve the complexities in hospital planning. 2. Be able to design a solution for any health care facility. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0066T	VASTUSHASTRA	2	2	Theory	4	3
Objective:						
To create awareness of the traditional knowledge systems and their relevance in modern architectural practice and to understand the various theoretical and practical aspects of Vastu.						
Contents:						
A brief overview of traditional knowledge systems in the subcontinent and their relevance in modern practice of architecture. Study of Vastushatra principles, purpose, nature, scope. The growing need for traditional knowledge systems and the applicability of Vastu in modern times. Understanding of Vastu principles, role of various mandalas and Vastu-Purush-Mandala. How Vastu principles can be applied in modern building typologies. Vastu principles and guidelines for site selection, shape of plots, orientation aspects, recommendation on sites, plots, location						

layouts, configuration of various areas, inner and outer spaces within and outside the building, spatial planning vis-à-vis their functions, etc. Case studies for houses and commercial building as per Vastu. Design exercises and case examples of building projects as per Vastu.

Course outcome:

1. Understand the theory and processes given in vastushastras.
2. Unravel the misconceptions regarding contents of vastushastras with the help of systematic learning.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0067T	ART APPRECIATION	2	2	Theory	4	3
Objective:						
To introduce the various art forms that exist from ancient to modern times and to sensitize the students towards the moral, aesthetical, cultural, political contexts and potential of art.						
Contents:						
Introduction of art its various definitions and philosophies -Kant, Walter Benjamin, Rabindranath Tagore, etc., its purpose and need in human life; evolving role of art both historically and in modern times. Formal analysis of Art such as line, shape, form, space, color, light, value, texture, composition, media and technique, various styles including personal, regional, etc. Art principles such as unity, variety, harmony, rhythm, balance, proportion, emphasis, contrast, movement. Historical overview of art aesthetics of various and cultures and traditions and their influences including important works of daily utilities, crafts, sculptures and buildings from Prehistoric period, ancient Egypt, ancient Mesopotamia, ancient Greek, ancient Roman art, medieval Europe, India, China, Persia, Japan and Renaissance, Baroque, Neoclassicism, Romanticism, Realism. Introduction to iconography and symbolism with cases from Hinduism, Islamic and Christian traditions and exercise dealing with iconographic analytical techniques. Various art movements and their influences on Realism, Impressionism, Expressionism, Dadaism, Fauvism, Cubism, Surrealism, De Stijl, Critical Regionalism, Brutalism, Structuralism, Deconstructivism etc. Theories of Visual Perception. Introduction to Modern Art media such as photography, movies, documentaries, installation art, etc.						
Course outcome:						
<ol style="list-style-type: none"> 1. Develop an understanding of the various art forms. 2. Fine tune the aesthetic sense and critically appreciate art. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0068T	VALUATION	2	2	Theory	4	3
Objective:						
To develop an understanding of real-estate market and how valuation is done for properties and land in the profession.						
Contents:						
Study characteristics of value, regarding the building. Factors affecting the value of built up property. Introduction to Value & Valuation including factors affecting value, supply and demand, cost of reproduction, valuation tables occupation of value, gild edged security;						

variables, the real market and its properties, the various types of investors in the market and their interests, purposes of valuation. Mathematics of valuation including simple interest, compound interest, present value, given amount per annum, annual sinking fund, present value of a given amount per annum, year of purchase in perpetuity, redemption of capital, numerical examples, etc. Methods of valuation such as land-building basis, development method of valuation, valuation for rating purpose, valuation for Government taxation, valuation for mortgage, consider valuables in Town planning, regarding the plots and development. Introduction to Mortgage including mortgage repayment and depreciation mortgage and mortgager, relation between mortgage and annual repayment, depreciation rates, numerical examples. Interest rate and life of property, various market interests on capital, concept of net income, economic life of a building property. Introduction to Rent with various forms of rent, methods valuation, direct comparison of capital cost, of land and cost of building, rental methods, development methods, belting. Arbitration including definition, scope, role of arbitrator, reference, submission, articles of agreement and award.

Course outcome:

