



THIAGARAJAR COLLEGE OF ENGINEERING

(A Government Aided Autonomous Institution affiliated to Anna University)

MADURAI – 625 015

REGULATIONS

CURRICULUM AND DETAILED SYLLABI

For

B.Arch DEGREE PROGRAMME

For the students admitted from the academic year 2022-2023 onwards

**THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI - 625 015
(A Govt. Aided Autonomous Institution affiliated to Anna University)**

RULES AND REGULATIONS

B.ARCH. DEGREE PROGRAMME

(CHOICE BASED CREDIT SYSTEM)

These Rules and Regulations are applicable to the candidates admitted from the Academic year 2021 – 22 onwards

1.0 PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires:

- i. **“Programme”** means B. Arch Degree Programme
- ii. **“Degree”** means Under Graduate (UG) Degree that is B.Arch degree.
- iii. **“Course”** means a theory, theory cum studio or studio subject that is normally studied in a semester, like Architectural Principles – World Architecture, Fundamentals of Building Systems, Architectural Design, etc.
- iv. **“University”** means Anna University.

2.0 QUALIFICATIONS FOR ADMISSION

- 2.1** Students for admission to the first semester of the Ten semester B.Arch. Degree Programme shall be required to have a pass in Higher Secondary Examination (Academic 10+2) curriculum or its equivalent examinations with 50% marks in Physics, Chemistry & Mathematics and also 50% marks in aggregate of the 10+2 level examination or 10+3 Diploma Examination with Mathematics as compulsory subject with at least 50% marks in aggregate.
- 2.2** Notwithstanding the qualifying examinations, the student shall have passed an aptitude test as specified by the Council of Architecture in the minimum standards of Architectural Education and Regulations or any other statutory authorities dealing with Architectural Education.
- 2.3** The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by affiliating University and Directorate of Technical Education, Chennai, from time to time.

3.0 **STRUCTURE OF THE PROGRAMME**

3.1 **Categorization of Courses**

B.Arch. Programme will have a curriculum with syllabi consisting of theory, theory cum studio, theory cum studio (Skill Based), and studio courses with well-defined Program Outcomes, Program Specific Outcomes and Programme Educational Objectives (PEO) as per Outcome Based Education (OBE) and Conceive-Design-Implement-Operate (CDIO) framework. The content of each course is designed based on the Course Outcomes (CO). The courses of the programme are categorized as follows:

A. Foundation Courses

- a. Architecture (AR)
- b. Engineering Science (ES)

B. Professional Core courses relevant to the chosen programme of study.

C. Elective Courses

- a. Foundation Elective
 - i. Architecture
 - ii. Engineering Science (ES)
 - iii. Humanities and Social Science (HSS)
- b. Programme Elective
 - i. Programme Specific Elective for Expanded Scope
 1. Courses offered by the Respective Department
 2. Industry Supported Course
 3. Guided Study Course
 4. Online Courses
 - ii. Programme Specific Elective for Skill Enhancement
 1. Courses offered by the Respective Department
 2. Industry Supported Course
 3. Guided Study Course
 4. Online Courses
 - iii. General Elective (Interdisciplinary)

D. Mandatory Audit Courses prescribed by AICTE / UGC

Foundation Courses: Courses which provides basic foundation to the core courses or supplement the core courses like Architectural Principles – World Architecture, Theory of Design etc

Professional Core Courses: Courses include the core courses relevant to the chosen

specialization/branch like Foundation of Design, Architectural Design etc

Foundation Elective Courses: Courses which leads to knowledge enhancement selected from a pool of courses under specific streams like Architecture, Engineering Science, Humanities and Social Science.

Programme Elective Courses:

- o **Programme Specific Elective for Expanded Scope:** Courses which are advanced/ courses with latest technologies or courses which are supportive to the discipline.
- o **Programme Specific Elective for Skill Enhancement:** Courses which are Supportive (specific or specialized) to the discipline of study.
- o **General Elective:** Courses which are chosen from varied discipline like English, Civil Engineering department, Mechanical department etc.

Mandatory Audit Courses: Students shall register at least any one of the Mandatory Audit courses as and when offered. Courses such as Constitution of India, Essence of Indian Traditional Knowledge, Yoga, English for Research Paper Writing, Value education, Stress Management and Personality Development through Life Enlightenment Skills, etc, which are mandated by AICTE/UGC shall be registered by the student as and when offered.

The recommended distribution of credits for each category is given in Table 1.

Table1: Credit Distribution

S.No	Category	Credits
A	Foundation Courses (CFC)	87
	Architecture	
	Engineering Science (ES)	
B	Foundation Elective	15-24
	Architecture	
	Engineering Sciences (ES)	
	Humanities and Social Sciences (HSS)	
C	Professional Core Courses	149
D	Programme Elective	9-21
	Programme Specific Elective for Expanded Scope	
	Programme Specific Elective for Skill Enhancement	
	General Elective	
E	Mandatory Courses prescribed by AICTE/UGC (Not included for CGPA)	-
	Minimum Credits to be earned for the award of the Degree	260 (from A to D) and the successful completion of Mandatory Courses

3.2 Personality and Character Development

All students shall register, on admission, in any one of the personality and character development programmes (NCC/NSS) and undergo training and attends camps as prescribed by the respective officers / coordinators. The training shall include classes on hygiene and health awareness and also training in first aid.

National Cadet Corps (NCC) will have a number of parades/camps specified by the NCC officer.

National Service Scheme (NSS) will have social service activities in and around the college specified by the NSS coordinator

Sports, games, drills and physical exercises specified by the Physical Director

While the training activities will normally be during weekends, the camp will normally be during vacation period. Every student shall put in a minimum attendance in the training and attend the camp.

3.3 Credit Assignment

Each course is assigned certain number of credits based on the following:

Table 2: Credit Assignment

Contact period per week	CREDITS
1 hour Lecture Period	1
1 hours Tutorial Period	1
1 hours Studio/Practical Periods	1

3.4 Number of Courses/ Credits per semester

Curriculum of a semester shall normally have a blend of theory courses, theory cum studio courses, and studio courses. Each course may have credits assigned as per clause 3.3. However, the total number of courses per semester shall not exceed 6. The maximum number of credits the student can register in a particular semester cannot exceed 28 credits (excluding courses for which the student has done reappearance registration (vide clause 5.7).

3.5 Educational Tour / Study Tour

Educational Tour as Study Tour or as Case study visits shall be part of the course and conducted every year. They help to consolidate course contents by acquainting students not only with professional practice but also the culture and context of a region. At the end of the study tour, the students shall submit a report that gives an overall understanding of the place(s) through different modes as found appropriate- sketches, analysis, cognitive mapping, digital documentation, essays, etc.

3.6 Industry supported Courses

- 3.6.1** Students can opt for one-credit courses and two credit courses offered by experts from industry /research organizations and approved by academic council. Students can register for such courses from his/her third year onwards. A student is also permitted to register for these courses of other departments, provided the student has fulfilled the necessary pre-requisites of the courses being offered and subject to the approval of both the heads of the departments. However, a student can register for only one course in a semester under Programme Specific Elective for Expanded Scope or Programme Specific Elective for Skill Enhancement in Programme Elective category. These courses are evaluated by the respective course coordinator of the programme. The maximum number of credits that can be earned from industry supported courses is limited to 4.
- 3.6.2** If a student does not successfully complete the registered industry supported one-credit or two credit courses in a semester, the registration of that course will be considered as cancelled. Further, it will not be treated as arrear and no supplementary examination will be conducted; alternatively, if he/she wishes, he/she can re-register for the same course in the ensuing semesters and successfully complete it as and when it is offered subsequently.

3.7 Guided Study Course

A student, who does not have history of arrear in the programme and CGPA greater than 8.0, can study ONE course under Programme Specific Elective for Expanded Scope or Programme Specific Elective for Skill Enhancement in Programme Elective category after his/her Third year of study, as a guided study course. One faculty member approved by the Head of the Department shall be responsible for the periodic monitoring and evaluation of the course. The student does not need to attend the classes. However, the student has to appear for continuous assessment tests and submit assignments to the respective faculty-in-charge assigned by the Head of the Department. The assessment and evaluation for theory and theory cum studio courses is as per vide clause 10.1 and 10.2 respectively.

3.8 Online Courses

Students may be permitted to register for online courses (which are provided with certificate after evaluation of the performance), during fourth to ninth semester of his/her study with the prior approval of Department Committee nominated by the Head of the

Department and approval from Academic Council. On successful completion of the course, he/she has to submit the copy of the certificate to the Head of the Department for exemption from registering for an elective course. Based on the recommendation by the team of faculty members nominated by the Head of the Department, the student will be awarded grade and credits in Programme Specific Elective or Programme Specific Elective for Expanded Scope sub-categories. The recommendation will be sent to The Controller of Examinations after the approval by the Head of the Department.

3.9 General Elective

General electives are courses offered by different departments from his / her second year onwards. These courses do not have any prerequisites and could be chosen as electives by students of any programme. Students should opt for the courses offered from other departments only.

3.10 Medium of Instruction

The medium of instruction is English for all Courses, Examinations, Design Studios, Seminar, Presentations and Project/Thesis reports.

4.0 DURATION OF THE PROGRAMMES

- 4.1** A student is ordinarily expected to complete the B.Arch. Programme in 10 semesters (5 years) but in any case not more than 8 years (16 Semesters). However, in special circumstances a candidate may be granted an extra 1 year by the University or Institution to complete the course.
- 4.2** Each semester normally consists of 90 working days (including examination days). In any contingent situation the number of working days per semester shall not be less than 65 days. The Principal is given the discretionary powers to decide the number of working days in such contingencies. The Principal shall ensure that every teacher imparts instruction as per the number of periods specified in the syllabus and that the teacher teaches the full content of the specified syllabus for the course being taught.
- 4.3** For the purpose of regulations, the academic year will be divided into two semesters, the odd semester normally spanning from June to November and the even semester from December to May.
- 4.4** The total duration for completion of the programme reckoned from the commencement of the first semester to which the student was admitted shall not exceed the maximum duration specified in clause 4.1 irrespective of the period of break of study (vide clause

16.0) or prevention in order that the student may be eligible for the award of the degree (vide clause 14).

5.0 COURSE REGISTRATION

- 5.1** Each student on regular admission shall register for all the courses prescribed in the curriculum in the student's first year of study.
- 5.2** A student has to earn the minimum number of 260 Credits as specified in the curriculum of the programme of study in order to be eligible to obtain the degree. However, a student can earn more than the number of credits, if he/she wishes. In such case, the highest grades in the relevant category would be considered for CGPA calculation.
- 5.3** The registration for the courses, from third semester, will commence three days after the declaration of the examination results of preceding semester. The student shall register for the courses with the guidance of the student's Tutor/Faculty Mentor. If the student wishes, the student may add or drop courses within five working days after the commencement of the concerned semester and complete the registration process.
- 5.4** No course shall be offered by a Department unless a minimum of 20 students register for that course.
- 5.5** After registering for a course, a student shall attend the classes, satisfy the attendance Requirements (vide clause 6), earn Continuous Assessment marks and appear for the Terminal examinations, except for the arrear courses.
- 5.6** The student shall register for the Architectural Design Studios, Practical Training and Thesis in the respective semesters only.

