M.ARCH

MASTER OF ARCHITECTURE (ADVANCE DESIGN)

[2 YEAR FULL TIME POST GRADUATE DEGREE PROGRAM]

RECOGNISED BY THE COUNCIL OF ARCHITECTURE, NEW DELHI

REGULATIONS

2021 – 2022 Batch (New Syllabus)

CHOICE BASED CREDIT SYSTEM
(CBCS)

FACULTY OF ARCHITECTURE

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be UniversityEstablished Under Section 3 of UGC Act 1956)

Pollachi Main Road, Eachanari Post, Coimbatore – 641 021. INDIA

Enable | Enlighten | Enrich
KARPAGAM
ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)

M.ARCH - REGULATIONS

2021 - 2022 batch (credit system)

These regulations are effective from the academic year 2021 - 2022 and applicable to the Full-Time candidates admitted to M. Arch (Advance Design) during 2021 - 2022and onwards.

The M.Arch. in Advanced Design Degree program (professional, post-graduate level) aims at producing architecture professionals who will assume major leadership role in shaping the built environment, the quality of which is the major determinant of the quality of life.

The main goal is to inculcate advanced design abilities and understanding in various focus areas of architecture through live ***research - analysis - design*** *based models.*

1. ADMISSION

Candidates seeking admission to the first semester of the four semesters M. Arch(Advance Design) Degree Programme: should have compulsorily passed the B. Arch having secured minimum 50% in aggregate as prescribed by the Council of Architecture, New Delhi.

Preference will be given to candidates who have passed level GATE / CEED examinations in Architecture and Planning / Design respectively or any other equivalent test at graduate level and having a valid score as prescribed by the UGC / MHRD, Govt. of India.

Students who have successfully completed a post graduate certificate course shall be eligible to enroll in the 3rd semester of a post graduate degree course in the same specialization

1.2Lateral Entry Admission

The candidates who possess B. Arch with one year and PG Diploma in Architecture recognized by the Council of Architecture, New Delhi are eligible to apply for admission directly in the third semester of M.Arch. This is at the discretion of the University and subject to the maximum number of students not exceeding the permitted maximum intake in a class as well as satisfying other academic requirements.

1.3Migration

The University may at its discretion permit M. Arch candidates from other institutions to migrate subject to the maximum number of students not exceeding the permitted maximum intake in a class as well as satisfying other academic requirements.

2. PROGRAMMES OFFERED

2.1 Faculty of Architecture offers M. Arch (Advance Design-2 year Full time) Programme in the branch of study approved by the University and the Council of Architecture, New Delhi.

2.2 **INTAKE**

Total intake is 20 in the current batch as approved by the Council of Architecture, New Delhi.

3. MODE OF STUDY

3.1 **Full-Time:**

In this mode of study, the candidates are required to attend regular classes, to satisfy University attendance and assessment requirements.

4. STRUCTURE OF PROGRAMMES

4.1 Every Programme will have curricula and syllabi consisting of elective, 2studio:

(i) General core courses comprising Research Methodology, Design Systems and Advanced Design Studio.

(ii) Focus Areas in Sustainable Architecture and Housing Design

(iii) Advanced Elective courses for specialization from any of the focus areas.

(iv) Research based course such as Design Research and field studies ,Documentation& Presentation

There shall be a certain minimum number of core courses of elective courses that can be opted by the student. The blend of different courses shall be so designed that the student, at the end of the Programme, would have been trained not only in his / her relevant focus area but also would have developed as a socially conscious human being.

4.2 Each semester curriculum shall normally have a blend of elective, studio and Dissertation courses not exceeding 5 in total per semester.

4.3 The prescribed credits required for the award of the degree shall be within the limits specified below.

PROGRAMME	MANDATORY CREDITS
M. Arch (Advance Design)	**74**

4.4 The **medium of instruction for all Courses, Examinations, Seminars, Presentations and Project /Thesis /Dissertation reports are English.**

5. DURATION OF THE PROGRAMME

5.1 A student is normally expected to complete the M. Arch (Advance Design) Full Time Programme in 4 semesters (two academic years) but in any case, not more than 8 Semesters (four academic years) for all

candidates.

5.2 Each semester shall normally consist of 90 working days or 540 hours each. The Dean shall ensure that every teacher imparts instruction as per the number of periods / hours specified in the syllabus and that the teacher teaches the full content of the specified syllabus for the course being taught.

5.3 The Dean may arrange additional classes for improvement, special coaching, conduct of model test etc., over and above the specified periods. But for calculation of attendance requirement or writing the end semester examinations by the students 540 hours conducted within the specified academic schedule alone shall be considered and the overall percentage of attendance shall be calculated accordingly.

5.4 The total period for completion of the Programme reckoned from the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 5.1 irrespective of the period of break of study in order that he/she may be eligible for the award of the degree.

6. REQUIREMENTS FOR COMPLETION OF THE SEMESTER

6.1 Ideally every student is expected to attend all classes and secure 100% attendance. However, to allow for certain unavoidable circumstances, the student is expected to attend at least 75% of the classes and the conduct of the candidate has been satisfactory during the course.

6.2 A candidate who has secured attendance between 65% and 74% (both included), due to medical reasons (Hospitalization / Accident / Specific Illness) or due to participation in University / District / State / National / International level sports or due to participation in Seminar / Conference / Workshop / Training Programme / Voluntary Service / Extension activities or similar programs with prior permission from the Registrar shall be given exemption from prescribed attendance requirements and shall be permitted to appear for the examination on the recommendation of the PG co-coordinator concerned and Dean to condone the lack of attendance. The PG co-coordinator must verify and certify the genuineness of the case before recommending to the Dean.

6.3A candidate who has secured less than 65% of attendance in any semester will not be permitted to take the regular examination and has to continue the study in the subsequent semester. The candidate has to redo the course by rejoining the semester in which attendance is less than 65% with proper approval of the Registrar.

7. FACULTY ADVISER

To help the students in planning their courses of study and for general advice on the academic Programme, the Dean/Head of the Department will attach a certain number of students to a teacher of the Department who shall function as **Faculty Adviser** for those students throughout their period of study. Such Faculty Advisers shall advise the students and monitor the courses undergone by the students, check the attendance and progress of the students attached to him/her and counsel them periodically. If necessary, the faculty adviser may display the cumulative attendance in the Department notice board and discuss with or inform the Parents/Guardian about the progress of the students.

8. CLASS COMMITTEE

8.1. Every class shall have a class committee consisting of teachers of the class concerned, student representatives [one boy and two girls] and the concerned Dean/Head of the Department. It is to improving the teaching-learning process. The functions of the class committee include

- Solving problems experienced by students in the studios & class room.
- Clarifying the regulations of the degree Programme and the details of rules therein particularly clause 4 and 5 which should be displayed on department Notice-Board.
- Informing the student representatives, the academic schedule including the dates of assessments and the syllabus coverage for each assessment.
- Informing the student representatives, the details of Regulations regarding weight age used for each assessment. In the case of Studio courses (drawing / project work / seminar etc.) the breakup of marks for each / exercise /module of work, should be clearly discussed in the class committee meeting and informed to the students.
- Analyzing the performance of the students of the class after each test and finding the ways and means of solving problems, if any.
- Identifying the weak students, if any and requesting the teachers concerned to provide some additional help or guidance or coaching to such weak students.

8.2 The class committee shall be constituted within the first week of each semester.

8.3 At least 2 student representatives (usually 1 boy and 1 girls) shall be included in the class committee.

8.4 The Chairperson of the Class Committee may convene the meeting of the class committee.

8.5 The Dean may participate in any Class Committee of the institution.

8.6 The PG Coordinator is required to prepare the minutes of every meeting, submit the same to Dean within two days of the meeting and arrange to circulate it among the students and teachers concerned. If there are some points in the minutes requiring action by the Management, the same shall be brought to the notice of the Registrar by the PG Coordinator through the Dean.

8.7 Two or three subsequent meetings may be held in a semester at suitable intervals. During these meetings, the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the other students of the class to improve the effectiveness of the teaching-learning process.

9. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

9.1 Every teacher is required to maintain an 'ATTENDANCE AND ASSESSMENT RECORD' which consists of attendance marked in each lecture, studio class, the test marks and the record of class work (topic covered), separately for each course. This should be submitted to the PG Coordinator periodically (at least three times in a semester) for checking the syllabus coverage and the records of test marks and attendance. The Dean shall sign with date after due verification. At the end of the semester, the record should be verified by the Dean who will keep this document in safe custody (for five years). Records of attendance and assessment of both current and previous semesters shall be submitted for Inspection to the team appointed by the University/any other approved body.

9.2Continuous Internal Assessment (CIA): The performance of students in each subject will be continuously assessed by the respective teachers as per the guidelines given below

9.2.1 STUDIO COURSES:

S. No	CATEGORY	MAXIMUM MARKS
1.	Internal Jury (5 Jury x7 marks)	35
2.	Attendance	5
Continuous Internal Assessment: TOTAL		40*

PRACTICAL COURSES:

S. No	CATEGORY	MAXIMUM MARKS
1.	Internal Jury (Exercise/sheet valuation) **	35
2.	Attendance	5
Continuous Internal Assessment: TOTAL		40*

* - proportionate increase for all categories will be based on the total marks allotted for Continuous Internal Assessment for the concerned course.
** - No of Exercise/Sheets depends on subject.

9.2 ATTENDANCE

Marks Distribution for Attendance

S. No.	Attendance %	Marks
1	Between 91 % and 100%	5
3	Between 86 % and 90%	4
4	Between 81 % and 85%	3
5	Between 76 % and 80%	2
6	Less than 75 %	0

10. REQUIREMENTS FOR APPEARING FOR UNIVERSITY EXAMINATION

A candidate shall normally be permitted to appear for the University Examination of any semester commencing from I semester if he/she has satisfied the semester completion and attendance requirements and has registered for examination in all courses of the semester. Registration is mandatory for Semester Examinations as well as Arrears Examinations failing which the candidate will not be permitted to move to the higher semester. A candidate already appeared for subjects in a semester and passed the examination is not entitled to reappear in the same subject or subjects of the semester for improvement of grades / marks.

11. END SEMESTER EXAMINATIONS – Studio

End Semester Examination (ESE): End Semester Examination will be held at the end of each semester for each subject, which consists of 60 marks.

11.2 PATTERN OF ESE QUESTION PAPER: (Studio courses)

The ESE for studio subjects shall be conducted as an examination and/or as a final jury (viva-voce) for marks as per scheme of examination comprising external architect/related professionals with minimum 5 years' experience in practice or teaching.

12. PASSING REQUIREMENTS

12.1 Passing minimum: **The passing minimum for CIA is 50% (i.e. 20 out of 40 marks). The passing minimum for ESE is 50% (i.e. 30 out of 60 marks). The overall passing minimum for every course is 50% i.e. 50 out of 100 marks (Sum of his/her score in internal and external examination).**

12.2 If the candidate fails to secure a pass in a particular Studio course as per clause 12.1, it is mandatory that candidate shall register and reappear for the examination in the subsequent semester as an arrear when examination is conducted in that course. Further the candidate should continue to register and reappear for the examination till a **pass** is secured in End Semester Examination of such arrear subjects.