1. Understand the concept and methods of valuation.
2. Be able to execute the valuation of small immovable property.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0069S	INFRASTRUCTURE PLANNING & DESIGN	3	2	Studio	5	4
Objective:						
To expose the student to the concepts, necessity and importance of urban infrastructure, social and physical infrastructure.						
Contents:						
A brief overview of economic and related development policies, urban agenda, resource development options and schemes on urban infrastructure. Understand current national and international approaches in infrastructural planning. An overview of basic concepts related to Infrastructure. Introduction to types of infrastructure - urban infrastructure such as social, civic, transport; power sector; water supply and sanitation sector; road, rail, air and port transportation sector; telecommunications sectors and overview of organizations and players of the respective infrastructure. The stages of an infrastructure project lifecycle and the associated risks including mapping of risks in infrastructure projects, economic and demand risks, political risks, socio-environmental risks, cultural risks in international infrastructure projects, legal and contractual issues in infrastructure, challenges in construction and maintenance of infrastructure. Strategies for successful implementation of infrastructure projects including risk management frameworks, phasing, fair process and negotiation, negotiating with multiple stakeholders, sustainable development, information technology and other management systems, infrastructure- modeling and life-cycle analysis techniques, improving the government's and private sector's role, emerging management systems and future directions.						
Course outcome:						
<ol style="list-style-type: none"> 1. Grasp the necessity and importance of developing urban infrastructure. 2. Understand the ways in which infrastructure projects are implemented. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0070S	URBAN AND REGIONAL PLANNING	3	2	Studio	5	4
Objective:						
To Study of components of urban areas and Regions; Role and working of Urban and Regional planning at different levels like national level, state level, district level etc.						
Contents:						
<p>Urban planning its definition, hierarchy and need. Regional planning its definition, hierarchy and need. Evolution of City Planning including settlement size, pattern and structure as a function of socio-cultural, economic, military and religious factors, origin and evolution of civic planning; impacts of industrial revolution on town and regional planning. Overview of different planning theories and models such as garden city, city beautiful, linear city etc. Introduction to planning theory & techniques such as settlement system, classification of settlements, central goods and services, range, threshold, city-region relationship, structure of city regions, area of influence, dominance, rural-urban fringes, push and pull factors, migration trends and impacts on urban and rural development, characteristics of the urban environment - land uses, physical structure and relationship between parts of a city. Introduction to surveys, analyses and methods, techniques of conducting surveys for land use, building use, density, structural condition of buildings, heights of building, land utilization and physical features of land; data requirement for various types of plans; population, distance criteria; performance standards, etc.</p> <p>Introduction to demography in urban planning. Demographic variables such as population study, fertility, mortality, migration; evolution of mortality-trends, biological and social factors and mortality-gender, race, social structure, life-style, occupation, ethnic groups, socio-economical group mobility, literacy level, life-table techniques; and population estimation, projection and population forecasting. Planning norms and development norms for green-field, existing areas, renewal schemes and development. Types of City Plans such as comprehensive planning, master plans, structure plans, zonal plans.</p>						
Course outcome:						
<ol style="list-style-type: none"> 1. Understand the process of urban planning. 2. Be able to read and analyse plans at different levels/scales like city, zone or district. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0071S	ENVIRONMENTAL IMPACT ASSESSMENT	3	2	Studio	5	4
Objective:						
To help students develop a comprehensive and critical understanding of EIA process as it is used for research, planning, project or program evaluation, monitoring, and regulatory enforcement, its significance in the planning and decision making process.						
Contents:						
<p>Overview of the relationship between natural environment and human societies and the environmental impact due to unchecked development on regions, communities, etc. Study of ecology of human societies and the connections between ecological and human social, cultural, and organizational processes. Introduction to Environmental Impact Assessment as a planning process with aims to predict, evaluate, and mitigate the potential impacts of proposed projects/policies/programs; need, evolution; objectives; and scope; tasks for approval</p>						

environmentally sustainable undertakings. Understand its general & specific jurisdictions, the various technical and policy issues involved in the production and the appraisal of environmental impact assessments. Introduction to the 'broader' context of environment and discussion of various EIA components such as its principles, legal and institutional frameworks, stages in the process, and specific analytical techniques. Study of the legal, economic, social, administrative and technical process of preparing and/or evaluating environmental impact documents. Course exercises shall include assessment of impacts on land use (Urban and regional); resources (including air, water, flora and fauna) and social & health impacts with relevant case studies from India and abroad; a critical reviews of EIA documents for policy development, project planning or for legal or political action planning, preparations of portions of environmental documents through administrative and legal requirements and standards of professional practice and analysis of proposed development project plans for possible environmental effects and prepare appropriate initial studies.

Course outcome:

1. To comprehend the process of EIA.
2. To carry out the EIA of a project.

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0072T	COMPUTER PROGRAMMING	2	2	Theory	4	3
Objective:						
To study Basic Computer organization: Processor & Memory Model and Networking Concepts.						
Contents:						
Study of Programming in 'C'. Need of Programming Languages, Flowcharts and algorithm development, data types, constants, variables, declarations, operators and expressions, operator precedence and associativity, input and output operations, formatting, decision making, branching and looping, array and character strings, built-in and user-defined functions, the scope and lifetime of variables, structures and unions, pointers, pointer arithmetic / expressions, pointers and arrays, pointers and structures, dereferencing file handling, command line arguments, defining macros, preprocessor directives simple use of dynamic memory allocation: malloc and calloc functions. Introduction to Networking Concepts and Internet usage, e-mail, FTP, TELNET, Search Tools, Browsers, HTML Programming using Visual Editors.						
Course outcome:						
1. Understand the fundamentals of computer programming.						
Suggested readings:						
<ul style="list-style-type: none"> • R.S. Salaria, Problem Solving and Programming in C 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0073T	BARRIER-FREE ARCHITECTURE	2	2	Theory	4	3
Objective:						
To study Barrier Free Environment is one which enables people with disabilities to move about						

safely and freely and to use the facilities within the built environment. It provides an environment that supports the independent functioning of individuals and participates without assistance, in everyday activities.