5.7 Reappearance Registration

- 5.7.1** If a student fails in a theory or a Theory-cum-Studio course, the student shall do reappearance registration for that course in the subsequent semester by retaining the Continuous Assessment Marks already earned in the next two attempts of his/her choice. For further attempts, only the marks earned in the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).
- 5.7.2** If a student fails in a theory or theory cum studio course, in Programme Electives or Foundation Elective Courses, he/she may register for the same course or any other course in the respective category in the subsequent semesters. If a student registers for

other courses, he/she has to satisfy all the requirements in Clauses 6 and 9.

- 5.7.3** The student who fails in any Studio / Thesis Course his/her Continuous Assessment Marks is valid for only one subsequent attempt. After one subsequent attempt (clause 11.4.4) the student shall register for the same course, when offered next, and repeat the course. In this case, the student shall attend the classes, satisfy the attendance requirements (vide clause 6), earn Continuous Assessment Marks and appear for the Terminal Viva -Voce Examinations. The facility of Reappearance Registration is not available for such courses.
- 5.7.4** The student who fails in Practical Training shall repeat the course again, when offered next.
- 5.7.5** If a student is prevented from taking the terminal examinations of a course (theory / theory cum studio / studio) due to lack of attendance, student has to register for the same course again when offered next, attend the classes and fulfill the attendance and Continuous assessment marks requirements as per clause 6 and clause 9 respectively. If the course, in which student has lack of attendance, is a Programme Elective or a Foundation Elective Courses, student may register for the same or some other Programme Elective or Foundation Elective course respectively in the subsequent semesters and fulfill the attendance and Continuous assessment marks requirements as per clause 6 and clause 9 respectively.
- 5.7.6** A student who has already appeared for a course in a semester and passed the examination is not entitled to reappear the same course for improvement of Grade / Marks.

6.0 REQUIREMENTS FOR APPEARING FOR THE TERMINAL EXAMINATIONS OF A COURSE

- 6.1** A student who has fulfilled the following conditions shall be deemed to be eligible to appear for the Terminal Examination.

Ideally, every student is expected to attend all the classes and earn 100% attendance. Students who have earned not less than 75% attendance in all the courses taking into account the number of periods required for that course as specified in the curriculum.

Students who have earned attendance less than 75% will not be permitted to appear for terminal examinations for that course. The student has to register and repeat that particular course in a subsequent semester when it is offered next. However,

exemption may be given for the students who earned attendance between 65% and

less than 75% in a particular course from the prescribed attendance requirement based on medical leave (hospitalization / accident / specific illness) and On Duty leave for participation in the College / University / State / National / International level Sports events (Vide clause 6.4) with prior approval from the Principal / competent authority. Such student shall be permitted to apply for Condonation to the Principal through the respective Head of the Department. After the approval from the principal, the student shall be permitted to appear for the terminal examinations for that course by paying the prescribed fee. However, the students who have represented the college in NCC/NSS/Sports are exempted from the Condonation fee.

His / her conduct has been satisfactory.

6.2 Student who is permitted by the respective Head of the Department to carry out Practical Training should submit the attendance certificate from the competent authority at every project review meetings and at the time of project report submission.

6.3 A student shall be permitted to appear for the terminal examinations only if,

- a. he/she satisfies the attendance requirements
- b. the student's conduct has been satisfactory
- c. he/she has paid the examination fees and registered for the examinations for all the courses of that semester by paying the prescribed examination fees within the due date specified by the Office of the Controller of Examinations. If any student fails to register and pay the examination fees within the due date, he /she shall not be permitted to attend the terminal examinations. However, he/she will be permitted to continue their studies in the next higher semester, provided that the student should satisfy the requirements as stipulated in this clause of this regulations and to write the current semester courses and arrear courses if any, in the next supplementary examination as arrear courses on registration and payment of fees. It will be counted as an attempt for the student.

6.4 The students who are consistently good in academics ONLY be considered for the grant of ODL under co-curricular / extra-curricular activities by the competent authorities. The following activities shall be considered for the award of ODL:

Sports and Games: TIES, Inter collegiate, Inter Zonal, Inter University, State level, National level and Open Tournaments.

NCC: Camps and expeditions, NSS camps

Cultural Programs at State, National and International level

Seminar / Symposia: Paper presentation / Quiz

Leadership course organized by other organizations & Alumni Association activities,
Association Activities, Placement Activities

NASA(National Association of Students of Architecture)

Zonal NASA Conventions.

Training Programs/internship at Industries and Higher Learning Institutions

Personal damages incurred during the extra-curricular activities.

The ODL requisition letter shall be forwarded to the Principal through the Head of the Department of the student by the staff-in-charge of the respective activities before completion of every activity.

The ODL sanctioned letters shall be submitted to the Department office. The faculty-in-charge of the department office will check the eligibility for the award of attendance at the end of semester and the same may be submitted to the Head of the Department for approval.

- 6.5** Those students who are not deemed to have completed the semester with reference to the conditions specified above shall undergo the semester again in all the courses in the respective semester during next academic year.

7.0 FACULTY MENTOR

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students (Maximum 20 to 25) to a faculty member of the Department. He /she shall function as Faculty Advisor for these students throughout their period of study. The faculty advisor shall

Advise the students in registering and reappearances registering of courses

Monitor their attendance, academic progress and discipline of the students

Counsel periodically or during the Faculty Advisor/Tutor/Proctor-ward meeting scheduled in the class time table.

Inform the students about the various facilities and activities available to enhance the student's curricular and co-curricular activities.

If necessary, the faculty mentor may also discuss with or inform the parents about the progress of the students through the Head of the Department or in the Parent – Teacher meeting.

8.0 ACADEMIC COMMITTEES

8.1 Class Committee

The objective of the Class Committee is to improve the teaching-learning process. The functions of the class committee include:

Resolving difficulties experienced by students in the classroom and in the laboratories.

Clarifying the regulations of the degree programme and the details of rules therein.

Discussing the progress of academic schedule and deviations if any.

Evaluating the performance of the students of the class after each test and finding the ways and means of improvement.

From I semester onwards, Class committee comprises of all the faculty members who are handling courses in that particular semester and comprising minimum of five student representatives. A chairperson who is a faculty not handling course for that particular semester, nominated by the Head of the Department shall coordinate the activities of this committee.

The class committee shall be constituted by the Head of the Department/Chief Tutor on the first week of commencement of the semester.

The class committee shall meet three times in a semester as specified in the academic calendar:

The Principal/ Dean/ Head of the Department may participate in any class committee of the institution.

During these meetings, the representative of the 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.

The Chairperson is required to prepare the minutes of the meeting, signed by the members and submit the same to Head of the Department within five working days of the meeting. Head of the Department will in turn consolidate and forward the same to the Principal, within 10 working days of the meeting.

In each meeting, the action taken report of the previous meeting is to be presented by the Chairperson of the class committee.

8.2 PERFORMANCE ASSESSMENT COMMITTEE

The Performance Assessment Committee comprises of the Head of the Department / Course Coordinators / Course faculty members and Programme Coordinator, nominated by the Head of Department. This committee shall meet to assess the attainment of

Course Outcomes and Program Outcomes, progress and status of the students of the semester concerned at the beginning and end of the semesters. The committee can invite Faculty mentors and students as invitees

9.0 **SYSTEM OF EXAMINATION**

9.1 B.Arch. Programme consists of Theory Courses, Theory cum Studio Courses, Studio Courses, Practical Training and Architectural Thesis as given in Table.3.

Performance in each course of study shall be evaluated based on (i) Continuous Assessments throughout the semester and (ii) Terminal Examination at the end of the semester.

9.1.1 For Theory courses and Theory cum Studio Courses including Programme elective courses and Elective Foundation Courses, out of 100 marks, the maximum marks for Continuous Assessment is 50 and the Terminal Examination will be conducted for 100 marks which will be reduced to 50 marks.

9.1.2 For Skill based Theory cum Studio Courses including Programme Elective courses and Foundation Elective Courses, out of 100 marks, the maximum marks for Continuous Assessment is 50 and the Terminal Examination (viva voce) will be conducted for 100 marks which will be reduced to 50 marks.

9.1.3 For Studio Courses like Fundamentals of Design, Architectural Design, Architectural Thesis out of 100 marks, the maximum marks for Continuous Assessment is 60 and the Terminal Viva Voce Examination will be conducted for 100 marks which will be reduced to 40 marks.

9.1.4 For Studio Courses like Practical Training, out of 100 marks, the maximum marks for Continuous Assessment are 50 and the Terminal Viva Voce Examination will be conducted for 100 marks which will be reduced to 50 marks.

Table 3: Mark Distribution

S. No	Categorization of courses	Continuous Assessment	Terminal Examinations	Total Marks
1.	Theory Courses and Theory cum Studio Courses (Including Guided Study Courses)	50	50	100
2.	Theory cum Studio Courses (Skill based)	50	50	100
3.	Architectural Design Studio and Architectural Thesis (Studio Courses)	60	40	100
4.	Practical Training	50	50	100
5.	Industry Supported Courses	50	50	100

- 9.2** Students are prohibited from entering into the Examination Hall / Laboratories with any book or portion of book, manuscript, or paper of any description or Communicating with or copying from each other or communicating with anyone outside the Examination Hall / Laboratories. Programmable calculator, mobile phone shall not be permitted inside the Examination hall / Laboratories. However, any required codebooks and data sheets / books as specified in the question paper will be supplied inside the Examination hall / laboratories by the office of the Controller of Examinations. The students are warned that any form of Malpractice will be dealt with severely. The punishment may be canceling all the examinations registered by the student in that semester and debarring permanently from all the examinations and disciplinary action will be taken by the college authorities after conducting enquiry.
- 9.3** Identity card/Hall ticket of the college must be produced at the time of terminal examination. Any student fails to produce Identity card / Hall ticket shall be levied a spot fine by the Chief superintendent/ Examiners.
- 9.4** A student can apply for reassessment of his/her semester examination answer paper in theory, within three working days from the declaration of results, on payment of a prescribed fee, as specified by the Controller of Examinations from time to time. The Controller of Examination will arrange for going through the answer scripts by the students and to make appeals. The reassessment results will be published before the commencement of supplementary examinations. Reassessment is not permitted for Studio Courses, Theory cum Studio Courses and Online/Industry Supported Courses.

10 PROCEDURE FOR AWARDING MARKS FOR CONTINUOUS ASSESSMENT

10.1 Assessment for Theory Courses

a. The award of marks for continuous Assessment comprises of two types of assessments (tests and assignments), conducted by the course instructor / coordinator / department. One type of assessment will be in the form of internal tests. The other will be through assignments (assignments/tutorials/seminars/mini projects/site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises)

The total marks obtained in the tests and the assignments put together shall be reduced to 50.