The Continuous Internal Assessment marks obtained by the candidate in the first appearance shall be retained by the Office of the Controller of Examinations and improved CIA marks may be considered for all subsequent attempts till the candidate secure a pass.

13. AWARD OF LETTER GRADES

13.1 All assessments of a course will be done on absolute marks basis. However, for reporting the performance of a candidate, letter grades, each carrying certain number of points, will be awarded as per the range of total marks (out of 100) obtained by the candidate in each subject as detailed below:

Letter grade	Marks Range	Grade Point	Description
O	91 - 100	10	OUTSTANDING
A+	81-90	9	EXCELLENT
A	71-80	8	VERY GOOD
B+	66-70	7	GOOD
B	61-65	6	ABOVE AVERAGE
C	55-60	5	AVERAGE
P	50-54	4	PASS
RA	<50		REAPPEARANCE
AB		0	ABSENT

13.2 GRADE SHEET

After results are declared, Grade Sheets will be issued to each student which will contain the following details:

i. The list of courses enrolled during the semester and the grade scored.
ii. The Grade Point Average (**GPA**) for the semester and
iii. The Cumulative Grade Point Average (**CGPA**) of all courses enrolled from first semester onwards.

GPA is the ratio of the sum of the products of the number of credits (**C**) of courses enrolled and the points corresponding to the grades (**GP**) corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester to the sum of the credits of all courses registered.

$$\text{GPA} = \frac{\text{Sum of [C * GP]}}{\text{Sum of C}}$$

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. **"RA** grade will be excluded for calculating **GPA** and **CGPA**.

13.3 Whenever students, having arrear subjects, appear for the end semester examination during which there are no regular batch of students writing the same subjects, then, the letter grades for the arrears subjects shall be awarded based on the range of marks.

13.4REVALUATION

Revaluation is not permitted for Studio courses.

14. ELIGIBILITY FOR THE AWARD OF THE DEGREE

A student shall be declared to be eligible for the award of the Degree if he/she has

- Successfully gained the required number of total credits as specified in the Curriculum corresponding to his/her Programme within the stipulated time.
- Successful completion of Dissertation/ Thesis.
- No disciplinary action is pending against him/her.
- The award of the degree must be approved by the Board of Management.

15. CLASSIFICATION OF THE DEGREE AWARDED

15.1 A candidate who qualifies for the award of the Degree having passed the examination in all the courses in his/her first appearance within the specified minimum number of semesters and securing a **CGPA of not less than 8.00** shall be declared to have passed the examination in **First Class with Distinction.** For this purpose, the withdrawal from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for classification.

15.2 A candidate who qualifies for the award of the Degree having passed the examination in all the courses within the specified minimum number of semesters plus one semester (i.e. n+1 semesters), and securing **CGPA of not less than 6.50** shall be declared to have passed the examination in **First Class**. For this purpose, the withdrawal from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for classification.

15.3 All other candidates (not covered in clauses 15.1 and 15.2) who qualify for the award of the degree shall be declared to have passed the examination in **Second Class**.

15.4 A candidate who is absent in semester examination in a course / dissertation after having enrolled for the same shall be considered to have appeared in that examination for classification.

16. PROVISION FOR WITHDRAWAL FROM END-SEMESTER EXAMINATION

16.1 A candidate, may for valid reasons and on prior application, be granted permission to withdraw from appearing for the examination of any one course or consecutive examinations of more than one course in a semester examination.

16.2 Such withdrawal shall be permitted only once during the entire period of study of the degree Programme.

16.3 Withdrawal application is valid only if it is made within 10 days prior to the commencement of the examination in that course or courses and recommended by the Head of the Department and Dean and approved by the Registrar.

16.3.1 Notwithstanding the requirement of mandatory TEN days' notice, applications for withdrawal for special cases under extraordinary conditions will be considered on the merit of the case.

16.4 Withdrawal shall not be construed as an appearance for the eligibility of a candidate for First Class with Distinction. This provision is not applicable to those who seek withdrawal during X semester.

16.5 Withdrawal from the End semester examination is **NOT** applicable to arrears subjects of previous semesters.

16.6 The candidate shall reappear for the withdrawn courses during the examination conducted in the subsequent semester.

17. PROVISION FOR AUTHORISED BREAK OF STUDY

17.1Break of Study shall be granted only once for valid reasons for a maximum of one year during the entire period of study of the degree Programme. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for break of study. If a candidate intends to temporarily discontinue the Programme in the middle of the semester for valid reasons, and to rejoin the Programme in a subsequent year, permission may be granted based on the merits of the case provided he / she applies to the Registrar, but not later than the last date for registering for the end semester examination of the semester in question, through the Head of the Department and Dean stating the reasons therefore and the probable date of rejoining the Programme.

17.2 The candidate thus permitted to rejoin the Programme after the break shall be governed by the Curriculum and Regulations in force at the time of rejoining. Such candidates may have to do additional courses as per the Regulations in force at that period.

17.3 The authorized break of study (for a maximum of one year) will not be counted for the duration specified for passing all the courses for classification. However, additional break of study granted will be counted for classification.

17.4 The total period for completion of the Programme reckoned from, the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 4.1 irrespective of the period of break of study (vide clause 17.3) in order that he/she may be eligible for the award of the degree.

17.5 If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'Break of Study' or 'Withdraw'

18. DISSERTATION / THESIS

18.1 As a part of the degree requirement, all candidates must submit a dissertation/thesis in the 3rd and 4th semesters under a faculty guide and/or external guide. This thesis is to be submitted individually by each candidate and is intended to assess individual research, methodology and design skills as a culmination of the knowledge accumulated throughout the course.

This thesis shall be submitted in two stages (evaluated separately and a candidate can proceed to stage II of the Dissertation/Thesis only if he/she passes the stage I successfully) as drawings, reports, models, slides, presentations, walkthroughs etc.

18.2 The topic selection, scope, criteria for evaluation, periodic reviews and all other matters related to the Dissertation/Thesis shall be decided by the Dissertation Committee of the Faculty of Architecture. The decision of the committee must be approved by Vice Chancellor/ Registrar before the commencement of the review process.

18.3 Continuous Internal Assessment (CIA- 160 marks) for Dissertation/Thesis (stage I) shall be held as a Viva-Voce examined by a jury comprising the Dissertation Committee (for 80 marks) and by the Guide (for 80 marks) of the Faculty of Architecture.

18.4 End Semester Examination (ESE-240 marks) for Dissertation/Thesis (stage I) shall be held as a Viva-Voce examined by a jury comprising external architect members (for 120 marks) and by internal members of the Thesis Committee (for 120 marks) of the Faculty of Architecture.

18.5 Continuous Internal Assessment (CIA- 320 marks) for Dissertation/Thesis (stage II) shall be held as a Viva-Voce examined by a jury comprising the Dissertation Committee (for 160 marks) and by the Guide (for 160 marks) of the Faculty of Architecture.

18.6 End Semester Examination (ESE-480 marks) for Dissertation/Thesis (stage II) shall be held as a Viva-Voce examined by a jury comprising external architect members (for 240 marks) and by internal members of the Thesis Committee (for 240 marks) of the Faculty of Architecture. Every Guide shall be an additional member (if not already a member) for evaluation of his/her Dissertation/Thesis student.

18.7 A Dissertation Committee shall be established well before the commencement of the Dissertation/Thesis for overseeing and regulating all aspects of the student's work and shall comprise minimum two faculty members from the concerned department, minimum one external faculty member from academic background and another one external members from practicing background. The PG Coordinator shall be the Convener; and the concerned class tutor of the batch shall be the Coordinator of this committee respectively.

19. ELECTIVES

Electives shall be from any of the focus areas and may be theory, practical or studio or self-study courses and subject to satisfying their course requirement

20. CASE STUDIES AND FIELD VISITS

As part of the degree requirement, all candidates must visit places and buildings of Architectural Interest and pertaining to the focus area as per course requirements, stipulated by the Faculty of Architecture.

21. DISCIPLINE

Every student is required to observe disciplined and decorous behavior both inside and outside the college and not to indulge in any activity which will tend to bring down the prestige of the University. The erring student will be referred to the Disciplinary Committee constituted by the University, to enquire into acts of

indiscipline and recommend the University about the disciplinary action to be taken. If a student indulges in malpractice in any of the University / Internal Examination, he / she shall be liable for punitive action as prescribed by the university from time to time.

23. REVISION OF REGULATION AND CURRICULUM

The University may from time to time revise, amend or change the Regulations, Scheme of Examinations and syllabi if found necessary at any stage of the course

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M.ARCH (Advance Design) - CURRICULUM
2021-2022 batch (New syllabus)

PROGRAMME EDUCATIONAL OBJECTIES (PEOs):

Master of Architecture curriculum is designed to prepare the graduates having knowledge and Skillful aptitude

I. To become a successful Professional
II. To imbibe and implant a strong foundation in Advanced design skills and technical aspects with research-oriented thinking and implementation
III. To learn the critical thinking process with the application of theoretical aspects and parameters for a quantifiable result.
IV. To Expertise the architectural and technical knowledge with field study and experimentation.
V. To bring out various ideas in advanced level for the society in future.

PROGRAMME OUTCOME (PO):

1. Ability to gain deep knowledge and understanding of Advanced Level Architectural design, Building science and simulation, digital applications, housing design.
2. Ability to Research, understands, analyze, synthesize and review the process of design outcome and publish as a report.
3. Ability to review the new technological developments in the profession of architecture and construction.
4. Ability to understand real life situation with enhanced approach towards the Architectural practice.