Contents:

Types of disability, Mobility devices and controls. Guidelines and space standards for barrier-free built Environment for disabled and elderly persons in various buildings such as institutes, hospitals, public spaces, shopping complexes and office buildings etc. Construction and maintenance standards, classifications of buildings and access provisions. Design elements within buildings, Site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, stairways, lifts, toilets, signage, guiding and warning systems. Floor materials. Design elements outside the buildings - kerb at footpath, road crossing, public toilet, bus stop, toilet booth, and signage. Provisions for residential buildings and public buildings and places like auditorium, parks, restaurants, railway station. Access audit and implication in building byelaw. Persons with Disabilities Act (equal opportunities, protection of rights and full participation) and bye-laws which would be applicable to all buildings and facilities used by the public. Introduction to how the modern day technology can aid in universal design/ built barrier free environment through audio and visuals.

Course outcome:

1. Sensitization towards needs of differently abled people.
2. Be able to design barrier free buildings and also carry out building audit .

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0074T	ARCHITECTURAL PEDAGOGY	2	2	Theory	4	3
Objective:						
To make students understand architectural pedagogy as a subject helpful for them in teaching profession.						
Contents:						
Planning of teaching lessons for Core Subjects such as Architecture Design, Building Construction, Architectural Drawing, etc. Planning of teaching lessons for Allied subjects such as Building Services, Structures, etc. and associated subjects such as Humanities, Management, Psychology, History, Fine Arts, etc. Planning of assessment methods - need & importance, defining goals and objectives for Assessment, planning and stages of assessment program. Making the weight age in total programs. Motivation and moral boosting its meaning & definition, need & importance. Introduction to Instructional Methodology its meaning, definition, need and importance of instructional methodology. Instruction and Learning including psychology of instruction, instructional theories such as Gagne, Instructional Models. Instructional Methods and techniques on Lecture Method, Demonstration Method, Case Study method, Project Method, Programmed Instruction / Learning, Studio method, Instructional techniques- seminar, symposium, tutorial, conference etc. Instructional Media it's Meaning, need and importance, Non-Projected media, Projected Media, Computer- Based Multimedia.						
Course outcome:						
<ol style="list-style-type: none"> 1. Get appreciate the special needs for improving architectural education. 2. Prepare effective lectures/demonstrations for various architectural topics and develop systems for their evaluation. 						

ELECTIVES						
Subject Code	Subject Name	Instruction Hours		Theory / Studio	Weekly Contact Hours	Credits
		Lecture	Studio			
ARE - 0075S	CAD CUSTOMIZATION	3	2	Studio	5	4
Objective:						
To utilize the tools within the AutoCAD program, modify the User Interface and enhance the operation of the program in specific areas of use.						
Contents:						
Understanding of graphic software while learning to configure basic shape files, complex line types, hatch patterns, along with CAD office configurations and plotting styles. Major Course Topics should include Creating ribbons, creating pull-down, cascading and cursor menus, Customizing toolbars, Image tile menus, Shapes, Auto Lisp and Visual Lisp, Creating line types and hatch patterns, Creating programmable dialog boxes, etc.						
Course outcome:						
<ol style="list-style-type: none"> 1. Be able to employ the tools available in AutoCAD effectively. 2. Enhance the operation of the software by customizing it. 						
Suggested readings:						
<ul style="list-style-type: none"> • Pradeep Jain & A.P. Gautam, Engineering AutoCAD 						

10. References

Curriculum of following prestigious institutions, as given on their respective web sites, was referred while preparing the proposed model curriculum for B. Architecture.

- Minimum standards of architectural education regulations, 2017 IIT, Kharagpur
- IIT, Roorkee
- SPA, Delhi
- SPA, Bhopal
- SPA, Vijaywada
- NIT, Bhopal
- NIT, Hamirpur
- NIT, Jaipur
- NIT, Nagpur
- NIT, Trichi
- NIT, Patna
- Anna University, Chennai
- VIT, Vellore
- SRM, University
- AMITY University, Mumbai
- Manipal University
- Andhra University
- BITS, Mesra
- Kerala University
- Nagpur University
- U. JJ College of Architecture, Mumbai

Highlights of Model Curriculum for Bachelor of Architecture (B. Arch) 2019

- Induction Training
- Good Mixture of Theory and Studio Courses
- Emphasis on Thesis and Training
- Inclusion of Traditional Ancient Knowledge
- Choice Based Subjects (Electives)



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