The apportioning of marks shall be as follows:

- 30 marks for tests
- 20 marks for assignments.

b. Three Tests will be conducted at regular intervals as per the schedule given in the academic calendar. Each test carries maximum of 50 marks. Among the three tests, the best two test marks will be considered and will be reduced to 30 marks for the award of test based on continuous assessment marks.

c. Both test and assignment marks put together is maximum of 50 marks and rounded to nearest integer if necessary.

d. A student who is absent or has failed in the Terminal Examinations in any theory course is permitted to appear for supplementary examination by retaining the Continuous Assessment already earned in the next two attempts of his/her choice. For further attempts, only the marks earned in the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).

10.2 Assessment for Theory cum Studio Courses

The award of marks for continuous assessment shall be based on two types of evaluations (out of which one will be in the form of written tests). The other will be in the form of assignments (assignments/tutorials/seminars/mini projects/site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises).

The total marks obtained in the tests and the assignments put together shall be reduced to 50.

The apportioning of marks shall be as follows:

- 20 marks for tests
- 30 marks for assignments.

The assignments shall be subject specific in the form of field visit report / working model /evaluation report / test report / drawings/construction yard exercises/viva etc.

b. Three Tests will be conducted at regular intervals as per the schedule given in the academic calendar. Each test carries maximum of 50 marks. Among the three tests, the best two test marks will be considered and will be reduced to 20 marks for the award of test continuous assessment marks.

c. Both test and assignment marks put together will be for 50 marks maximum and rounded to nearest integer if necessary.

d. A student who is absent or has failed in the Terminal Examinations in any theory cum studio course is permitted to appear for supplementary examination by retaining the Continuous Assessment already earned in the next two attempts of his/her choice. For

further attempts, only the marks earned in the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).

10.3 Assessment for Theory cum Studio Courses (Skill Based)

10.3.1. The assessment of Theory cum studio (Skill Based) courses will be carried out in the form of assignments/ drawings/ sketches/ report etc. for a maximum of 100 marks. The total marks obtained in the assessments put together shall be reduced to 50 marks and rounded to the nearest integer. The weightage for these evaluations shall be discussed and recommended by the Department Committee constituted by the Head of the Department.

10.3.2. For the Theory cum studio courses (Skill Based) Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the semester by an internal and external examiner appointed by the Controller of Examination from a panel recommended by the Head of the Department.

10.4 Assessment for Architectural Design Studio Courses

The Continuous Assessment evaluation for Studio Courses like Fundamentals of Design and Architectural Design comprises of three assessments carried out for 100 marks for the performance of the candidate in the studio projects throughout the semester. The total marks obtained in the continuous assessments put together shall be reduced to 60 marks and rounded to the nearest integer. A minimum of 2 studio projects shall be done in a semester of which one shall be a time project for a period of not less than 2 working days. The evaluation weightage for these studio projects shall be discussed and recommended by the Department Committee constituted by the Head of the Department.

10.5 Assessment for Practical Training

10.5.1 Every student shall undergo Practical Training in the IX Semester. The student shall undergo Practical Training in architectural firms/offices in India only under architects registered with the Council of Architecture, India with a minimum of 5 years professional standing with the approval of the Head of the Department.

10.5.2 Practical Training shall be undertaken for one semester as specified by the Council of Architecture.

10.5.3 If the student wishes to undergo training outside India, it should be under an architect registered with the Governing body for Architects of that Country with a minimum of 5

years professional standing. This should be duly approved by the Department Committee two weeks prior to the training period.

- 10.5.4** Ideally every student is required to undertake the entire duration of Practical Training in the IX semester in a single architectural firm/office. However, under unforeseen circumstances, if the student wishes to change his/ her place of Practical Training, student shall be allowed to do so only once with the prior approval of the coordinator.
- 10.5.5** The Continuous Assessment evaluation for Studio Courses like Practical Training shall be carried out for 50 marks for the entire period of the practical training during the IX semester. The evaluations shall be in the form of Monthly Progress report, Work diary, Portfolio, Site visits etc which will be evaluated by the Principal Architect / his or her Designee Architect. The evaluation weightage for these studio subjects shall be discussed and recommended by the Department Committee constituted by the Head of the Department.
- 10.5.6** For the Practical Training, Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the IX semester by an internal and external examiners appointed by the Controller of Examination from a panel recommended by the Head of the Department.

10.6 Assessment for Architectural Thesis

Every candidate shall submit a synopsis at the end of IX Semester to be approved by the Department Committee constituted by the Head of the Department. The thesis review committee constituted by the Head of the Department shall comprise of the Coordinator of the Thesis, the Supervisor and Two External members. The Thesis shall be evaluated for 100 marks by the Thesis review committee through continuous assessment with a minimum of 5 reviews (including one topic selection review which will not be evaluated) throughout the semester. The total marks obtained in the five assessments put together shall be reduced to 60 marks and rounded to the nearest integer. The External Review members will be appointed by the Controller of Examination from a panel recommended by the Head of the Department. Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the X semester by the External Examiners appointed by the Controller of Examination from a panel recommended by the Head of the Department.

- 10.7** Revaluation is not permitted for Studio Courses; Theory cum Studio Courses, Skill based Theory cum Studio Courses and Industry Supported Courses.

11.0 ELIGIBILITY FOR PASS IN EACH COURSE

11.1 Theory Courses

For theory courses a candidate shall be declared to have passed the examination, if he / she secures minimum of 25 marks out of 50 in the Terminal Examination with a minimum aggregate of 50 marks out of 100 in continuous assessment and Terminal Examination put together.

11.2 Theory cum Studio Courses

For Theory cum Studio courses, a candidate shall be declared to have passed the examination, if he / she secures minimum of 25 marks out of 50 in the Terminal Examination with a minimum aggregate of 50 marks out of 100 in Continuous Assessment and Terminal Examination put together.

11.3 Theory cum Studio Courses (Skill Based)

11.3.1 The Continuous Assessment evaluation for Theory cum Studio courses (Skill Based) will be carried out for 50 marks for the performance of the candidate throughout the semester. The total marks obtained in the assessments put together shall be reduced to 50 marks and rounded to the nearest integer. The evaluation weightage for the Continuous Assessment of Theory cum Studio courses (Skill Based) shall be discussed and recommended by the Department Committee constituted by the Head of the Department. Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the semester by an internal and external examiner appointed by the Controller of Examination from a panel recommended by the Head of the Department for 100 Marks which shall be reduced to 50 Marks. A candidate shall be declared to have passed the examination if he / she secure an aggregate of 50 marks out of 100 obtained in the Continuous Assessment and Terminal Examination put together.

11.3.2 If a student fails to secure a pass in a theory cum studio course (Skill Based) the student shall do reappearance registration for the Terminal Examination.

11.4 Studio Courses

11.4.1 For Fundamentals of Design and Architectural Design studio courses, a candidate shall be declared to have passed the examination if he / she secure an aggregate of 50 marks out of 100 obtained in the Continuous Assessment and Terminal

- Examination put together. The Terminal Examination will be conducted as Viva-Voce for the portfolio submitted by the candidate.
- 11.4.2** For Practical Training, a candidate shall be declared to have passed if he / she secure a minimum of 50 marks out of 100 in the Continuous Assessment and the Terminal Examination put together. The Terminal Examination will be conducted as Viva-Voce for the portfolio submitted by the candidate.
- 11.4.3** For Architectural Thesis, a candidate shall be declared to have passed if he / she secure an aggregate of 50 marks of the total of 100 marks in the Continuous Assessment and the Terminal Viva Voce examination put together.
- 11.4.4** If a student fails to secure a pass in examinations of studio courses comprising of Fundamentals of Design and Architectural Design/ Architectural Thesis, the student shall resubmit an improved portfolio/works/sheets for the subsequent viva voce examination conducted in the following semester. The continuous assessment marks shall be valid for the subsequent attempt only.
- 11.4.5** In case, a student fails to secure a pass in the subsequent attempt also, in the studio courses comprising of Fundamentals of design and Architectural Design/ Architectural Thesis, the student shall repeat when the course is offered next, attend classes, secure continuous assessment marks and submit the portfolio/works/sheets as in the case of a regular student as per vide clause 6 and 9.
- 11.4.6** If a student fails to secure a pass in Practical Training, the student shall repeat the course again, when offered next.

11.5 Award of Grades

Table 4: Grade Classification

Range of Total Marks (TM) (Continuous assessment +Terminal Examination)	Letter Grade	Grade Point (GP)
$90 \leq TM \leq 100$	S	10
$80 \leq TM < 90$	A	9
$70 \leq TM < 80$	B	8
$60 \leq TM < 70$	C	7
$50 \leq TM < 60$	D	6
$0 \leq TM < 50$	U	0
Non-completion of a semester(Repeat course)	I	0
Withdrawal from terminal examination	W	0
Absent	AA	0

$$GPA = \frac{\sum_{i=1}^N C_i GP_i}{\sum_{i=1}^N C_i}$$

N is the number of courses registered in a particular semester, GP_i is the grade point obtained in i^{th} course and C_i is the number of credits assigned to i^{th} course. Cumulative GPA (CGPA) will be calculated when the student is declared to be eligible for the award of the degree. CGPA calculation is based on all the courses considered (vide clause 5.2) for the award of the degree.

12.0 REQUIREMENTS FOR MOVING TO A HIGHER SEMESTER

12.1 A student of the B.Arch. shall move to the higher semester if student satisfies semester completion requirements (vide clause – 6) and the following conditions.