PROGRAMME SPECIFIC OUTCOME (PSO):

5. Ability to understand the overall design parameters with advanced level of analytical thought process and to give a quantifiable product based on research.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOME:

A broad relation between the Programme objectives and the outcome is given in the following table

PEO	PO1	PO2	PO3	PO4	PSO5
I			□	□	□
II	□		□		□
III	□	□			□
IV	□	□			□
V	□				□

M.ARCH (ADVANCE DESIGN) - CURRICULUM
2021-2022 batch (New syllabus)
Choice Based Credit System

Subject Legend:
ART – Theory -0, ARP – Practical-1, ARS – Studio-2, ARE Elective-3,
L- Lecture, T- Theory, P/S- Practical /Studio C- Credits
Abbreviation: CIA – Continuous Internal Assessment; ESE – End Semester Exam
Exam Hours: Theory (T)-3 Hrs Practical (P)-6 Hrs Studio(S) - 6 Hrs

Course code	Name of the course	Objectives and out comes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P/ S		CIA	ESE	Total
								40	60	100
SEMESTER - I										
21MARS111	Research Methodology I	I, II, III	2,4,5	1	-	2	**2**	40	60	100
21MARS112	Building Performance Analysis	I, IV	2,4,5	1	-	2	**2**	40	60	100
21MARS113	Advanced Design Studio I	I, IV, V	3,4,5	3	-	9	**8**	160	240	400
21MARES*	Advanced Elective I	II, III, V	2,3,4 ,5	2	-	4	**4**	80	120	200
21MARES**	Advanced Elective II	II, III, V	2,3,4 ,5	2	-	4	**4**	80	120	200
	Semester Total			**09**	**-**	**21**	**20**	**400**	**600**	**1000**
21MARESH1 Introduction to Housing & Real Estate 21MARESH2 Field Studies in Housing & Real Estate 21MARESS1 Introduction to Sustainable Architecture 21MARESS2 Field Studies in Sustainable Architecture										
SEMESTER – II										
21MARS211	Research Methodology II	I, II, III	2,4,5	1	-	2	**2**	40	60	100
21MARS212	Advanced Design Studio II	I, IV, V	3,4,5	4	-	8	**8**	160	240	400
21MARES*	Advanced Elective III	II, III, V	2,3,4 ,5	1	-	4	**4**	80	120	200
21MARES*	Advanced Elective IV	II, III, V	2,3,4 ,5	1	-	4	**4**	80	120	200
21MARES**	Advanced Elective V	II, III, V	2,3,4 ,5	1	-	4	**4**	80	120	200
	Semester Total			**08**	**-**	**22**	**22**	**440**	**660**	**1100**

21MARESH3	Sustainable Housing &Community participation
21MARESH4	Legal Framework for Real Estate & housing
21MARESH5	Project Valuation
21MARESS3	Sustainable Design Strategies &Systems
21MARESS4	Sustainable Theories & Trends
21MARESS5	Energy Conservation & Code Compliance

Course code	Name of the course	Objectives and out comes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P/ S		CIA	ESE	Total
								40	60	100
SEMESTER - III										
21MARS311	Dissertation I	I, III, IV, V	1,2,3, 4	3	-	9	**8**	160	240	400
21MARS*	Advanced Elective VI	II, III, V	2,3,4	2	-	4	**4**	80	120	200
21MARES**	Advanced Elective VII	II, III, V	2,3,4	2	-	4	**4**	80	120	200
Semester Total				**07**	**-**	**17**	**16**	**320**	**480**	**800**
21MARESH6 Project Formulation and Implementation 21MARESH7 Project Marketing 21MARESS6 Green buildings & Code Compliance 21MARESS7 Sustainable Integrated Systems										
SEMESTER – IV										
21MARS411	Dissertation II	I, II, III, IV, V	1,2,3 ,4	6	-	20	**16**	320	480	800
Semester Total				**6**	**-**	**20**	**16**	**320**	**480**	**800**

Total Marks :

Semester	Total Credits	Marks	Course	Credits
Semester- I	20	1000	Studio Courses	22
Semester- II	22	1100	Dissertation	24
Semester- III	16	800	Elective course	28
Semester- IV	16	800		
Total	**74**	**3700**	**Total**	**74**

21MARS111	RESEARCH METHODOLOGY - I								SEMESTER-I
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	2			**Credits**	**2**

COURSE OBJECTIVE:

- To learn the importance of research methodology
- To understand the Research application in architectural design.
- To understand the different methods and techniques as relevant to the design profession
- To apply the research concepts in evaluation and appraisal of architectural design projects.
- To Analyze the Various methodologies of Field Survey
- To Develop the skill of preparation of report and Documentation

COURSE OUTCOME:

1. Student will understand the methods of research
2. Student will be able to develop the Skill of field study and experimentation
3. Student will understand the research application in the field of Architectural Design
4. Student will understand about the collection of data and Analyze the data
5. Student will develop the skill of documentation of various Survey and Research
6. Student will be able to prepare documents, report writing and publish in journals

UNIT-I INTRODUCTION TO RESEARCH

Importance, Purpose and Scope of Research and Field Studies. Application in architecture in terms of design, technology, environment, economic and behavioral areas.

UNIT-II RESEACRH OBJECTIVES AND METHODOLOGY

Sequence and Methods of Research. Identification of Problem, Hypothesis Formulation, Objectives and Methodology.

UNIT-III APPLICATION OF RESEARCH

Understanding and Applying Qualitative, Analytical, Interpretative, Correlation, Quasi- Experimental, Experimental, Simulation and Modeling techniques in Architectural Design.

UNIT-IV FIELD STUDIES

Pilot Studies, Field Surveys and Collection of Samples - Physical, Architectural, Environmental, Organizational. Preparation and Analysis of Data Sheets and Questionnaires. Critical analysis of field study data and compilation

UNIT-V ANALYSIS, PREPARATION AND DOCUMENTATION

Preparation and Analysis of Data Sheets and Questionnaires. Arriving at conclusions from the Research at Field Studies. Report Writing and Publications. Organizing the Documents as per Inferences and Findings

SUGGESTED READINGS:

1.Knight, A. and Ruddock., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2.Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3.Gibbs, J.P., " Urban Research Methods", (rev) Von Nostrand. 1988.
4 Kothari, C. R., and Gaurav Garg. *Research Methodology: Methods and Techniques*. New Delhi: New Age International (P) Limited, Publishers, 2019.

21MARS112	BUILDING PERFORMANCE ANALYSIS								SEMESTER-I
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	2			**Credits**	**2**

COURSE OBJECTIVE:

- To Understand the principles of Sustainable building through Simulation process
- To learn the simulation techniques with digital applications, and to get quantifiable results by usage of various building simulation analysis software.
- To Understand the Effective methods of Day lighting through Simulation
- To Understand the Effective methods of Reduction of Solar Radiation through Simulation
- To Understand the effects of Indoor thermal comfort through Simulation.
- To Understand the Energy performance Index of a Building

COURSE OUTCOME:

1. Student will understand the effects of indoor comfort through software simulation and analysis
2. Student will be able to achieve a quantitative result of thermal analysis by software simulations
3. Student will be able to effectively use the modeling tools and techniques
4. Student will be able to design a building with good thermal comfort with optimum design solutions
5. Student will be able to give quantitative results of Day lighting and Ventilation of a building
6. Student will be able to give an energy performance index of a building.

UNIT-I BUILDING PERFORMANCE-DATA FILES

Building Performance Analysis - Design Optimization and Visualization using Building Information Modeling. - use of Epw file – TMY data extraction – IMD files

UNIT-II DAYLIGHTING, IRRADIATION AND WIND ANALYSIS

Building Performance Analysis - Day lighting, Shading and Ventilation.

UNIT-III ENERGY ANALYSIS

Building Performance Analysis - Whole building energy analysis.

UNIT-IV MODELLING TOOLS

Building Performance Analysis - Modeling Tools and Techniques.

UNIT-V SIMULATION TOOLS

Building Performance Analysis - Simulation Tools and Techniques.

Suggested software: CLIMATE CONSULTANT, HEED, SBEED, OPAQUE, ECOTECT, SKETCHUP – OPEN STUDIO, OPTIVENT, ENERGY PLUS, DAYSIM -RADIANCE, COOLVENT, RHINO-GRASSHOPPER-LADY BUG, DIVA, DRAGONFLY, SEFAIRA, IES-VE, VELUX and recent software.

SUGGESTED READINGS:

1. Autodesk Manuals for BIM tools such as CAD, REVIT, ECOTECT
2. Rhino tutorials, Sefaira tutorials
3. Climate consultant Tutorials, ClimaPlus- Climabox, Design Builder tutorials
4. Computational fluid Dynamics – Tutorials,
5. Open Studio – Tutorials

21MARS113	ADVANCED DESIGN STUDIO-I								SEMESTER-I
Marks	**Internal**	**160**	**External**			**240**	**Total**	**400**	**Exam Hours**	**6**
Instruction Hours /week	**L**	3	**T**	0	**P/S**	9			**Credits**	**8**

COURSE OBJECTIVE:

- To learn the importance of and undertake the design process at advanced level t
- To learn the design aspects and considerations in large scale projects
- To understand the Urban Reformation and Renewal systems through Design
- To Categorize the Physiological and Psychological aspects in advanced level of Design
- To understand the various design systems, guidelines and considerations as undertaken in the research and field studies and apply them in architectural design.
- To understand the future need for the city & design accordingly

COURSE OUTCOME:

1. Student will be able to design complex structures with advanced level planning principles
2. Student will be able to understand the Urban Renewal and urban level design
3. Student will be able to Design large scale projects
4. Student will understand the Physiological and Psychological aspects in advanced level of Design
5. Student will be able to give a wholesome product of design in all aspects
6. Student can give futuristic proposals for the urban Architecture.

UNIT-I to UNIT - V

CONTENT:

Design of advanced and complex built environments having strong linkages with the urban scale and focusing on architectural, spatial, landscape, environmental, structure, services and technology features.
Examples: Campus Design, Urban Centers, Mixed Use Development, Competition projects etc.

SUGGESTED READINGS:

1.Agkathidis, A., Hudert, M. and Schillig, G.,"Form Defining strategies: Experimenting Architectural Design", Wasmuth International. 2007.

2. Ching, F.D.K., "Architecture: Form, Space and Order", 3rd ed., John Wiley & Sons. 2007.

3. Morgan, C.L., "Jean Nouvel - The Elements of Architecture", Thames and Hudson. 1998.Neufert, P., "Architects' Data", 3rd ed., Blackwell Science. 2000.

21MARS211	RESEARCH METHODOLGY - II								SEMESTER-II
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	2			**Credits**	**2**

COURSE OBJECTIVE:

- To learn the importance of research methodology
- To understand the Research application in architectural design.
- To understand the different methods and techniques as relevant to the design profession
- To apply the research concepts in evaluation and appraisal of architectural design projects.
- To Analyze the Various methodologies of Field Survey in focus area such as Sustainability, housing etc
- To Develop the skill of preparation of report and Documentation in the focus area

COURSE OUTCOME:

1. Student will understand the methods of research
2. Student will be able to develop the Skill of field study and experimentation
3. Student will understand the research application in the field of Architectural Design
4. Student will understand about the collection of data and Analyze the data
5. Student will develop the skill of documentation of various Survey and Research
6. Student will be able to prepare documents, report writing and publish in journals

UNIT-I RESEARCH METHODS – PART -1

Importance, Purpose and Scope of Research methodology specific to the focus area. Understanding and Applying Qualitative, Analytical, Interpretative research in Architectural Design

UNIT-II RESEARCH METHODS – PART -2

Importance, Purpose and Scope of Research methodology specific to the focus area. Understanding and Applying Quasi- Experimental, Experimental, Simulation and Modeling techniques in the focus area of Architectural Design. Frame work of the collected data

UNIT-III FIELD STUDIES AND EXPERIMENT

Focus area and specialization specific Pilot Studies, Field Surveys and Collection of Samples - Physical, Architectural, Environmental, and Organizational samples. Various samples to be collected and Analyzed

UNIT-IV FIELD STUDY ANLAYSIS

Preparation and Analysis of Data Sheets and Questionnaires. Preparation and Analysis of Data Sheets and Questionnaires. Arriving at conclusions from the Research at Field Studies.

UNIT-V PROJECT REPORT

Arriving at conclusions from the Research and Field Studies. Preparation of Report Writing and Publication in Scopus indexed, peer reviewed journal

SUGGESTED READINGS:

1.Knight, A. and Ruddock,L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2.Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3.Gibbs, J.P., " Urban Research Methods", (rev.ed.) Von Nostrand. 1988.
4.Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.
5.Khanzode, V.V., "Research Methodology -Techniques and Trends", APH Publishing. 1995.
Books and Magazines/Journals specific to the focus area.