- (i) To enroll in III semester 21AR360 - Personal Space Design, a pass is required in 21AR160 - Fundamentals of Design (Sem I)
- (ii) To enroll in IV semester 21AR450 - Social Space Design, a pass is required in 21AR260 - Micro Personal Space Design (Sem II)
- (iii) To enroll in V semester 21AR530 - Urban Architectural Design, a pass is required in 21AR360 - Personal Space Design (Sem III)
- (iv) To enroll in VI semester 21AR630 - Campus Design, a pass is required in 21AR450 - Social Space Design (Sem IV)
- (v) To enroll in VII semester 21AR730 - Public Space Design, a pass is required in 21AR530 - Urban Architectural Design (Sem V)
- (vi) To enroll in VIII semester 21AR830 - Architectural Design and Research, a pass is required in 21AR630 - Campus Design (Sem VI)
- (vii) To enroll in IX semester 21AR910 – Practical Training, a pass is required in 21AR730 - Public Space Design (Sem VII)
- (viii) To enroll in X semester 21ART10 – Architectural Thesis, a pass is required in 21AR830 - Architectural Design and Research (Sem VIII)

13.0 ISSUE OF GRADE CARD

13.1 The consolidated grade card will be issued, through the head of the department, when the student is declared to be eligible for the degree. The consolidated grade card will contain the following information:

- (i) The courses for which credits are earned
- (ii) Grade obtained in each course
- (iii) Cumulative grade point average earned during the course
- (iv) Month and year of successful appearance
- (v) Course code and title

13.2 Grade Card will be issued at the end of each semester examinations. The Grade Card will contain the following information:

- (i) The credits registered and earned in the particular semester
- (ii) Grade obtained in each course
- (iii) Grade point average earned in the particular semester
- (iv) Cumulative grade point average earned until the semester.
- (v) Course code and title

14.0 ELIGIBILITY FOR THE AWARD OF DEGREE

A student shall be declared to be eligible for the award of the B.Arch. Degree provided the student has satisfied the following

- a. A student seeking B.Arch degree shall be required to undergo the prescribed courses of study and evaluation in the college for the specified duration and to pass all the examinations prescribed therefore.
- b. He/ she should register for all the courses prescribed in the curriculum of the respective degree programme fulfill the requirement of credits in each category of credit distribution, pass in all mandatory courses in the curriculum and earn the minimum number of 260 credits.
- c. The maximum time limit for the completion of the B.Arch Degree programme is 8 (Eight) years from the date of admission to the first semester of the programme. However, in special circumstances a candidate may be granted an extra 1 year by the University or Institution to complete the course. This shall be given only once to the candidate and treated as zero year.
- d. No disciplinary action pending against the student

15.0 CLASSIFICATION OF THE DEGREE AWARDED

15.1. First class with Distinction

A student who qualifies for the award of degree (vide clause 14.0) having passed the examination in all registered courses in his / her first appearance (including industry supported courses), within SIX years including the authorized Break of Study of One Year, and securing a CGPA of not less than 8.50 shall be declared to have passed in First class with distinction and should not have been prevented from writing Terminal Examination due to lack of attendance in any of the courses. The authorized break of study (vide clause 16.0) and withdrawal from the examination (vide clause 17.0) will not be counted as an attempt.

15.2. First Class

A student who qualifies for the award of degree (vide clause 14.0) having passed the examination in all the courses within SIX years including the authorized Break of Study of One Year, and securing a CGPA of not less than 7.00 shall be declared to have passed in First class. The authorized break of study (vide clause 16.0) and withdrawal from the examination (vide clause 17.0) will not be counted as an attempt.

15.3. Second Class

All other students (not covered in 15.1 and 15.2) who qualify for the award of degree having passed the examination in all the courses and fulfilling the requirements given in clause 14.0 above shall be declared to have passed in Second Class.

15.4 A student who is absent for Terminal Examination in a course / project work after having registered for the same shall be considered to have appeared in that (except approved withdrawal from Terminal Examination) for the purpose of classification.

16.0 TEMPORARY BREAK OF STUDY FROM A PROGRAMME

16.1. A student is not normally permitted to break the study temporarily. However, if a student intends to temporarily discontinue the programme in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the programme, he/she shall apply in advance to The Principal, through the Head of the Department stating the reasons, in any case, not later than the last lecture day, provided he/she fulfills the requirement in Clause 6.0.

- 16.2** The student permitted to rejoin the programme after the break shall be governed by the rules and regulations in force at the time of rejoining.
- 16.3** The duration specified for passing all the courses for the purpose of classification vide Clause 15.1 and 15.2 shall be increased by the period of such break of study permitted.
- 16.4** The total period for completion of the programme reckoned from the commencement of the first semester to which the student was admitted shall not exceed the maximum period specified in clause 14.0 irrespective of the period of break of study in order that he/she may be eligible for the award of the degree.
- 16.5** 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'.

17.0 **PROVISION FOR WITHDRAWAL FROM THE EXAMINATIONS**

- 17.1** A student will be permitted to withdraw in any one of the semesters except first semester during the entire duration of the degree programme for valid and genuine reasons by making an application in the office of the Controller of Examinations through the respective Head of the Department for withdrawal at least one day in advance of the last theory examination in that semester. When he / she appear subsequently, he / she have to appear for all the courses of that semester on registration and payment of fees. Subsequent appearance will not be counted as separate attempt.
- 17.2** Those students who withdraw are eligible for the award of First Class and First Class with Distinction as per the requirement in this regard. However he / she will not be considered for ranking.
- 17.3** Withdrawal is permitted ONLY ONCE during the entire duration of the degree programme.
- 17.4.** Withdrawal is not permitted to the student who has not satisfied the conditions prescribed in clause 6.0 as requirements for appearing in the Terminal Examination.
- 17.5.** Withdrawal is permitted for the Terminal Examinations in the final semester, only if the period of study the student concerned does not exceed 6 years as per clause 15.1.

18.0 DISCIPLINE

18.1 Every student is required to observe discipline 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 college. The Principal shall constitute a disciplinary committee to enquire into acts of indiscipline and notify the institution about the disciplinary action recommended for approval. In case of any serious disciplinary action which leads to suspension or dismissal, then a special committee shall be constituted by the Head of the Institution for taking the final decision.

18.2 If a student indulges in malpractice in any test/Examinations, the student shall be liable for punitive action as prescribed by the College from time to time.

19.0 REVISION OF REGULATIONS AND CURRICULUM

The standing committee/Academic Council of the College reserves the right to revise or change or amend the regulations, the scheme of examinations, the curriculum and the syllabi from time to time if found necessary.

20.0 SPECIAL CASES

In the event of any clarification in the interpretation of the above rules and regulations, they shall be referred to the Standing Committee. The Standing Committee will offer suitable interpretations/ clarifications /amendments required for special case on such references and get them ratified in the next meeting of the Academic Council. The decision of the Academic Council is final.

Annexure: Amendment to B.Arch 2021 Regulation

Ref. No	Existing	To be changed as																																																																	
9.1.1	9.1.1 For Theory courses and Theory cum Studio Courses including Programme elective courses and Elective Foundation Courses, out of 100 marks, the maximum marks for Continuous Assessment is 50 and the Terminal Examination will be conducted for 100 marks which will be reduced to 50 marks.	9.1.1 a. For Theory courses including Programme elective courses and Elective Foundation Courses, out of 100 marks, the maximum marks for Continuous Assessment is 40 and the Terminal Examination will be conducted for 100 marks which will be reduced to 60 marks. b. For Theory cum Studio Courses including Programme elective courses and Elective Foundation Courses, out of 100 marks, the maximum marks for Continuous Assessment is 50 and the Terminal Examination will be conducted for 100 marks which will be reduced to 50 marks.																																																																	
Table 3	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">S . N O</th> <th style="text-align: center;">Categorization of courses</th> <th style="text-align: center;">Continuous Assessment</th> <th style="text-align: center;">Terminal Examinations</th> <th style="text-align: center;">Total Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Theory Courses and Theory cum Studio Courses (Including Guided Study Courses)</td> <td style="text-align: center;">50</td> <td style="text-align: center;">50</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Theory cum Studio Courses (Skill based)</td> <td style="text-align: center;">50</td> <td style="text-align: center;">50</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Architectural Design Studio and Architectural Thesis (Studio Courses)</td> <td style="text-align: center;">60</td> <td style="text-align: center;">40</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">4</td> <td>Practical Training</td> <td style="text-align: center;">50</td> <td style="text-align: center;">50</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">5</td> <td>Industry Supported Courses</td> <td style="text-align: center;">50</td> <td style="text-align: center;">50</td> <td style="text-align: center;">100</td> </tr> </tbody> </table>	S . N O	Categorization of courses	Continuous Assessment	Terminal Examinations	Total Marks	1	Theory Courses and Theory cum Studio Courses (Including Guided Study Courses)	50	50	100	2	Theory cum Studio Courses (Skill based)	50	50	100	3	Architectural Design Studio and Architectural Thesis (Studio Courses)	60	40	100	4	Practical Training	50	50	100	5	Industry Supported Courses	50	50	100	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">S . N O</th> <th style="text-align: center;">Categorization of courses</th> <th style="text-align: center;">Continuous Assessment</th> <th style="text-align: center;">Terminal Examinations</th> <th style="text-align: center;">Total Marks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Theory Courses (Including Guided Study Courses)</td> <td style="text-align: center;">40</td> <td style="text-align: center;">60</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Theory cum Studio Courses (Including Guided Study Courses)</td> <td style="text-align: center;">50</td> <td style="text-align: center;">50</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Theory cum Studio Courses (Skill based)</td> <td style="text-align: center;">50</td> <td style="text-align: center;">50</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">4</td> <td>Architectural Design Studio and Architectural Thesis (Studio Courses)</td> <td style="text-align: center;">60</td> <td style="text-align: center;">40</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">5</td> <td>Practical Training</td> <td style="text-align: center;">50</td> <td style="text-align: center;">50</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">6</td> <td>Industry Supported Courses</td> <td style="text-align: center;">50</td> <td style="text-align: center;">50</td> <td style="text-align: center;">100</td> </tr> </tbody> </table>	S . N O	Categorization of courses	Continuous Assessment	Terminal Examinations	Total Marks	1	Theory Courses (Including Guided Study Courses)	40	60	100	2	Theory cum Studio Courses (Including Guided Study Courses)	50	50	100	3	Theory cum Studio Courses (Skill based)	50	50	100	4	Architectural Design Studio and Architectural Thesis (Studio Courses)	60	40	100	5	Practical Training	50	50	100	6	Industry Supported Courses	50	50	100
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10.1	<p>10.1 Assessment for Theory Courses</p> <p>a. The award of marks for continuous Assessment comprises of two types of assessments (tests and assignments), conducted by the course instructor / coordinator / department. One type of assessment will be in the form of internal tests. The other will be through assignments (assignments/tutorials/seminars/mini projects/site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises)</p> <p>The total marks obtained in the tests and the assignments put together shall be reduced to 50. The apportioning of marks shall be as follows: 30 marks for tests</p>	<p>10.1 Assessment for Theory Courses</p> <p>10.1.1 The internal assessment of Theory courses will be carried out in the form of two assessments: written test and Assignments (Individual assignments/tutorials/seminars/mini projects/site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises).</p> <p>Each internal assessment is to be conducted for 100 marks and will have to be distributed in two parts Assignments (Individual assignments /tutorials /seminars /mini projects/site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises) and tests with each having a weightage of 40% and 60%</p>																																																																	

	<p>20 marks for assignments.</p> <p>b. Three Tests will be conducted at regular intervals as per the schedule given in the academic calendar. Each test carries maximum of 50 marks. Among the three tests, the best two test marks will be considered and will be reduced to 30 marks for the award of test based on continuous assessment marks.</p> <p>c. Both test and assignment marks put together is maximum of 50 marks and rounded to nearest integer if necessary.</p> <p>d. A student who is absent or has failed in the Terminal Examinations in any theory course is permitted to appear for supplementary examination by retaining the Continuous Assessment already earned in the next two attempts of his/her choice. For further attempts, only the marks earned in the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).</p>	<p>respectively.</p> <p>a. Two internal tests each carrying 60 marks shall be conducted during the semester for Duration of 2 hours. The tests shall be in written mode.</p> <p>b. Two internal assignments each carrying 40 marks shall be conducted as a part of continuous assessment.</p> <p>The total marks obtained in all assessments put together out of 200*, shall be proportionately reduced for 40 marks and rounded to the nearest integer (This also implies equal weightage to the two assessments).</p> <p>*The weighted average shall be converted into 40 marks for internal Assessment.</p> <p>10.1.2 A student who is absent or has failed in the Terminal Examinations in any theory course is permitted to appear for supplementary examination by retaining the Continuous Assessment already earned in the next two attempts of his/her choice. For further attempts, only the marks earned in the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).</p>
10.2	<p>10.2 Assessment for Theory cum Studio Courses</p> <p>The award of marks for continuous assessment shall be based on two types of evaluations (out of which one will be in the form of written tests). The other will be in the form of assignments (assignments/tutorials/seminars/mini projects/site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises).</p> <p>The total marks obtained in the tests and the assignments put together shall be reduced to 50.</p> <p>The apportioning of marks shall be as follows: 20 marks for tests 30 marks for assignments.</p> <p>The assignments shall be subject specific in the form of field visit report / working model /evaluation report / test report / drawings/construction yard exercises/viva etc.</p> <p>b. Three Tests will be conducted at regular intervals as per the schedule given in the academic calendar. Each test carries maximum of 50 marks. Among the three tests, the best two test marks will be considered and will be reduced to 20 marks for the award of test continuous assessment marks.</p> <p>c. Both test and assignment marks put together will be for 50 marks maximum and rounded to nearest integer if necessary.</p> <p>d. A student who is absent or has failed in the Terminal Examinations in any theory cum studio course is permitted to appear for supplementary examination by retaining the Continuous Assessment already earned in the next two</p>	<p>10.2 Assessment for Theory cum Studio Courses</p> <p>10.2.1 The internal assessment of Theory cum Studio courses will be carried out in the form of two assessments: Written test and Assignments (Individual assignments /tutorials /seminars /mini projects /site study / field visit report / working model / evaluation report / test report / drawings/construction yard exercises).</p> <p>Each internal assessment is to be conducted for 100 marks and will have to be distributed in two parts Assignments (Individual assignments /tutorials /seminars /mini projects /site study / field visit report / working model / evaluation report / test report / drawings/construction yard exercises) and tests with each having a weightage of 60% and 40% respectively.</p> <p>a. Two internal tests each carrying 40 marks shall be conducted during the semester. The tests shall be in written mode.</p> <p>b. Two internal assignments each carrying 60 marks shall be conducted as a part of continuous assessment.</p> <p>The weightage of first assessment shall be 40% and the second assessment is 60%. *The weighted average shall be converted into 50 marks and rounded to the nearest integer for internal Assessment.</p> <p>10.1.2 A student who is absent or has failed in the Terminal Examinations in any Theory cum Studio course is permitted to appear for supplementary examination by retaining the Continuous Assessment already earned in the next two attempts of his/her choice. For further attempts, only the marks earned in</p>

	attempts of his/her choice. For further attempts, only the marks earned in the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).	the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).
10.3	<p>10.3 Assessment for Theory cum Studio Courses (Skill Based)</p> <p>10.3.1. The assessment of Theory cum studio (Skill Based) courses will be carried out in the form of assignments/ drawings/ sketches/ report etc. for a maximum of 100 marks. The total marks obtained in the assessments put together shall be reduced to 50 marks and rounded to the nearest integer. The weightage for these evaluations shall be discussed and recommended by the Department Committee constituted by the Head of the Department.</p> <p>10.3.2. For the Theory cum studio courses (Skill Based) Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the semester by an internal and external examiner appointed by the Controller of Examination from a panel recommended by the Head of the Department.</p>	<p>10.3 Assessment for Theory cum Studio Courses (Skill Based)</p> <p>10.3.1. The internal assessment of Theory cum studio (Skill Based) courses will be carried out in the form of two assessments. Each internal assessment is to be conducted for 100 marks in the form of assignments (Individual assignments /tutorials /seminars /mini projects /site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises etc. for a maximum of 100 marks. The total marks obtained in the assessments will be conducted as internal viva voce. The weightage of first assessment shall be 40% and the second assessment is 60%. *The weighted average shall be converted into 50 marks and rounded to the nearest integer for internal Assessment.</p> <p>.10.3.2. For the Theory cum studio (Skill Based) courses Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the semester by an internal and external examiner appointed by the Controller of Examination from a panel recommended by the Head of the Department.</p> <p>10.3.3 A student who is absent or has failed in the Terminal Examinations viva voce in any Theory cum studio (Skill Based) courses is permitted to appear for supplementary examination by retaining the Continuous Assessment already earned in the next two attempts of his/her choice. For further attempts, only the marks earned in the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).</p>
11.1	<p>11.1 Theory Courses</p> <p>For theory courses a candidate shall be declared to have passed the examination, if he / she secures minimum of 25 marks out of 50 in the Terminal Examination with a minimum aggregate of 50 marks out of 100 in continuous assessment and Terminal Examination put together.</p>	<p>11.1 Theory Courses</p> <p>For Theory courses (including Programme Elective and Elective foundation courses) a candidate shall be declared to have passed the examination, if he / she secures minimum of 45 marks out of 100 in the Terminal Examination with a minimum aggregate of 50 marks out of 100 in continuous assessment and Terminal Examination put together.</p>
11.2	<p>11.2 Theory cum Studio Courses</p> <p>For Theory cum Studio courses, a candidate shall be declared to have passed the examination, if he / she secures minimum of 25 marks out of 50 in the Terminal Examination with a minimum aggregate of 50 marks out of 100 in Continuous Assessment and Terminal Examination put together.</p>	<p>11.2 Theory cum Studio Courses</p> <p>For Theory cum Studio courses a candidate shall be declared to have passed the examination, if he / she secures minimum of 45 marks out of 100 in the Terminal Examination with a minimum aggregate of 50 marks out of 100 in continuous assessment and Terminal Examination put together.</p>
11.3	<p>11.3 Theory cum Studio Courses (Skill Based)</p> <p>11.3.1 The Continuous Assessment evaluation for Theory cum Studio courses (Skill Based) will be</p>	<p>11.3 Theory cum Studio Courses (Skill Based)</p> <p>11.3.1 Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the</p>

	<p>carried out for 50 marks for the performance of the candidate throughout the semester. The total marks obtained in the assessments put together shall be reduced to 50 marks and rounded to the nearest integer. The evaluation weightage for the Continuous Assessment of Theory cum Studio courses (Skill Based) shall be discussed and recommended by the Department Committee constituted by the Head of the Department. Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the semester by an internal and external examiner appointed by the Controller of Examination from a panel recommended by the Head of the Department for 100 Marks which shall be reduced to 50 Marks. A candidate shall be declared to have passed the examination if he / she secure an aggregate of 50 marks out of 100 obtained in the Continuous Assessment and Terminal Examination put together.</p> <p>11.3.2 If a student fails to secure a pass in a theory cum studio course (Skill Based) the student shall do reappearance registration for the Terminal Examination.</p>	<p>semester by an internal and external examiner appointed by the Controller of Examination from a panel recommended by the Head of the Department for 100 Marks which shall be reduced to 50 Marks.</p> <p>11.3.2 For Theory cum Studio (Skill Based) courses a candidate shall be declared to have passed the examination, if he / she secures minimum of 45 marks out of 100 in the Terminal Examination viva voce with a minimum aggregate of 50 marks out of 100 in continuous assessment and Terminal Examination put together.</p> <p>11.3.3 If a student fails to secure a pass in a theory cum studio course (Skill Based) the student shall do reappearance registration for the Terminal Examination.</p>															
11.4	<p>11.4.4 If a student fails to secure a pass in examinations of studio courses comprising of Fundamentals of Design and Architectural Design/ Architectural Thesis, the student shall resubmit an improved portfolio/works/sheets for the subsequent viva voce examination conducted in the following semester. The continuous assessment marks shall be valid for the subsequent attempt only.</p> <p>11.4.5 In case, a student fails to secure a pass in the subsequent attempt also, in the studio courses comprising of Fundamentals of design and Architectural Design/ Architectural Thesis, the student shall repeat when the course is offered next, attend classes, secure continuous assessment marks and submit the portfolio/works/sheets as in the case of a regular student as per vide clause 6 and 9.</p> <p>11.4.6 If a student fails to secure a pass in Practical Training, the student shall repeat the course again, when offered next.</p>	<p>11.4.4 If a student fails to secure a pass in examinations of studio courses comprising of Fundamentals of Design and Architectural Design/ Architectural Thesis, the student shall resubmit portfolio/report within 30 calendar days of publishing of the results. In case the 30th day happens to be a public holiday, the next working day can be considered for the date of submission. The resubmission of the portfolio/report and the subsequent viva-voce examination will be considered as arrears with payment of exam fee.</p> <p>11.4.5 In case, a student fails in the resubmission of the portfolio/report and subsequent viva-voce examination, the student shall repeat when the course is offered next, attend classes, secure continuous assessment marks and submit the portfolio/works/sheets as in the case of a regular student as per vide clause 6 and 9.</p> <p>11.4.6 If a student fails to secure a pass in Practical Training, the student shall repeat when the course is offered next. There is no option to resubmit the portfolio and attend a subsequent Viva Voce Examination for this course.</p>															
11.5	<p>11.5 Award of Grades Table 4: Grade Classification</p> <table border="1" data-bbox="240 1686 841 1881"> <thead> <tr> <th>Range of Total Marks (TM) (Continuous assessment +Terminal Examination)</th> <th>Letter Grade</th> <th>Grade Point (GP)</th> </tr> </thead> <tbody> <tr> <td>$90 \leq TM \leq 100$</td> <td>S</td> <td>10</td> </tr> <tr> <td>$80 \leq TM < 90$</td> <td>A</td> <td>9</td> </tr> </tbody> </table>	Range of Total Marks (TM) (Continuous assessment +Terminal Examination)	Letter Grade	Grade Point (GP)	$90 \leq TM \leq 100$	S	10	$80 \leq TM < 90$	A	9	<p>11.5 Award of Grades The award of letter grades will be decided using relative grading principle. The performance of a student will be reported using letter grades, each carrying certain points as given in Table 4: Table 4: Grade Classification</p> <table border="1" data-bbox="873 1808 1503 1902"> <thead> <tr> <th>Letter Grade</th> <th>Grade Point (GP)</th> </tr> </thead> <tbody> <tr> <td>O (Outstanding)</td> <td>10</td> </tr> <tr> <td>A + (Excellent)</td> <td>9</td> </tr> </tbody> </table>	Letter Grade	Grade Point (GP)	O (Outstanding)	10	A + (Excellent)	9
Range of Total Marks (TM) (Continuous assessment +Terminal Examination)	Letter Grade	Grade Point (GP)															
$90 \leq TM \leq 100$	S	10															
$80 \leq TM < 90$	A	9															
Letter Grade	Grade Point (GP)																
O (Outstanding)	10																
A + (Excellent)	9																

$70 \leq TM < 80$	B	8
$60 \leq TM < 70$	C	7
$50 \leq TM < 60$	D	6
$0 \leq TM < 50$	U	0
Non-completion of a semester (Repeat course)	I	0
Withdrawal from terminal examination	W	0
Absent	AA	0

$$GPA = \frac{\sum_{i=1}^N C_i GP_i}{\sum_{i=1}^N C_i}$$

N is the number of courses registered in a particular semester, GP_i is the grade point obtained in i^{th} course and C_i is the number of credits assigned to i^{th} course. Cumulative GPA (CGPA) will be calculated when the student is declared to be eligible for the award of the degree. CGPA calculation is based on all the courses considered (vide clause 5.2) for the award of the degree.