21MARS212	ADVANCED DESIGN STUDIO- II								SEMESTER-II	
Marks	**Internal**	**160**	**External**			**240**	**Total**	**400**	**Exam Hours**	**6**
Instruction Hours /week	**L**	3	**T**	0	**P/S**	9			**Credits**	**8**

COURSE OBJECTIVE:

- To learn the importance of and undertake the design process at advanced level t
- To learn the design aspects and considerations in large scale projects
- To understand the Urban Reformation and Renewal systems through Design
- To Categorize the Physiological and Psychological aspects in advanced level of Design
- To understand the various design systems, guidelines and considerations as undertaken in the research and field studies and apply them in architectural design.
- To understand the future need for the city & design accordingly

COURSE OUTCOME:

1. Student will be able to design complex structures with advanced level planning principles
2. Student will be able to understand & design as per the Sustainability aspects
3. Student will be able to Design large scale projects
4. Student will understand the Physiological and Psychological aspects in advanced level of Design
5. Student will be able to give a wholesome product of design in all aspects
6. Student can give futuristic proposals for the urban Architecture.

CONTENT:

Design of advanced and complex built environments having strong linkages with the urban scale and focusing on architectural, spatial, landscape, environmental, structure, services and technology features.
Examples: Campus Design, Urban Centers, Mixed Use Development, Slum redevelopment, Housing Development etc

SUGGESTED READINGS:

1. Agkathidis, A., Hudert, M. and Schillig, G., "Form Defining Strategies: Experimenting Architectural Design", Wasmuth International. 2007.
2. Ching, F.D.K., "Architecture: Form, Space and Order", 3rd ed., John Wiley & Sons. 2007.
3. Morgan, C.L., "Jean Nouvel - The Elements of Architecture", Thames and Hudson. 1998.
4. Neufert, P., "Architects' Data", 3rd ed., Blackwell Science. 2000.
5. Any other books, documents and standards relevant to the focus area.

21MARS311	DISSERTATION-I							SEMESTER-III	
Marks	**Internal**	**160**	**External**			**240**	**Total**	**400**	**Exam Hours**	**6**
Instruction Hours /week	**L**	3	**T**	0	**P/S**	9			**Credits**	**8**

COURSE OBJECTIVE:

- To Learn and show advanced understanding and application of the knowledge of Architectural design
- To Understand the Sustainability & housing in general or to any specific focus area through the culmination in a dissertation.
- To develop the skill of Unique research-based application through various Literature study
- To develop knowledge by own experimentation as per the chosen topic
- To do an in- depth study and analysis for a chosen topic of interest
- To present a Wholesome Technical Study report based on Experimentation and Research

COURSE OUTCOME:

1. Student will be able to identify the thrust area of research
2. Student will understand and develop his own dissertation topic with research -oriented study
3. Student will know the basis of experimentation, methods and applications
4. Student will understand the core ideas of Application design through the experimental research
5. Student will be able to analyze and synthesize a defined context with in-depth study and scientific approach
6. Student will be able to provide innovative and practical solutions for the future architecture.

CONTENT:

Identification of Dissertation Topic and Area, Hypothesis Formulation, Objectives and Methodology. Importance, Purpose and Scope of the Dissertation in architecture in terms of design, technology, environment, economic and behavioral areas.

Related Research, Literature and Field Studies. Submission of the above in report form.

Students must Publish a Research paper in a Journal

SUGGESTED READINGS:

1. Knight, A. and Ruddock,L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3. Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.
4. Wayne C Booth, Joseph M Williams, Gregory G. Colomb, 'The Craft of Research', 2nd Edition, University of Chicago Press, 2008.
5. Ranjith Kumar, 'Research Methodology- A Step by Step Guide for Beginners', Sage Publications, 2005.
6. John W Creswell, 'Research Design: Qualitative, Quantitative and Mixed Methods Approaches', Sage Publications, 2002.

21MARS411	DISSERTATION-II								SEMESTER-IV	
Marks	**Internal**	**320**	**External**			**480**	**Total**	**800**	**Exam Hours**	**6**
Instruction Hours /week	**L**	6	**T**	0	**P/S**	20			**Credits**	**16**

COURSE OBJECTIVE:

- To Learn and show advanced understanding and application of the knowledge of Architectural design
- To Understand the Sustainability & housing in general or to any specific focus area through the culmination in a dissertation.
- To develop the skill of Unique research-based application through various Literature study
- To develop knowledge by own experimentation as per the chosen topic
- To do an in- depth study and analysis for a chosen topic of interest
- To present a Design report based on previous Experimentation and Research

COURSE OUTCOME:

1. Student will be able to identify the thrust area of research
2. Student will understand and develop his own dissertation topic with research -oriented study
3. Student will know the basis of experimentation, methods and applications
4. Student will understand the core ideas of Application design through the experimental research
5. Student will be able to analyze and synthesize a defined context with in-depth study and scientific approach
6. Student will be able to provide innovative and practical solutions for the future architecture by Design

UNIT-I to UNIT - V

CONTENT:

Identification of Dissertation Topic and Area, Hypothesis Formulation, Objectives and Methodology. Importance, Purpose and Scope of the Dissertation in architecture in terms of design, technology, environment, economic and behavioral areas.

Related Research, Literature and Field Studies. Submission of the above in report form.

SUGGESTED READINGS:

1. Knight, A. and Ruddock,L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3. Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.
4. Wayne C Booth, Joseph M Williams, Gregory G. Colomb, 'The Craft of Research', 2nd Edition, University of Chicago Press, 2008.
5. Ranjith Kumar, 'Research Methodology- A Step by Step Guide for Beginners', Sage Publications, 2005.
6. John W Creswell, 'Research Design: Qualitative, Quantitative and Mixed Methods Approaches', Sage Publications, 2002

LIST OF ELECTIVES		
FOCUS AREA: HOUSING DESIGN & REAL ESTATE		
Elective 1 (Sem I)	Introduction to Housing & Real Estate management	21MARESH1
Elective2 (Sem I)	Field Studies on Housing & Real Estate	21MARESH2
Elective 3 (Sem II)	Sustainable Housing & Community participation	21MARESH3
Elective 4 (Sem II)	Legal Framework for Real Estate & housing	21MARESH4
Elective 5 (Sem II)	Project Valuation	21MARESH5
Elective 6 (Sem III)	Project Formulation and Implementation	21MARESH6
Elective 7 (Sem III)	Project Marketing	21MARESH7
FOCUS AREA: SUSTAINABLE ARCHITECTURE		
Elective 1 (Sem I)	Introduction to Sustainable Architecture	21MARESS1
Elective2 (Sem I)	Field Studies in Sustainable Architecture	21MARESS2
Elective 3 (Sem II)	Sustainable Design Strategies & Systems	21MARESS3
Elective 4 (Sem II)	Sustainable Theories & Trends	21MARESS4
Elective 5 (Sem II)	Energy Conservation & Code Compliance	21MARESS5
Elective 6 (Sem III)	Green Buildings & Code Compliance	21MARESS6
Elective 7 (Sem III)	Sustainable Integrated Systems	21MARESS7

21MARESH1	INTRODUCTION TO HOUSING & REAL ESTATE								SEMESTER-I
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

- To Gain Knowledge about the Housing Typologies all over the world
- To Understand the principles of Community living & Neighborhood
- To understand the social, economic, environmental, and psychological implications of housing process and products.
- The goal is to familiarize with housing as a process and a product in the context of the individual, the family, and the community.
- To introduce various stakeholders involved in the housing scenario.
- To Understand about the Housing Finance

COURSE OUTCOME:

1. Student will be able to gain knowledge about housing typologies
2. Student will understand about the theories and concepts of community and Neighborhood
3. Student will understand about the emerging trends in housing
4. Student will understand about the housing finance schemes and management
5. Student will understand the relation of housing and real estate management in the global and local scenario.
6. Student will Understand the Basis of Housing Demand all over the world

UNIT-I HOUSING TYPOLGY - COMMUNITY & POLICIES

History of Housing -Housing typologies - Identification of stakeholders, roles responsibilities of various stakeholders, classification of various typologies. Community and neighborhood - Theories and concepts, Housing Policies.

UNIT-II REAL ESTATE CONCEPTS FOR HOUSING

Fundamental Concepts, Techniques & Sequential events in Real Estate Development Process, Site evaluation – Land Procurement - Development Team assembly – Micro and Macro market study

UNIT-III HOUSING AND REAL ESTATE- TRENDS & MARKETS

Housing markets - Real estate scenario, Land availability & Acquisition, suburban and rural trends SEZ, SPV, Joint ventures, Smart city concepts, Types & Parameters, Franchisee systems, Green building, Rating of Buildings (CARE, CRISIL, ICRA). Rationales for Cross Border RE Investing - Facilitators of Real Estate Globalization: public markets, professionalization -Types of Global Real Estate Investors and Developers. Investment Formats - Developer equity/ Types of Debt Private Equity: Comingled and Direct - Different Types of Direct Development Strategies.

UNIT-IV HOUSING PROPERTY DEVELOPMENT & APPROVAL

Opportunities and Constraints in Emerging Markets - Structures for Development Finance - Risk Return Analysis –Exit Strategies. Planning objectives, identifying technical inputs required - Master plan & Detailed Development Plan- Front end clearances from various authorities - Timing of the project and scheduling.

UNIT-V HOUSING PROPERTY MARKET FUNDAMENTALS

Opening up New Markets Demand analysis for different types of Housing & RE - Property Market: Cyclical Rationales Capital Markets Supply constraints real side: land, infrastructure, finance. Government Policies: Subsidies, Taxation, Regulation

SUGGESTED READINGS:

1. Merrill, J.L. (Ed.). Introduction to Housing. Upper Saddle River, NJ:Pearson Prentice Hall. 2006
2. Joseph DeChiara, Julius Panero. Time-Saver Standards for Interior Design and Space Planning, McGraw-Hill Education, 2001
3. Robert E. Stevens, Philip K. Sherwood. How to prepare a feasibility study Prentice-Hall, 1982
4. Susan S. Fainstein, Scott Campbell, Readings in Planning Theory, Wiley, 2011
5. Doris Kohn, J. D. von Pischke, "Housing Finance in Emerging Markets: Connecting Low-Income Groups to Markets"Springer
6. Fillmore W Galaty, "Modern Real estate practice" (2002); Dearborn Trade Publishing, New York, U.S.A
7. Gerald R Cortesi, "Mastering Real estate principles" (2001); Dearborn Trade Publishing, New York, U.S.A.
8. Mike .E. Miles, "Real estate development – Principles & Process 3rd edition, (2000); Urban Land Institute, ULI – Washington DC
9. Richard B Peiser& Anne B. Frej, "Professional real estate development" – The ULI guide to the business – (2003), Urban Land Institute U.S.A.
10. Tanya Davis, "Real estate developer's handbook", (2007), Atlantic pub company, Ocala, USA.

21MARESH2	FILED STUDIES ON HOUSING & REAL ESTATE MARKET								SEMESTER-I
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVES:

- To understand the implications of the Capital Markets on the Real Estate Sector
- To sensitize on the concepts of development of real estate investment trusts (REIT)
- To provide an insight into the financial aspects of Real estate
- Basic analytical methods for investment and financing in properties
- Influences of international modes of decision making
- Understanding risks in real estate as a tool in mortgaging and investment performance
- To use the case study-based approach to examine investment strategies.

COURSE OUTCOMES:

- Students will acquire knowledge on development of real estate risks and securitization
- Students will acquire knowledge on structured financing including mortgage contract
- Students will be able to practice the principles, analytical methods and tools are useful for making investment and finance decisions.
- Students will acquire knowledge of the real estate market which is driven by Capital Intensive Economy.
- Students will acquire knowledge on real estate investment trusts (REIT) industry
- Students will acquire knowledge on development of market for real estate debt securities.

UNIT I CAPITAL MARKETS

Globalization of capital markets – impact on real estate finance and investment – institutional investors. Capital asset pricing theory – Asset allocation strategies – risk diversification – multi asset portfolios – benefits of capital market integration. Development of real estate investment trusts (REIT) industry. Capital theory and trade-offs over time – financial markets and economic efficiency Principles, analytical methods and tools useful for making investment and finance decisions regarding individual properties (Commercial, Industrial, Residential)

UNIT II CONVENTIONAL AND NON CONVENTIONAL FINANCE

Financial Markets – Investment strategies – market hypothesis – innovations – Tobin's Q – Portfolio selection. Institutional real estate decision making (pension funds, banks, life insurance companies, investment trusts, joint venture) debt financing- field studies

UNIT III RISK ANALYSIS and SECURITIZATION

Forecasting cash flows and estimating risk in real estate investments. Development of real estate securitization and structured financing including mortgage contract – Mortgage and options including calculation of various durations to evaluate risk sharing- field studies

UNIT IV PRICING, BENCH MARKING AND FINANCIAL TOOLS

Equilibrium pricing of assets clauses – investment performances measurement – bench marking, counseling for purchase and sale. Investment Criteria - Discounted Cash Flow, Return on Investment, IRR, NPV, Payback Period, CBR, CBA, Debt Service, Coverage Ratio, Techniques of Financial Appraisal. - field studies

UNIT V FIELD STUDIES OF HOUSING MARKET

Field studies Housing Market-Financial Viability, Capital Cost, Operational cost, Planning, Analysis, Costing, Income/Expenditure Statement, Balance Sheets etc

SUGGESTED READINGS:

1. Terrence M Clauritie, "Real estate finance: Theory & practice", (2005), Prentice hall, U.S.A
2. Steve Bergsman, "Maverick real estate financing", (2006), John Wiley &Sonss Inc, New Jersey,U.S.A.
3. David Falk; "The fundamentals of Real estate finance", (2005).USA Ira Nachem, The complete guide to "Financing real estate development" 2007- Mc Graw hill companies, USA.
4. Nathan. S. Collier, "Construction finding – the process of RE development, Appraisal & finance (2007); John Wiley & Sons Inc; New Jersey.
5. GE Greer, "Investment analysis for R E decision", (2003), Dearborn R E education.

21MARESH3	SUSTAINABLE HOUSING & COMMMUNITY PARTICIPATION								SEMESTER-II
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

- To Understand about the Site Analysis &Affordable housing
- To gain Knowledge about Resource Mapping & Building services for housing
- To learn about High Performance Housing
- To gain knowledge about the Community participation in Housing
- To Learn and determine the involvement end users in various stage of housing process

COURSE OUTCOME:

1. Student will be able to understand the sustainable site planning with site inventory and analysis
2. Student will understand about Affordable Housing & cost-effective techniques in housing
3. Student will be able to understand the advance level building services
4. Student will be able to understand the intricacies of Community participation in Housing
5. Student will gain Knowledge about the best practices in Community housing
6. Student will be able to develop a model for both the end user and the service provider

UNIT-I SITE ANALYSIS&A RESOURCE MAPPING

How Site and climate related issues affect the design parameters and decisions. -Site Inventory and Analysis- Location, Access- Circulation, Traffic, Climate, Sensory – Analysis Exploring the social and economic choices, options and decision of housing, various technologies available. Identifying the resources (construct techniques & technology, Manpower & Material) predominant in that area. Understanding the Availability and Cost implication of the resources

UNIT-II SERVICES & HIGH PERFORMANCE

Services -understanding of building system, how houses work as a system. Exploring the science and technology required to build high performance houses.

UNIT- III AFFORDABLE HOUSING

Affordable Housing –sustainable aspects – Space planning – Material Optimization etc

UNIT-IV COMMUNITY PARTICIPATION PLANNING

Awareness and importance of Community participation, Planning and design stages - Zoning studies, spatial analysis, customs & cultural practices and user -based studies People-based planning - Identifying & incorporating Aspiration, Needs & Affordability, incorporating special needs of the elderly and children, concept of better living. Degrees of customizations. Familiarization with development and planning process of various agencies (Public, Private (Multifamily), Private (single family), Co-operative, NGO), view on community participation, organizational structure, Project and product brief, Identification of beneficiaries.

UNIT-V COMMUNITY PARTICIPATION MODELS AND CASE STUDIES

Existing models of community participation across various typologies, best practices, Case studies.

SUGGESTED READINGS:

1. Thomas Russ, Site Planning and Design Handbook, Second Edition, McGraw-Hill Education, 2009
2. Joseph De Chiara, Julius Panero Time-Saver Standards for Interior Design and Space Planning, McGraw-Hill Education, 2001.
3. Clayton Bennett Greening Your Home: Sustainable options for every system in your house McGraw-Hill Professional 2008
4. Global Green USA, "Blueprint for Greening Affordable Housing" Island Press. 2007
5. Jessica Kellner Housing Reclaimed: Sustainable Homes for Next to Nothing New Society Publishers 2011
6. Sylvia J.T. Jansen, Henny C.C.H. Coolen and Roland W. Goetgeluk, "The Measurement and Analysis of Housing Preference and Choice" Springer 2011
7. Andrew Beer, Debbie Faulkner, Chris Paris, Terry Clower - Housing transitions through the life course: Aspirations, needs and policy 2011
8. Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
9. Merrill, J.L. (Ed.). Introduction to Housing. Upper Saddle River, NJ:Pearson Prentice Hall. 2006
10. Juilenne Hanson, Decoding Homes and Houses Cambridge University Press 20

21MARESH4	LEGAL FRAMEWORK FOR REAL ESTATE & HOUSING								SEMESTER-II
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVES:

- To introduce the various laws that affect land and property, Development control rules as the affect the property market.
- To relate the land use to property market.
- To equip students with formalities and regulatory mechanism of land ownership, transfer, lease and mortgage regulations.
- To examine the effect of Development control rules on the property market.
- To expose students to the Tender process, Construction contracts & bidding evaluation.
- To introduce students to legal requirements of land and its development.

COURSE OUTCOMES:

- The students will develop better understanding and skills advise to the client in this area.
- The students are exposed to land ownership, transfer, lease and mortgage regulations.
- The student will understand the dynamics of transfer of land and the system of registration of title.
- The students are exposed to the rules and regulation in obtaining Approval.
- The students will be sensitized to design of International contract documents & World Bank Procedural Rules
- The students will be equipped to deal with labor related legal issues in development projects

UNIT I REGULATORY REGIME

Laws and regulatory Framework – Understanding and appraisal of the regulatory regime. Development Control - Land use regulations – ordinances – subdivision rules –– Land Acquisition –Land ceiling act, Town and country planning Act, municipalities and local bodies act, Acts relating to environmental quality and infra structure development. Real Estate Regulatory Act (RERA)

UNIT II REGISTRATION AND TRANSFER OF PROPERTY

Legal Requirements – Insurance and Bonding – Laws governing sale- Purchases and use of Urban and Rural land – Land revenue codes- Tax Laws – Income tax – Sales tax – Excise and customs duties and their influence on construction –costs – Legal Requirements of Planning. Law of Property, examining the rules relating to the transfer of land, the system of registration of title, co-ownership of land - Land title – Tenancy– Local Government laws for Approval – Statutory Regulations

UNIT III CONSTRUCTION CONTRACTS

Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents- International Contract document - Standard Contract Document – Law of Torts.

UNIT IV TENDERS

Tenders – Prequalification – Bidding – Accepting – Evaluation of Tender Form – Technical – Contractual – Commercial points of View –Contract Formation and Interpretation – Potential Contractual Problems – World Bank Tender Procedures and Guidelines

UNIT V LABOUR REGULATIONS

Labour Regulations – Social Security – Welfare Legislation – Laws relating to wages – Bonus and Industrial disputes – Labour Administration – Insurance and safety Regulations – Workmen's Compensation Act – Other Labour Laws.

SUGGESTED READINGS:

1. Judith – Anne Mackenzie, "Text book on Land Law", (2004), Oxford University Press, U.K.
2. Kevin J Gray, "Elements of land law", (2004), Lexis Nexis, U.K.
3. Kendemadward Digby, "An introduction to the history of the law of real property"' (2005), the law book exchange Ltd. UK.
4. V.G. Ramachandran, "Law of land acquisition & compensation, 8th edition, 2000, Eastern Book Company, Lucknow.
5. K.C. Gopalakrishnan, "Legal Economics (Interactional Dimensions of economics and Law), (1998) ed; reprinted (2005), Eastern Book Company, Lucknow.
6. Catherine Ellioth, Contract Law (2003)
7. Richard Willmot Constructions Contracts – Law & Practice Oxford University Press, U.S.A.

21MARESH5	PROJECT VALUATION								SEMESTER-II	
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVES:

- To understand the concept of value and various factors affecting it
- To understand demand and supply characteristics
- To understand the role and responsibilities of a value
- To understand the impact of legal aspect on land value
- To understand various types of rights and interests involved in a property
- To teach the techniques of valuation of properties

COURSE OUTCOMES:

- Students will gain understanding on factors affecting the markets (demand
- Students will gain basic understanding of valuation procedures and standards
- Students can specialize in this area.
- Students will get trained to value various kinds of property.
- Students can evaluate investment decisions
- The Case Study based approach would equip students to handle similar valuation projects in their professional practice.

UNIT I CONCEPT OF VALUE AND NATURE AND SCOPE OF VALUATION

Cost, Price and value- Types of value, Elements of value, Factors affecting Value, HABU, Value in use and exchange. Demand and supply, Price and Elastics. Economic principles in valuation. Real property – rights and interests in real estate, Types of ownership and types of occupancy in real estate

Valuation function, Valuation standards as per the provisions of companies act 2013, IVS. – Role, responsibilities and functions of value.