A (Very Good)	8
B + (Good)	7
B (Average)	6
C (Satisfactory)	5
RA (Re-appearance)	0
SA (Shortage of Attendance)	0
W (Withdrawal)	0

A student is deemed to have passed and acquired the corresponding credits in a particular course if he/she obtains any one of the following grades: "O", "A+", "A", "B+", "B", "C".

'SA' denotes shortage of attendance (as per clause 6.1) and hence prevented from writing the Terminal examination. 'SA' will appear only in the result sheet.

"RA" denotes that the student has failed to pass in that course. "W" denotes withdrawal from the exam for the particular course. The grades RA and W will figure both in the Grade Sheet as well as in the Result Sheet. In both cases, the student has to appear for the Terminal examination as per the Regulations.

If the grade RA or W is given to Theory courses (including Elective Theory Courses) and Theory cum Studio (Skill Based) Courses, it is not required to satisfy the attendance requirements (vide clause 6) but the student has to appear for the Terminal examination and fulfil the norms specified in Clause 14 to earn a pass in the respective courses.

If the grade RA or W is given to Studio Courses, Dissertation and Thesis, the procedure to be followed will be as per Clause 14.

12.0 12.0 REQUIREMENTS FOR MOVING TO A HIGHER SEMESTER

12.1 A student of the B.Arch. shall move to the higher semester if student satisfies semester completion requirements (vide clause – 6) and the following conditions.

To enroll in III semester 21AR360 - Personal Space Design, a pass is required in 21AR160 - Fundamentals of Design (Sem I)

To enroll in IV semester 21AR450 - Social Space Design, a pass is required in 21AR260 - Micro Personal Space Design (Sem II)

To enroll in V semester 21AR530 - Urban Architectural Design, a pass is required in 21AR360 - Personal Space Design (Sem III)

To enroll in VI semester 21AR630 - Campus Design, a pass is required in 21AR450 - Social Space Design (Sem IV)

To enroll in VII semester 21AR730 - Public Space Design, a pass is required in 21AR530 - Urban Architectural Design (Sem V)

To enroll in VIII semester 21AR830 - Architectural Design and Research, a pass is required in

12.0 REQUIREMENTS FOR MOVING TO A HIGHER SEMESTER

12.1 A student of the B.Arch. shall move to the higher semester if student satisfies semester completion requirements (vide clause – 6) and the following conditions.

To move to:

(i) To enroll in II semester 21AR260 - Micro Personal Space Design, a pass is required in 21AR160 - Fundamentals of Design (Sem I)

(ii) To enroll in III semester 21AR360 - Personal Space Design, a pass is required in 21AR260 - Micro Personal Space Design (Sem II)

(iii) To enroll in IV semester 21AR450 - Social Space Design, a pass is required in 21AR360 - Personal Space Design (Sem III)

(iv) To enroll in V semester 21AR530 - Urban Architectural Design, a pass is required in 21AR450 - Social Space Design (Sem IV)

(v) To enroll in VI semester 21AR630 - Campus Design, a pass is required in 21AR530 - Urban Architectural Design (Sem V)

(vi) To enroll in VII semester 21AR730 - Public Space

	<p>21AR630 - Campus Design (Sem VI) To enroll in IX semester 21AR910 – Practical Training, a pass is required in 21AR730 - Public Space Design (Sem VII) To enroll in X semester 21ART10 – Architectural Thesis, a pass is required in 21AR830 - Architectural Design and Research (Sem VIII)</p>	<p>Design, a pass is required in 21AR630 - Campus Design (Sem VI) (vii) To enroll in VIII semester 21AR830 - Architectural Design and Research, a pass is required in 21AR730 - Public Space Design (Sem VII) (viii) To enroll in IX semester 21AR910 – Practical Training, a pass is required in 21AR830 - Architectural Design and Research (Sem VIII) (ix) To enroll in X semester 21ART10 – Architectural Thesis, a pass is required in 21AR910 – Practical Training (Sem IX)</p>
15.2	<p>15.2. First Class A student who qualifies for the award of degree (vide clause 14.0) having passed the examination in all the courses within SIX years including the authorized Break of Study of One Year, and securing a CGPA of not less than 7.00 shall be declared to have passed in First class. The authorized break of study (vide clause 16.0) and withdrawal from the examination (vide clause 17.0) will not be counted as an attempt.</p>	<p>15.2. First Class A student who qualifies for the award of degree (vide clause 14.0) having passed the examination in all the courses within SIX years including the authorized Break of Study of One Year and securing a CGPA of not less than 6.50 shall be declared to have passed in First class and should not have been prevented from writing Terminal examination due to lack of attendance in any of the courses. The authorized break of study (vide clause 16.0) and withdrawal from the examination (vide clause 17.0) will not be counted as an attempt.</p>

THIAGARAJAR COLLEGE OF ENGINEERING

DEPARTMENT OF ARCHITECTURE

VISION

Impart excellence in architectural education and nurture socially responsible professionals.

MISSION

M1. Evolve and inculcate experiential and effective teaching learning processes.

M2. Strive to inculcate professional ethics and excellence through effective industry-institute collaboration.

M3. Lead and coordinate the profession's involvement in socio-cultural and environment related issues in architecture.

M4. Engage in environmental conscious research and scholarly activities in Architecture and Interdisciplinary fields.

M5. Promote the department into a centre of excellence through inter disciplinary associations and team work.

Programme Educational Objectives (PEO's)

PEO1: Graduates shall employ appropriate techniques and technologies to become the catalysts for change.

PEO2: Graduates shall pursue ethical professional development through lifelong learning.

PEO3: Graduates shall become socially responsible and environmentally conscious architects.

PEO4: Graduates shall critically solve socially and environmentally pertinent issues by undertaking research relevant to their career.

PEO5: Graduates shall become effective contributing members of trans-disciplinary teams.

PEO- Mission Mapping

PEO	M1	M2	M3	M4	M5
PEO1	S	S	S	S	M
PEO2	S	S	S	S	S
PEO3	M	S	S	S	M
PEO4	S	S	S	S	M
PEO5	M	S	S	S	S

1 – Low; 2 – Medium; 3 – Strong

Programme Outcomes (POs) for B.Arch

After the successful completion of the B.Arch degree programme, the graduates should be able to:

PO1: Architectural Design Knowledge: Evolve architectural designs that address both aesthetic and technical requirements.

PO2: Design Precedence and Creative Disciplines: Possess adequate knowledge of the history and theories of architecture and the related arts, technologies and human anthropometry that influence the quality of architectural design.

PO3: Planning Processes: Apply the knowledge of urban design, planning and the skills involved in the planning process.

PO4: Human Behavioral Studies: Establish the relationship between people, buildings and their environment; and of the need to relate buildings and the open spaces to human needs and scale.

PO5: Socio Cultural Interface: Value the profession of architecture and the role of architect in a society, with focus on preparing design briefs that take into account social and cultural factors.

PO6: Architectural Programming: Comprehend the methods of investigation and preparation of the design brief for an architectural design project.

PO7: Constructional & Engineering Knowledge: Understand the structural design and solve constructional and engineering problems associated with building design.

PO8: Energy Efficiency and Eco friendly design: Evolve ecologically sustainable design which results in an energy efficient, environmental friendly and climatically responsive built environment that provides spatial comfort.

PO9: Professional Practice & Ethical values: Demonstrate design skills necessary to meet the design programme requirements with awareness of responsibilities towards human, social, cultural, architectural and environmental values.

PO10: Design Coordination: Develop adequate knowledge of the industries, organizations, regulations and procedures involved in translating the design concepts into buildings.

PO11: Technical Competence and Research Orientation: Develop a creative competence in techniques and technology, founded on a comprehensive understanding of the disciplines and updated knowledge through exposed research opportunities.

PO12: Project Management and Financing: Develop adequate knowledge of project financing, project management and cost control.

PEO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	S	S	S	S	S	S	M	S	S	S	S	M
PEO2	S	S	S	S	S	M	S	S	S	S	S	M
PEO3	S	M	S	M	M	M	S	S	M	M	S	M
PEO4	S	M	S	S	S	S	M	S	M	M	S	M
PEO5	S	S	S	S	S	M	M	S	M	S	S	M

Programme Specific Outcomes (PSO):

After the successful completion of the B.Arch degree programme:

PSO1: Graduates shall become competent, socially responsible and environmentally conscious architects.

PSO2: Graduates shall employ appropriate skills and technologies in allied fields of design and development.

PSO3: Graduates shall undertake continuous learning and research in pursuit of ethical professional excellence.

Credit Distribution

S.No	Category	Credits
A	Foundation Courses	87
	Architecture	
	Engineering Science (ES)	
B	Foundation Elective	15-24
	Architecture	
	Engineering Science (ES)	
	Humanities and Social Science (HSS)	
C	Professional Core Courses	149
D	Programme Elective	9-21
	Programme Specific Elective Courses for Expanded Scope	
	Programme Specific Elective for Skill Enhancement	
	General Elective	
E	Mandatory Courses prescribed by AICTE/UGC (Not included for CGPA)	
	Minimum Credits to be earned for the award of the Degree	260 (from A to D) and the successful completion of Mandatory Courses

- General electives are courses offered by different departments that do not have any prerequisites and could be of interest to students of any branch.
- All students have to undertake co-curricular and extra-curricular activities that include activities related to NCC, NSS, Sports, Professional Societies, participation in identified activities which promote the growth of Departments and the College

Board of Studies Meeting approved on 07.05.2022

Approved in 63rd Academic Council Meeting held on 25.06.2022

Department of Architecture, Thiagarajar College of Engineering, Madurai – 625015
(For the candidates admitted from 2021-2022 onwards)
Scheduling of Courses

SEM	THEORY		THEORY CUM STUDIO			STUDIO	Total Hours/Credits	
	Foundation Courses		Foundation Courses		Skill Based	Professional Core Courses		
I	21AR110 Architectural Principles - World Architecture (2)		21AR120 Fundamentals of Building Systems (4)	21AR130 Architectural Projections (4)	21AR140 Visual Arts (4)	21AR150 Computer Aided Drafting (4)	21AR160 Fundamentals of Design (10)	28
II	21AR210 Architectural Principles - Indian Architecture (2)		21AR220 Climate Responsive Architecture (4)	21AR230 Graphical Visualizations (4)	21AR240 Architectural Workshop (4)	21AR250 Digital Visualization (4)	21AR260 Micro Personal Space Design (10)	28
	Foundation Courses		Foundation Courses				Professional Core Courses	
III	21AR311 Residential Building Services (3)	21AR320 Design Thinking and Principles of Design (2)	21AR330 Horizontal Spanning Systems (4)	21AR340 Materials and Components (3)	21AR350 Site Planning and Site Services (4)		21AR360 Personal Space Design (10)	26
	Foundation Courses			Skill Based	Foundation Elective / Programme Elective Courses		Professional Core Courses	
	THEORY		THEORY CUM STUDIO	THEORY CUM STUDIO	THEORY/ THEORY CUM STUDIO		STUDIO	
IV	21AR410 Non-Residential Building Services (3)	21AR420 Architectural Principles - Regional Architecture (2)	21AR431 Vertical Spanning Systems (4)	21AR440 BIM Processes (4)	**Credits are to be earned Foundation Elective / Program Elective that could be chosen are as in Annex1		21AR450 Social Space Design (12)	28
V	21AR510 Building Science and Management Systems (3)	21AR520 Architectural Principles - Modern Architecture (3)	-	-	**Credits are to be earned Foundation Elective / Program Elective that could be chosen are as in Annex1	**Credits are to be earned Foundation Elective / Program Elective that could be chosen are as in Annex1	21AR530 Urban Architecture Design (12)	24-26
VI	21AR610 Emerging Building Systems and Practices (3)	21AR620 Urban Design Theories (3)	-	-			21AR630 Campus Design (15)	27-28
VII	21AR710 Project Management (3)	21AR720 Geometric Modeling (2)	-	-			21AR730 Public Space Design (15)	26-27
VIII	21AR810 Professional Practice (3)	21AR820 Environmental Science For Architecture (2)	-	-			21AR830 Architectural Design and Research (15)	23-24
IX	-	-	-	-	-		21AR910 Practical Training (25)	25
X	-	-	-	-	**Credits are to be earned Foundation Elective / Program Elective that could be chosen are as in Annex1		21ART10 Architectural Thesis (25)	25-28
TOTAL CREDITS								

- Program Core Courses+ Compulsory Foundation Courses =149+ 87 =236 credits; ** Elective Foundation Courses (EFC)+ Program Elective(PE) = 15 min (24 max) + 9 min (21 max) =24 (min)credits; (Audit Courses will be offered from 3rd semester); **TOTAL CREDITS = 260 CREDITS MINIMUM**

THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI- 625 015
(A Govt. Aided Autonomous Institution affiliated to Anna University)
COURSES OF STUDY

Annexure – I
Programme: Architecture

Degree: B. Arch

Foundation Courses:
a. Architecture

Total Credits to be earned: 87

S. No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
THEORY							
1.	21AR110	Architectural Principles - World Architecture	2	-	-	2	I SEM AND ABOVE
2.	21AR210	Architectural Principles - Indian Architecture	2	-	-	2	II SEM AND ABOVE
3.	21AR320	Design Thinking and Principles of Design	2	-	-	2	III SEM AND ABOVE
4.	21AR420	Architectural Principles - Regional Architecture	2	-	-	2	IV SEM AND ABOVE
5.	21AR520	Architectural Principles - Modern Architecture	3	-	-	3	V SEM AND ABOVE
6.	21AR610	Emerging Building Systems and Practices	3	-	-	3	VI SEM AND ABOVE
7.	21AR620	Urban Design Theories	3	-	-	3	VI SEM AND ABOVE
8.	21AR710	Project Management	2	1	-	3	VII SEM AND ABOVE
9.	21AR810	Professional Practice	3	-	-	3	VIII SEM AND ABOVE
THEORY CUM STUDIO							
10.	21AR130	Architectural Projections	1	-	3	4	I SEM AND ABOVE
11.	21AR230	Graphical Visualizations	1	-	3	4	II SEM AND ABOVE
12.	21AR350	Site Planning and Site Services	2	-	2	4	III SEM AND ABOVE
THEORY CUM STUDIO (SKILL BASED)							
13.	21AR140	Visual Arts	1	-	3	4	I SEM AND ABOVE

14.	21AR150	Computer Aided Drafting	1	-	3	4	I SEM AND ABOVE
15.	21AR240	Architectural Workshop	1	-	3	4	II SEM AND ABOVE
16.	21AR250	Digital Visualization	1	-	3	4	II SEM AND ABOVE
17.	21AR440	BIM Processes	1	-	3	4	IV SEM AND ABOVE

b. Engineering Science

S. No	Course code	Name of the Course	Number of Hours / Week			Credit	Semester/ prerequisite
			L	T	P		
THEORY							
18.	21AR311	Residential Building Services	3	-	-	3	III SEM AND ABOVE
19.	21AR410	Non-Residential Building Services	3	-	-	3	IV SEM AND ABOVE
20.	21AR510	Building Science and Management Systems	3	-	-	3	V SEM AND ABOVE
21.	21AR720	Geometric Modeling	2	-	-	2	VII SEM AND ABOVE
22.	21AR820	Environmental Science for Architecture	2	-	-	2	VIII SEM AND ABOVE
THEORY CUM STUDIO							
23.	21AR120	Fundamentals of Building System	2	-	2	4	I SEM AND ABOVE
24.	21AR220	Climate Responsive Architecture	2	-	2	4	II SEM AND ABOVE
25.	21AR330	Horizontal Spanning Systems	2	-	2	4	III SEM AND ABOVE
26.	21AR340	Materials and Components	1	-	2	3	III SEM AND ABOVE
27.	21AR431	Vertical Spanning Systems	2	-	2	4	IV SEM AND ABOVE

2. Professional Core Courses:**Total Credits to be earned: 149**

S.No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
STUDIO							
1.	21AR160	Fundamentals of Design	-	-	10	10	I SEM / NIL
2.	21AR260	Micro Personal Space Design	-	-	10	10	II SEM / [Pass in 21AR160 - Fundamentals of Design (I SEM)]
3.	21AR360	Personal Space Design	-	-	10	10	III SEM / [Pass in 21AR260 - Micro Personal Space Design (II SEM)]
4.	21AR450	Social Space Design	-	-	12	12	IV SEM / [Pass in 21AR360 - Personal Space Design (III SEM)]
5.	21AR530	Urban Architecture Design	-	-	12	12	V SEM / [Pass in 21AR450 - Social Space Design (IV SEM)]
6.	21AR630	Campus Design	-	-	15	15	VI SEM / [Pass in 21AR530 - Urban Architecture Design (V SEM)]
7.	21AR730	Public Space Design	-	-	15	15	VII SEM / [Pass in 21AR630 - Campus Design (VI SEM)]
8.	21AR830	Architectural Design and Research	-	-	15	15	VIII SEM / [Pass in 21AR730 - Public Space Design (VII SEM)]
9.	21AR910	Practical Training	-	-	25	25	IX SEM / [Pass in 21AR830 - Architectural Design and Research (VIII SEM)]
10.	21ART10	Architectural Thesis	-	-	25	25	X SEM [Pass in 21AR910 – Practical Training (IXSEM)]

3. Elective Foundation Courses:

Total Credits to be earned: 15

a. Architecture

S. No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
THEORY							
1.	21ARFA0	Vernacular Architecture	3	-	-	3	V SEM AND ABOVE
2.	21ARFB0	Housing Standards and Design	3	-	-	3	VI SEM AND ABOVE
3.	21ARFC0	Architectural Conservation	3	-	-	3	VIII SEM AND ABOVE
4.	21ARFR0	Urban Analysis and Mapping	3	-	-	3	VII SEM AND ABOVE
5.	21ARFT0	Energy Efficient Buildings	3	-	-	3	VI SEM AND ABOVE
THEORY CUM STUDIO							
6.	21ARFD0	Lateral Thinking	2	-	2	4	IV SEM AND ABOVE
7.	21ARFE0	Product Design and Ergonomics	2	-	2	4	IV SEM AND ABOVE
8.	21ARFF0	Computational Design	1	-	3	4	V SEM AND ABOVE
9.	21ARFG0	Landscape Design	2	-	2	4	VI SEM AND ABOVE

b. Engineering Science

S. No	Course code	Name of the Course	Number of Hours / Week			Credit	Semester/ prerequisite
			L	T	P		
THEORY							
10.	21ARFH0	Indigenous Building Practices	3	-	-	3	VI SEM AND ABOVE
11.	21ARFJ0	Introduction to Digital Fabrication	3	-	-	3	VI SEM AND ABOVE
12.	21ARFK0	Structural Systems for High-rise Buildings	3	-	-	3	VIII SEM AND ABOVE
13.	21ARFS0	Alternate Building Construction Practices	3	-	-	3	IV SEM AND ABOVE

c. Humanities and Social Science

S. No	Course code	Name of the Course	Number of Hours / Week			Credit	Semester/ prerequisite
			L	T	P		
THEORY							
14.	21ARFL0	Sociology and Culture	2	-	-	2	IV SEM AND ABOVE
14.	21ARFM0	Environmental Behavioural Studies	2	-	-	2	VI SEM AND ABOVE
16.	21ARFN0	Human Settlements and Planning	3	-	-	3	VI SEM AND ABOVE
17.	21ARFP0	Sociology, Culture and Architecture	3	-	-	3	IV SEM AND ABOVE
18.	21ARFQ0	Built Environment and the Human Behaviour	3	-	-	3	VI SEM AND ABOVE

4. Program Elective Courses:**Total Credits to be earned: 09****a. Programme Specific Elective for Expanded Scope**

S. No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
THEORY							
1.	21ARPA0	Iconography in Architectural History	2	-	-	2	IV SEM AND ABOVE
2.	21ARPB0	Art Appreciation	2	-	-	2	IV SEM AND ABOVE
3.	21ARPC0	Architectural Journalism and Criticism	3	-	-	3	VI SEM AND ABOVE
4.	21ARPH0	Art History	3	-	-	3	IV SEM AND ABOVE
5.	21ARPJ0	Specification, Cost Estimation and Budgeting	3	-	-	3	IV SEM AND ABOVE
6.	21ARPK0	Lighting Design for Work Environment	3	-	-	3	V SEM AND ABOVE

b. Programme Specific Elective for Skill Enhancement

S. No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
THEORY							
7.	21ARPD0	Green Buildings	2	-	-	2	VI SEM AND ABOVE
8.	21ARPE0	Biomimicry in Architecture	3	-	-	3	VIII SEM AND ABOVE
9.	21ARPF0	Sustainable Cities and Communities	3	-	-	3	VIII SEM AND ABOVE
10.	21ARPG0	Disaster Management	3	-	-	3	VIII SEM AND ABOVE
THEORY CUM STUDIO (SKILL BASED)**							
11.	21ARPL0	Digital Design Communication Through UX and UI	1	-	2	3	VIII SEM AND ABOVE
12.	21ARPM0	BIM for Mechanical, Electrical and Plumbing	1	-	3	4	VI SEM AND ABOVE