UNIT II APPROACHES TO VALUATION – Cost Approach

Methods of cost estimate for building, Life of building – Physical, economical and legal, Factors affecting life of a building, Depreciation and obsolesce (Functional, technological and Economic), Cost – reproduction, replacement and depreciated replacement

UNIT III APPROACHES TO VALUATION –Income approach

Relation between income and value, Properties affected by RCA's, EA 1882, Leasehold properties under TPA 1882, Yeild Rate, RROI, AROI, Types of rent, outgoings, income, yield and years purchase. Types of lease, lease provisions and covenants. Valuation of interest – Lessor, lessee. Real estate as an investment, Investment decisions

UNIT IV APPROACHES TO VALUATION – Market approach

Types of Markets, Market survey and data collection, comparison of sale instances, Hedonic model and adjustment grid model, Land characteristics and effect on land value, Hypothetical plotting scheme, residue technique and other development methods.

UNIT V CASE STUDY

Property valuation – Residential, retail , Office, Industry & Hospitality . methods of valuation – land & building

SUGGESTED READINGS:

1. "Valuation of Immovable properties" (Under Direct Taxes) edn(2002), Grish Chand Gupta, Bharath Law House,New Delhi-83.
2. "Law Relating to Arbitration and A.D.R, New Edn(2002), N.K. Acharya's Asia Law House, Hyderabad, India.
3. Ko Wang, Real estate valuation theory, (2001) Kluwer Academic publishers, S. America.
4. Howard C Gelbtuch, "Real estate valuation in global markets", (1997), Appraisal institute.
5. Aswanth Damodaran, Investment Valuation (2002), John Wiley & Sons, UK

21MARESH6	PROJECT FORMULATION AND IMPLEMENTATION								SEMESTER-III	
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

1. This course aims at examining techniques and procedures relevant for project planning and implementation in developing countries, including project identification, feasibility analysis, design and implementation monitoring.
2. It also considers how to evaluate economic and distributive effects of completed or ongoing infrastructure development projects.
3. Specific attention has been given to show how institutional setting and other practical influences affect the use of conventional analytical tools.
4. To study relationship between projects and planning at various levels
5. To study about Management, implementation and evaluation of projects
6. To understand organizational aspects in project management

COURSE OUTCOMES:

1. Plan identifies projects and the success of plans depends on Implementation of identified projects.
2. In this context, students will develop knowledge on important aspects of project formulation, criteria for project appraisal and project management.
3. They learn about project monitoring
4. The resource management for project funding, operation and maintenance
5. Learn about preparing feasibility reports for project planning
6. Presentation skill development

UNIT I INTRODUCTION TO PROJECT FORMULATION

Introduction to project management - Importance of project management – Overview of the project cycle- Project life cycle analysis, Planning process and project planning – Search for project ideas – Strategies in capital allocation - Key elements in project formulation – Methods and tools for project formulation

UNIT II PROJECT ANALYSIS

Project identification and selection –Preparation of Detailed project report and feasibility reports. Project selection methods, Risk associated with Projects Decision; Tree Modeling. Capital cost estimation - Cost Evaluation Techniques in Project Management - Market and demand analysis – Technical analysis – Environmental analysis – Financial and economic analysis – Cash flow generation. Risk management, Risk and technical analysis, HRM issues in project management,

UNIT III PERT, CPM; Project Life Cycles,

Concept of CRITICAL PATH METHOD (CPM) and Concept of PERT, Aspects and applications of CPM and PERT, Concepts of a Project Life Cycle, Discounting Rates and Project Pricing, Concept of Forward Rates and Payback Time, Important Example of PERT Network involving Probabilistic time and variance,

UNIT IV PROJECT SCHEDULING

Concepts of Scheduling; GERT, QGERT, Critical Chain and Theory of Constraints, Probability models in networks, Work Breakdown Structure in Project Management, Activity Networks used in Project Management, Scheduling and Crashing of Jobs, Resource leveling and resource constraint, Detailed Explanation on Crashing of Jobs

UNIT V PROJECT IMPLEMENTATION AND MONITORING

Project Planning & Control - Project organization, contracting, Procurement and recruitment Budget, Fund flow statement, stabilization & finish. Integrated reporting system, flow diagrams, bar charts, milestone charts, Project management strategies, tools & techniques, Classical persuasive & non- persuasive techniques. New techniques of management by Objectives (MBO).

Need and techniques for monitoring – Performance and process monitoring – Monitoring schedules. Techniques of monitoring of development works, Management Information Systems, Environmental care, Safety.

Research writing and article writing stating case studies.

SUGGESTED READINGS:

1. Gudda, 'A Guide to Project Monitoring and Evaluation' Author House, 2011
2. Gray F.Cilfford, Larsen W Erik, Desai V. Gautam, "Project Management" Tata McGraw Hill Edition, New Delhi, 2010.
3. Henderson PD, 'Investment Criteria for Public Enterprises, Penguin Books, New Delhi 1999.
4. Michael Bambarger and Eleanor Hewitt, 'Monitoring and Evaluating, Urban Development Programmes: A Hand Book for Program Managers and Researchers, The World Bank. 1988.
5. Kurowski Lech, David Sussman., "Investment Project Design- A Guide to Financial and Economic Anaysis with Constraints" John Wiley & Sons publications. 2011
6. Prasanna Chandra, 'Projects', Tata McGraw-Hill Publishing Company Limited, New Delhi, 2009
7. Raghuram G, Rekha Jain, SidharthSinha, PremPangotra and Sebastian Morris, 'Infrastructure Development and Financing, Macmillan India, Delhi, 2000
8. Samuel Mantel, Jack Meredith, Scott Shafer, 'PROJECT MANAGEMENT CORE TEXTBOOK' John Wiley & Sons, 2006
9. Warren C. Baum, 'The Project Cycle', World Bank – Economic Development Projects, Washington, 1993.
10. K.Lyons, Impact assessment & project appraisal, (2001), Beach tree publishing, England.
11. UNIDO (1972) "Guidelines for project evaluation", UN, New York.
12. N. Imboden, A Management appraisal to Project Appraisal & Evaluation (1978), Development centre, Paris.
13. Punekar S.D, Aspects of evaluation & Project Appraisal, Popular PrakashanPvt. Ltd.

21MARESH7	PROJECT MARKETING								SEMESTER-III
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVES

- To facilitate understanding of the conceptual framework of marketing and its applications in decision making under various environmental constraints.
- To understand the importance of branding and pricing
- To understand on the sales and marketing aspects of real estate business
- To identify customer needs and assess their risk appetite
- To introduce students to new age marketing techniques
- To understand the importance of IOT in real estate

COURSE OUTCOMES:

- The student will acquire in depth knowledge in various types of marketing
- The student gain expertise in organising and controlling marketing operations
- The students will gain knowledge on identifying potential clients and developing marking strategies accordingly
- The students will gain better understanding about packaging their products
- The students will gain expertise on creating a portfolio for their product.
- The students will gain knowledge on creating a web site.

UNIT I INTRODUCTION TO MARKETING

Concept, nature, scope and importance of marketing; Marketing concept and its evolution; Marketing mix; Strategic marketing planning – an overview. Market Analysis and Selection: Marketing environment – macro and micro components and their impact on marketing decisions; Market segmentation and positioning; Buyer behaviour; consumer versus organizational buyers; Consumer decision making process. Branding & franchising

UNIT II BRANDING, PRICING AND DISTRIBUTION CHANNELS

Branding – strategic implications, new product development and consumer adoption process. Pricing Decisions, Factors affecting price determination, Pricing policies and strategies; Discounts and rebates. The traditional marketing process and consumer behaviour - Marketing of residential property and agencies-Consumer behaviour.

Distribution Channels and Physical Distribution Decisions: Nature, functions, and types Retailing and wholesaling. Promotion Decisions: Communication Process; Promotion mix – advertising, personal selling, sales promotion, publicity and public relations; Advertising effectiveness; Sales promotion – tools and techniques.

UNIT III MARKETING RESEARCH & ISSUES AND DEVELOPMENTS IN MARKETING

Marketing Research: Meaning and scope of marketing research; Marketing research process. Marketing Organisation and Control: Organising and controlling marketing operations Social, ethical and legal aspects of marketing; Marketing of services; International marketing; Green marketing; Cyber marketing; Relationship marketing and other developments of marketing.

UNIT IV INTRODUCTION TO WEB DESIGN

Basics of web design – Introduction to software used for web design – ADOBE IMAGE READY, DREAMWEAVER, and FLASH etc. Static pages

Slice – URL in ADOBE IMAGEREADY. Creation and Editing of site map – layer, tables, frameset, - CSS style – Forms – tools like insert, roll over etc., in DREAMWEAVER, Animation In Flash- Introduction to MACROMEDIA FLASH, importing other file formats to Flash- saving and exporting Flash files, Frame by frame animation – Motion Tweening – Shape Tweening, Introduction to scripting - Using Timeline – Frames –Key frames- Creating and using Symbols- Simple scripting in flash – Publishing SWF files

UNIT V DEVELOPING A WEB SITE

Using the skills and concepts learnt with the ADOBE IMAGEREADY, DREAMWEAVER, FLASH software. Students will develop their portfolio in the form of web pages. These pages have to be uploaded in free public domains.

SUGGESTED READINGS:

1. Rosenauer& Mayfield, Real Estate Sales & Marketing, 3rd Edition, , Thomson South western.
2. Catharine Slade-Brooking, Creating a Brand Identity: A Guide for Designers: (Graphic Design Books, Logo Design, Marketing), Laurence King Publishing, 2016
3. Will Leach, Marketing to Mind states: The Practical Guide to Applying Behaviour Design to Research and Marketing, Lioncrest Publishing, 2018
4. Adobe Dreamweaver CS6 classroom in a book, Adobe creative team, 2012.
5. Adobe Flash CS3 professional on demand by Steve Johnson, Andy Anderson, Perspectioninc, 2012.
6. Adobe Photoshop CS3 studio techniques, Ben Wilmore, 2012.
7. Flash Web Design, The Art of Motion Graph, Curtis Hillman, New Riders Publishing, Indianapolis, IN. U.S.A, 2000
8. M.E. Morris, and R.J. Hinrichs, Web Page Design, Prentice Hall, 1996.
9. Mark Von Wodtke, Mind over Media : Creative Thinking Skills for Electronic Media, McGraw-hill, New York, 1993
10. Photoshop 7 Bible Professional Edition, Wiley John & Son INC, New York, Deke McClelland, 2000.

21MARESS1	INTRODUCTION TO SUSTAINABLE ARCHITECTURE								SEMESTER-I	
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

- To Orient & Proceed towards the United nations Sustainable Development goals
- To Understand the environmental impact of building as well as to safeguard the environment
- To Understand the Sustainable Design principles in Traditional Buildings
- To Understand the Climatic impacts due to urbanization and ways for mitigation.
- To Understand about the building science and its impacts
- To Understand the broad guideline of various green Building Systems

COURSE OUTCOME:

1. Student will understand the fundamentals of sustainable concepts and applications
2. Student will understand the Site planning principles of the traditional buildings
3. Student will understand the climate and its impacts in indoor thermal comfort
4. Student will understand the concepts of energy usage ratio and the utilization of energy.
5. Student will understand the Green building Rating Systems in a Broader context
6. Student will understand the Effective methods to propose green buildings through Case Studies

UNIT-I INTRODUCTION TO SUSTAINABILITY

Introduction to Sustainable Design Concepts and Strategies - Energy and Environment in Architecture, Green building systems, Energy efficiency- United nations -Sustainable Development Goals

UNIT-II SUSTAINABLE CONCEPTS IN TRADITIONAL BUILDINGS

Sustainable Design Principles & concepts- Vernacular Style-Traditional buildings-history & Human Settlements around the world -level of sustainability - Urban level planning -water management – waste management- Building level – Micro and Micro planning – Structures – Systems – Materials – Thermal comfort -adaptation to geographical conditions etc

UNIT-III CLIMATE AND BULT ENVIRONMENT

Climate and Built Environment – Overall climatic influences – Microclimatic conditions – Thermal Comfort – Body heat Balance – weather data summary – Bioclimatic, Psychometric – chart- Comfort Indices- Effective Temperature – Operative Temperature –Comfort Standards- ASHRAE, TSI, IMAC, Adaptive comfort model etc

UNIT-IV BUILDING SCIENCE -SOLAR CONTROL, DAYLIGHTING & VENTILATION

Solar Control -Sun Path – Shading concepts – Thermodynamics -Heat balance – Thermal properties of materials- Heat Dissipation – Albedo effect etc.-Overview of Radiation, Day lighting- WWR etc, Ventilation- Wind rose analysis – Ventilation concepts – Fenestrations- Methods and calculations – Orientation strategies- Cross ventilation etc

UNIT-V ENERGY IMPACTS & GREEN BUILDING SYSTEMS

Introduction to Energy concepts -Zero Energy and Zero Waste - Methods to achieve zero energy and zero waste in buildings, life cycle assessments and energy audits, renewable energy technologies, integrated energy design. Introduction to Green buildings systems - GRIHA, LEED, BREEAM, GREEN STAR. Comparative Studies and analysis, relevance to India.

SUGGESTED READINGS:

1. Koenigsberger, O. H., Ingersoll, T. G., Mayhew, A., Szokolay, S. V., 1973, 2014 *Manual of Tropical Housing and Building Part 1. Climatic* Design, Orient Longman Pvt. Ltd.
2. Givoni, B., 1969. *Man, Climate and Architecture*, Elsevier Publishing Company Limited.
3. Krishnan, A. (ed.), Baker, N., Yannas, S., Szokolay, S., 2001. *Climate Responsive Architecture – A Design Handbook for Energy Efficient Buildings*, Tata McGraw-Hill Publishing Company Limited, New Delhi
4. Mark Dekay and G.Z. Brown, "*Sun, Wind and Light- Architectural Design Strategies*",,John Wiley and Sons
5. Norbert Lechner, "*Heating, Cooling, Lighting*", John wiley and sons,2010
6. Szokolay, S. V., 2004. *Introduction to Architectural Sciences: The Basis of Sustainable Design*, Architectural Press, Oxford.
7. TERI, 2004. *Sustainable Building Design Manual Volume 2*, prepared under a European Union cofunded ASIA-URBS project under the leadership of InstitutCatalad'Energia (Spain), The Energy & Resources Institute, India.

21MARESS2	FIELD STUDIES IN SUSTAINABLE ARCHITECTURE								SEMESTER-II
Marks	Internal	80	External			120	Total	200	Exam Hours	6
Instruction Hours /week	L	2	T	0	P/S	4			Credits	4

COURSE OBJECTIVE:

- To Understand the importance of research & Field study in Sustainable Architecture
- To Understand the survey by analysis of results as the basis of research.
- To Develop the Art of data collection and Collection of Samples
- To Undertake field study & learn from research-based publications
- To refer reputed journals/magazines and gain the skill & Importance of good presentation methods.

COURSE OUTCOME:

1. Student will be able to collect data and information as per the context
2. Student will understand the methods of Field Survey
3. Student will understand the method of collection and compilation of Data of Survey & Field Study
4. Student will be able to format all the data into types and to prepare and publish
5. Student will be able to critically find solutions with the analytical skills of research
6. Student will develop the Skill of Report Writing

UNIT-I FIELD STUDY – PROCESS OF SURVEY

Field Study – Introduction & Preparation – Types of Study – Survey – Questionnaire format – Key Approach - Methods -importance of detail – Choosing the right area & topic

UNIT-III DATA COLLECTION & LITERATURE REVIEW

Data - types, collection methods, comprehension. Literature study – previous publication, information sources - Areas of the research - frame work and methodology of study, outcome of the results. Field study – by means of survey/questionnaire – by equipment/instruments, etc. – Manual readings/reports. Compilation of data – organizing the collected data – analysis, inference, conclusions. Types of analytical methods. Literature review and sources of information; analysis of documents and data; scope and limitations of design and research. Documentation of differing data and information of books & Field study- To undertake

UNIT-II FIELD STUDY ANALYSIS

Field study and Survey related to Sustainable Architecture- Study interpretations – Analysis by means of charts and tables

UNIT-IV REPORT WRITING, COMPILATION & PRESENTATION

Reports - authentication of sources-Methods- Sequence of Presentation – data, Document styles, formats – figures, charts, tables. Technical writing skills-Effective presentation techniques of oral / written material and information, for professionals in the design field.

UNIT-V EDITING & PUBLISHING

Paper Presentation - organizing & participating in technical seminars, exhibitions, workshops, conferences related to architecture & allied fields. Publication and dissemination of analysis/inferences from experiments/surveys. Publication of papers / articles in reputed magazines/journals. Preparing, editing and publishing reports, dossiers, documents, and portfolio of masters' course work, off/on-line dissemination of information in media - web, blogs, etc. Frame work of the comprised date with additional information.

SUGGESTED READINGS:

1. Knight, A. and Ruddock,L., "*Advanced Research Methods in Built Environment*", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "*Architectural Research Methods*" second edition, John Wiley & Sons. 2013.
3. Gibbs, J. P., "*Urban Research Methods*", (rev.ed.) Von Nostrand. 1988.
4. Booth, Wayne C., Gregroy G. Colomb, and Joseph M. Williams. 2008.”*The Craft of Research*,” 3rd edition. Chicago: University of Chicago Press.
5. Zeisel, J., "*Inquiry by Design*", Revised edition. New York: Norton, 2006.
6. Joo-Hwa Bay and Boon- Lay Ong., *“Tropical Sustainable Architecture*”, Elsevier Ltd,2006.
7. PLEA-*Passive Low Energy Architecture*- conference Proceedings- 2014, 2015 etc

21MARESS3	SUSTAINABLE DESIGN STRATEGIES & SYSTEMS								SEMESTER-II
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

- To understand the sustainable design strategies and its principles in the design.
- To gain understanding of Passive, hybrid strategies & Mixed mode building for various climatic zone
- To Understand about the aspects of indoor Environmental Quality& Systems
- To Understand the Green Material Products & Applications
- To gain Knowledge about the Sustainable materials

COURSE OUTCOME:

1. Student will be able to apply the Sustainable design strategies in architecture, Design and environment
2. Student will understand the application of Passive, Active and Hybrid Deign strategies.
3. Student will understand about the needs of Indoor Environment Quality
4. Student will understand about Green Materials &Construction
5. Student will understand about the Sustainable construction techniques
6. Student will gain knowledge about new sustainable materials

UNIT-I PASSIVE & HYBRID DESIGN STRATEGIES

Fundamental Design Strategies -Passive design strategies & techniques – Heating & Cooling Strategies– Climatic Zone &Techniques for Passive design – Day lighting, natural Ventilation, built form, External Features -Hybrid Design strategies- Heating & Cooling Strategies- Mixed mode system – Fan forced ventilation – Exhaust systems – low energy systems etc –etc

UNIT-II DESIGN FOR CLIMATE

Design strategies recommended for Indian Climatic Zone & other Zones of the World-Application of passive & hybrid Design strategies- Preparation of Climatic Design building bundles as per the Climatic Zone relevant case studies- residential – commercial – institutional etc

UNIT-III INDOOR ENVIRONMENTAL QUALITY& SYSTEMS

Introduction to Indoor Environment - Quality and Standards, Systems for Indoor Air Quality monitoring – CO2 monitoring Daylight level & comfort- minimizing Pollutants – Low Emitting materials – Indoor Air Quality management etc

UNIT-IV MATERIAL STUDY & STRUCTURAL SYSTEMS

Introduction to Sustainable Materials- Embodied energy of materials -composite materials – phase change materials – sustainable aspects – Structural systems with new material etc

UNIT-V GREEN MATERIALS& CONSTRUCTION SYSTEMS

Green Materials and green Products- Manufacture- reuse- reduce-recycled materials- Life cycle assessment of materials – traditional materials – Bamboo, earth construction, Filler slabs, arches, CSEB minimum embodied energy etc

.

SUGGESTED READINGS:

1. Szokolay, S. V., 2004. *Introduction to Architectural Sciences: The Basis of Sustainable Design,* Architectural Press, Oxford.
2. TERI, 2004. *Sustainable Building Design Manual Volume 2*, prepared under a European Union cofunded ASIA-URBS project under the leadership of InstitutCatalad'Energia (Spain), The Energy & Resources Institute, India.
3. Minke, Gernot and Bansal, N. K. 1988. *Climatic Zones and Rural Housing in India*, Kernforschungsanlage GmbH, Jülich.
4. CPWD construction manual
5. Sustainability of Construction Materials, A volume in Woodhead Publishing Series in Civil and Structural Engineering *Edited by J. Khatib* ISBN: 978-1-84569-349-7
6. Bureau of Indian Standards, 1987. *SP41(S&T): Handbook on Functional Requirements of Buildings (Other than Industrial Buildings)*, New Delhi.
   Bureau of Indian Standards, 2005. *National Building Code of India, Part 8: Building Services, Section 1: Lighting and Ventilation*, New Delhi.
7. Krishnan, A. (ed.), Baker, N., Yannas, S., Szokolay, S., 2001. *Climate Responsive Architecture – A Design Handbook for Energy Efficient Buildings,* Tata McGraw-Hill Publishing Company Limited, New Delhi
8. Mark dekay and G. Z. Brown, "*Sun Wind and light – Architectural Design Strategies* ", John wiley and sons, New York.2013
9. Arceivala. S.J., "Wastewater Treatment for pollution Control"- Tata-McGraw Hill, New Delhi, 1986.
10. Municipal Solid Waste (Handling & Management) Rules 2000
11. MiliMajunder, Teri – "*Energy Efficient Buildings in India"* - Thomson Press, New Delhi. 2001

21MARESS4	SUSTAINABLE THEORIES & TRENDS								SEMESTER-II	
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

- To Understand the various Sustainable Development goals & Policies
- To Gain an understanding about the Environmental Impact Assessment
- To Gain knowledge about bio mimicry and applications in building design
- To Gain Knowledge about Adaptive reuse & Urban regeneration
- To Understand about Resource Optimization &Operational procedure
- To gain knowledge about the futuristic approaches in sustainability

COURSE OUTCOME:

1. Student will be able to understand the sustainable policy level mechanisms and design process and product accordingly.
2. Student will understand the concepts of environmental Impacts & Assessment
3. Student will understand to use the site in an optimum manner and know about the operational and maintenance practices.
4. Student will gain knowledge about futuristic design systems and new material applications.
5. Student will Understand about the Adaptive Reuse & urban Generation
6. Student will gain knowledge about futuristic systems, bio mimicry and its importance in sustainable design

UNIT-I POLICY AND REGULATORY MECHANISMS

Sustainable Development Goals -Policies and regulatory mechanisms, Economic approaches – measuring wealth – social – capital- central Government Policies & Schemes for Urban infrastructure etc

UNIT-II ENVIRONMETAL IMPACT ASSESSMENT

Introduction to Environmental protect Act – state & central pollution control board – Air act, Water Act, real Estate Development Act etc

UNIT-III RESOURSE OPTIMISATION &ADAPTIVE REUSE

Introduction to resource Optimization Of site potential, Minimization of energy consumption, Protection and conservation of water resources, Use of environmentally friendly materials and products, Provision of a healthy and convenient indoor climate, Optimization of operational and maintenance practices Sustainable Practices- Adaptive Reuse – recycling and reuse of materials – Building restoration- Structural restoration –

UNIT-IV URBAN REGENERATION

Introduction to Urban regeneration – Sustainability issues in urban level –Urban heat Island mitigation- Open spaces- Parks – Water bodies – Pedestrianization -relevant case studies etc

UNIT-V DIGITAL APPLICATIONS AND FUTURISTC APPROACH

Introduction to sustainable Future- Futuristic thoughts and approaches, New materials and technologies, Application of digital technologies, Bio-mimicry – Evolution of design.

SUGGESTED READINGS:

1. Lawrence D.P., Environmental Impact Assessment – Practical solutions to recurrent problems, Wiley-Interscience,NewJersey, 2003*&Relevant Acts and Publications of Government / Autonomous bodies and other Agencies*
2. Vancouver in Focus: The City's Built Form, Author: Mike Chadwick, Publisher: Granville Island Publishing, ISBN-10: 1894694449, ISBN-13: 978-1894694445
3. Albert Ting-Pat so & Wai Lokchan, "*Intelligent Building Systems (The international series on Asian studies in computer and information science),* Springer, 1999.
4. Safdie, Moshe, 1998 *"The City After the Automobile: An Architect's Vision"* Westview Press,
5. Preiser Wolfgang F E and Jacqueline C Vischer, 2004, "*Assessing Building performance*" Elsevier limited, London,
6. Robert B. Bechtel and Arza Churchman,2002. "*Handbook of Environmental Psychology*", John Wiley & Sons Inc., New York
7. Sara J. Wilkinson, Hilde Remoy, Craig Langston, 2014 "*Sustainable Building Adaptation: Innovations in Decision-making*", John Wileyand sons,
8. John Krigger, 2009," *Residential Energy: Cost Savings and Comfort for Existing Buildings"* Prentice Hall
9. Paul Apple, 2013," *Sustainable Retrofit and Facilities Management*", Routledge,
10. William H. Clark, 1997," *Retrofitting for Energy Conservation*", McGraw Hill Professional,

21MARESS5	ENERGY CONSERVATION & CODE COMPLIANCE							SEMESTER-II	
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

- To Understand the various Energy in buildings& Energy Consumption
- To Gain knowledge about Energy impacts& Conservation techniques
- To Understand about Energy Optimization in Large scale projects
- To understand the cost impacts & learn about energy & cost audit
- To gain deep understanding about the Net Zero Energy Buildings

COURSE OUTCOME:

1. Student will be able to understand the energy usage in buildings
2. Student will understand the energy impacts & Conservation techniques
3. Student will understand about the Energy Optimization due to design decisions
4. Student will gain knowledge about the Energy Audit process
5. Student will gain knowledge about the Cost Audit & evaluation
6. Student will Understand about the design of Net Zero Energy buildings

UNIT-I ENERGY IN BUILDINGS & ECBC CODE

Energy – Global Energy consumption -Conventional systems – Modern systems – Energy bills – Equipment & Utility-Embodied energy -Energy performance Assessment- Energy ratings – ECBC guidelines – ECBC CODE compliance & Certification- ECBC, ECBC+, Super ECBC

UNIT-II ENERGY RESOURCES & CONSUMPTION

Renewable & Non-Renewable resources – Fuel – Demand & Supply charts -Energy consumption – small scale & large-Scale Projects- calculation- Energy performance Index (EPI)- Energy Usage Index (EUI)recommendations from ECBC– Load factor -energy use- Residential -office- Education- hospitality -supermarkets -Apartments- hotels- relevant Case studies

UNIT-III ENERGY CONSERVATION TECHNIQUES- LOW ENERGY BUILDINGS

Energy Conservation – techniques- Orientation, built form, Fenestration – Integrated systems& Services- HVAC optimization - Manual operations- Low Energy building Design and operation

UNIT-IV ENERGY&COST AUDIT

Energy Audit -Cost Audit- Pre-Audit – Audit- Post Audit -Phase calculation – Post occupancy Calculation & Report making- property audit – Efficiency audit- Audit procedures etc

UNIT-IV NET ZERO ENERGY BUILDINGS (NZEB)

Net Zero Energy buildings- concept-methods to achieve zero energy zero waste – Integration of hybrid design for energy optimization

SUGGESTED READINGS:

1. Nayak, J. K., Prajapati, J. A., 2006. *Handbook on Energy Conscious Buildings*, Prepared under the interactive R&D Project No. 3/4(03)99-SEC between Indian Institute of Technology, Bombay, and Solar Energy Centre, Ministry of New and Renewable Energy, Government of India.
2. Slessor,1997 "*Eco-Tech: Sustainable Architecture and High Technology*"- Thames and Hudson
3. Mostaedi (A) – Carles Broto 2002 "*Sustainable Architecture: Low tech houses*"
4. YeangKen, 2006 "*Eco-design: A manual for Ecological Design*" Wiley Academy

21MARESS6	GREEN BUILDINGS & CODE COMPLAINCE							SEMESTER-III	
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

- To develop and acquire knowledge about the Green buildings
- To Gain knowledge about the green Building codes
- To understand the code compliance Process
- To understand the Indian and International green building codes
- To understand the design ideas for the green building

COURSE OUTCOME:

- Student will understand the basic concept of Green buildings
- Student will gain knowledge in various green rating systems around the world
- Student will understand the criteria involved in the Green rating systems
- Student will learn about the design techniques to be followed as per codes
- Student will learn about the documentation of project for green Building certification
- Student will gain knowledge about the green building design aspects

UNIT- I GREEN BUILDING CODES & CERTIFICATION

Green building design – benefits – rating systems – Introduction to USGBC, IGBC codes- for various types of buildings – campus rating-Cities rating -factory – health care -Schools- Interiors etc LEED, GRIHA, ECBC, super ECBC, CASBEE- Japan, BREEAM, Green Building Council of Australia (GBCA),PEARL- Abu Dhabi ,Green building Imitative (GBI)etc- HK- BEAM – Hong Kong, Prescriptive method- Building performance method variations etc

UNIT- II USGBC &IGBC CODE & COMPLIANCE

USGBC – LEED &IGBC codes – all credits & ratings- Compliance Process & Certification

UNIT- III GRIHA CODES & COMPLIANCE

GRIHA codes – all credits & ratings – Compliance Process & Certification

UNIT- IV GREEN BUILDING CASE STUDIES

Green Buildings – Appropriate case studies & Inferences – rating Comparison

UNIT- V GREEN BUILDING DESIGN

Green building design – requirements & Design

SUGGESTED READINGS:

1. GRIHA Manual, National Building Code, Energy Conservation Building Code Overview of green building rating tools-
2. IGBC Green Building Guide
3. USGBC Green Building Guide

21MARESS7	SUSTAINABLE INTEGRATED SYSTEMS								SEMESTER-III
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

- To develop and acquire Knowledge about Smart buildings &Sustainability
- To Understand about the Building Automation systems& Responsive façade Design
- To gain knowledge about the Sustainable waste management & water management & landscape Architecture
- To understand about the Sustainable Urban transportation
- To understand about Sustainable Cities and Development

COURSE OUTCOME:

1. Student will understand the concepts and practices of Smart building technologies
2. Student will gain knowledge in Building Automation Systems & Integration for Sustainable Future
3. Student will understand the energy usage and Optimization by Automation systems
4. Student will learn about sustainable water & Waste management
5. Student will learn about the Urban level transportation & Sustainable Planning of Future Cities
6. Student will gain knowledge about the Sustainable landscape Architecture for the Urban

UNIT- I SMART BUILDINGS & BUILDING AUTOMATION SYSTEMS

Introduction to Smart Buildings – Sustainable technologies for the future -Energy saving systems & Technology Building Automation- Lighting control – HVAC control- Water flow systems -Low flow fixtures-Sensors – types – activity – Monitoring level – Control systems & Integration – Safety – Security – high rise structures- renewable energy systems & Technology -Responsive façade systems- day light & ventilation control

UNIT- II SUSTAINABLE WATER MANAGEMENT & WASTE MANAGEMENT

Introduction to Water & Waste management -Sustainable methods- Water resource analysis – Ground water management – urban water supply – channel network – Harvesting techniques – Usage in landscape- waste water treatment – Reuse in landscaping – Water metering- Waste Management – Building Phase and Post occupancy – Public Health -Segregation of Waste- Pollution reduction – Recycling & Reuse – Domestic level, Commercial Level & urban level etc

UNIT- III SUSTAINABLE LANDSCAPE ARCHITECTURE

Introduction to Sustainable Development in Landscape Architecture –Plant Design – Landscape management – Ecological sustainability – Local Vegetation principles -

UNIT- IV SUSTAINABLE URBAN TRANSPORTATION

Introduction to Sustainable aspects – Urban transportation –Circulation & movement -Optimizing Cost – parking Criteria -Transit Oriented Developments etc – Case studies

UNIT- V SUSTAINABLE URBAN DESIGN

Introduction to Sustainable urban Design – Macro Level planning aspects -large Scale projects- Sustainable townships – future ideologies of Sustainable Urban Sprawl & Growth– Smart cities concept -relevant case Studies- Sino city, Masdar City etc

SUGGESTED READINGS:

1. Derek Clements – Croom(ed), "Intelligent Buildings: Design, Maintenance and Operation, Thomas Telford, London, 2004.
2. Michael Nigginton & Jude Harris, "Intelligent skins" Architectural Press, Oxford, 2002.
3. Andrew Harrison & Eric Loe, "Intelligent Buildings in South East Asia", Spon Press, 1997.
4. Anna ray – Jone – Sustainable architecture in japan – The green buildings of Nikken seiki, Wiley – academy 2000
5. Moughtin, C., (2003). Urban Design: Street and Square. Architectural Press
6. Transport and Sustainability. (2014). Parking Issues and Policies (Vol. 5). (C. M. Stephen Ison, Ed.) Emerald Group Publishing Limited.
7. City form lab, MIT. (2016, January 20). Urban network analysis toolbox. Retrieved from Urban network analysis: http://cityform.mit.edu/projects/urban-network-analysis.html