5. Audit Courses:**Total Credits to be earned: 00**

S. No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
THEORY							
1.	21ARAA0	Sanga Tamil Literature Appreciation	2	-	-	-	III SEM AND ABOVE
2.	21ARAB0	Essence of Indian Knowledge Tradition	2	-	-	-	III SEM AND ABOVE
3.	21ARAC0	Stress Management by Yoga	2	-	-	-	III SEM AND ABOVE
4.	21ARAD0	Value Education	2	-	-	-	III SEM AND ABOVE
5.	21ARAE0	Constitution of India	2	-	-	-	III SEM AND ABOVE

6. One /Two Credit Courses:

S. No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
THEORY							
1.	21AR1A0	Road Safety and Civic Sense	1	-	-	-	VI SEM AND ABOVE

SCHEME OF EXAMINATION

FIRST SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY ^													
1.	21AR110	Architectural Principles - World Architecture	3	40	-	-	60^	-	100	-	45	-	50
THEORY CUM STUDIO^													
2.	21AR120	Fundamentals of Building System	3	-	50	-	50^^	-	100	-	45	-	50
3.	21AR130	Architectural Projections	3	-	50	-	50^^	-	100	-	45	-	50
THEORY CUM STUDIO (SKILL BASED)**													
4.	21AR140	Visual Arts	-	-	-	50	-	50**	100	-	-	45	50
5.	21AR150	Computer Aided Drafting	-	-	50	-	-	50**	100	-	-	45	50
STUDIO#													
6.	21AR160	Fundamentals of Design	-	-	-	60	-	40#	100	-	-	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

^^**For** Theory cum Studio Courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 50 marks for the award of terminal examination marks.

** **For** Theory cum Studio Courses (Skill based) Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 50 marks for the award of terminal examination marks.

For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

SECOND SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY ^													
1.	21AR210	Architectural Principles - Indian Architecture	3	40	-	-	60^	-	100	-	45	-	50
THEORY CUM STUDIO^													
2.	21AR220	Climate Responsive Architecture	3	50	-	-	50^^	-	100	-	45	-	50
3.	21AR230	Graphical Visualizations	3	50	-	-	50^^	-	100	-	45	-	50
THEORY CUM STUDIO (SKILL BASED)**													
4.	21AR240	Architectural Workshop	-	-	-	50	-	50**	100	-	-	45	50
5.	21AR250	Digital Visualization	-	-	50	-	-	50**	100	-	-	45	50
STUDIO#													
6.	21AR260	Micro Personal Space Design	-	-	-	60	-	40#	100	-	-	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

^^**For** Theory cum Studio Courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 50 marks for the award of terminal examination marks.

** **For** Theory cum Studio Courses (Skill based) Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 50 marks for the award of terminal examination marks.

For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

THIRD SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks						Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)			Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce	Written test			Viva voce		
THEORY ^														
1.	21AR311	Residential Building Services	3	40	-	-	60^	-	100	-	45	-	50	
2.	21AR320	Design Thinking and Principles of Design	3	40	-	-	60^	-	100	-	45	-	50	
THEORY CUM STUDIO^														
3.	21AR330	Horizontal Spanning Systems	3	-	50	-	50^^	-	100	-	45	-	50	
4.	21AR340	Materials and Components	3	50	-	-	50^^	-	100	-	45	-	50	
5.	21AR350	Site Planning and Site Services	3	50	-	-	50^^	-	100	-	45	-	50	
STUDIO#														
6.	21AR360	Personal Space Design	-	-	-	60	-	40#	100	-	-	-	50	

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

^^**For** Theory cum Studio Courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 50 marks for the award of terminal examination marks.

For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

FOURTH SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks						Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)			Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce	Written test			Viva voce		
THEORY ^														
1.	21AR410	Non-Residential Building Services	3	40	-	-	60^	-	100	-	45	-	50	
2.	21AR420	Architectural Principles - Regional Architecture	3	40	-	-	60^	-	100	-	45	-	50	
THEORY CUM STUDIO^														
3.	21AR431	Vertical Spanning Systems	3	-	50	-	50^^	-	100	-	45	-	50	
THEORY CUM STUDIO (SKILL BASED)**														
4.	21AR440	BIM Processes	-	-	-	50	-	50**	100	-	-	45	50	
STUDIO#														
5.	21AR450	Social Space Design	-	-	-	60	-	40#	100	-	-	-	50	

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

^^**For** Theory cum Studio Courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 50 marks for the award of terminal examination marks.

** **For** Theory cum Studio Courses (Skill based) Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 50 marks for the award of terminal examination marks.

For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

FIFTH SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY ^													
1.	21AR510	Building Science and Management Systems	3	40	-	-	60^	-	100	-	45	-	50
2.	21AR520	Architectural Principles - Modern Architecture	3	40	-	-	60^	-	100	-	45	-	50
STUDIO#													
3.	21AR530	Urban Architecture Design	-	-	-	60	-	40#	100	-	-	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

SIXTH SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY ^													
1.	21AR610	Emerging Building Systems and Practices	3	40	-	-	60^	-	100	-	45	-	50
2.	21AR620	Urban Design Theories	3	40	-	-	60^	-	100	-	45	-	50
STUDIO#													
3.	21AR630	Campus Design	-	-	-	60	-	40#	100	-	-	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

SEVENTH SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY ^													
1.	21AR710	Project Management	3	40	-	-	60^	-	100	-	45	-	50
2.	21AR720	Geometric Modeling	3	40	-	-	60^	-	100	-	45	-	50
STUDIO#													
3.	21AR730	Public Space Design	-	-	-	60	-	40#	100	-	-	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

EIGHTH SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY ^													
1.	21AR810	Professional Practice	3	40	-	-	60^	-	100	-	45	-	50
2.	21AR820	Environmental Science for Architecture	3	40	-	-	60^	-	100	-	45	-	50
STUDIO#													
3.	21AR830	Architectural Design and Research	-	-	-	60	-	40#	100	-	-	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

NINTH SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
STUDIO[#]													
1.	21AR910	Practical Training	-	-	-	60	-	40 [#]	100	-	-	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

[#] **For** Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

TENTH SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
STUDIO[#]													
1.	21ART10	Architectural Thesis	-	-	-	60	-	40 [#]	100	-	-	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

[#] **For** Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

ELECTIVE FOUNDATION COURSES

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks			Min. Marks for Pass				
				Continuous assessment* (A)	Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
					Written test	Viva voce			Written test	Viva voce	
THEORY ^											
1.	21ARFA0	Vernacular Architecture	3	40	60^	-	100	-	45	-	50
2.	21ARFB0	Housing Standards and Design	3	40	60^	-	100	-	45	-	50
3.	21ARFC0	Architectural Conservation	3	40	60^	-	100	-	45	-	50
4.	21ARFH0	Indigenous Building Practices	3	40	60^	-	100	-	45	-	50
5.	21ARFJ0	Introduction to Digital Fabrication	3	40	60^	-	100	-	45	-	50
6.	21ARFK0	Structural Systems for High-rise Buildings	3	40	60^	-	100	-	45	-	50
7.	21ARFL0	Sociology and culture	3	40	60^	-	100	-	45	-	50
8.	21ARFM0	Environmental Behavioural Studies	3	40	60^	-	100	-	45	-	50
9.	21ARFN0	Human Settlements and Planning	3	40	60^	-	100	-	45	-	50
10.	21ARFP0	Sociology, Culture and Architecture	3	40	60^	-	100	-	45	-	50
11.	21ARFQ0	Built Environment and the Human Behaviour	3	40	60^	-	100	-	45	-	50
12.	21ARFR0	Urban Analysis and Mapping	3	40	60^	-	100	-	45	-	50
13.	21ARFS0	Alternate Building Construction Practices	3	40	60^	-	100	-	45	-	50
14.	21ARFT0	Energy Efficient Buildings	3	40	60^	-	100	-	45	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

ELECTIVE FOUNDATION COURSES

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY CUM STUDIO[^]													
1.	21ARFD0	Lateral Thinking	3	-	50	-	50 ^{^^}	-	100	-	45	-	50
THEORY CUM STUDIO (SKILL BASED)^{**}													
2.	21ARFE0	Product Design & Ergonomics	-	-	-	50	-	50 ^{**}	100	-	-	45	50
3.	21ARFF0	Computational Design	-	-	-	50	-	50 ^{**}	100	-	-	45	50
4.	21ARFG0	Landscape Design	-	-	50	-	50 ^{^^}	-	100	-	45	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^{^^}**For** Theory cum Studio Courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 50 marks for the award of terminal examination marks.

^{**}**For** Theory cum Studio Courses (Skill based) Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 50 marks for the award of terminal examination marks.

PROGRAM ELECTIVE COURSES

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks				Min. Marks for Pass			
				Continuous assessment* (A)	Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
					Written test	Viva voce			Written test	Viva voce	
THEORY ^											
1.	21ARPA0	Iconography in Architectural History	3	40	60^	-	100	-	45	-	50
2.	21ARPB0	Art Appreciation	3	40	60^	-	100	-	45	-	50
3.	21ARPC0	Architectural Journalism and Criticism	3	40	60^	-	100	-	45	-	50
4.	21ARPD0	Green Buildings	3	40	60^	-	100	-	45	-	50
5.	21ARPE0	Biomimicry in Architecture	3	40	60^	-	100	-	45	-	50
6.	21ARPF0	Sustainable Cities and Communities	3	40	60^	-	100	-	45	-	50
7.	21ARPG0	Disaster Management	3	40	60^	-	100	-	45	-	50
8.	21ARPH0	Art History	3	40	60^	-	100	-	45	-	50
9.	21ARPJ0	Specifications, Cost Estimation and Budgeting	3	40	60^	-	100	-	45	-	50
10.	21ARPK0	Lighting Design for Work Environment	3	40	60^	-	100	-	45	-	50

* **Continuous** Assessment Evaluation pattern will differ from subject to subject

^ **For** Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

PROGRAM ELECTIVE COURSES

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass				
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY CUM STUDIO (SKILL BASED)**													
2.	21ARPL0	Digital Design Communication Through UX and UI	-	-	-	50	-	50**	100	-	-	45	50
3.	21ARPM0	BIM for Mechanical, Electrical and Plumbing	-	-	-	50	-	50**	100	-	-	45	50

Continuous Assessment Evaluation pattern will differ from subject to subject

^^For Theory cum Studio Courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 50 marks for the award of terminal examination marks.

****For** Theory cum Studio Courses (Skill based) Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 50 marks for the award of terminal examination marks.

21AR110	ARCHITECTURAL PRINCIPLES – WORLD ARCHITECTURE	Category	L	T	P	Credit
		CFC	2	0	0	2

Preamble

History is "the process of inquiry into the past of man in society" (E.H. Carr). History defines and illustrates the cultural context in which theories (scientific, artistic, architectural, and philosophical) and architectural products (cities, buildings, bridges, etc.) emerge.

This course, covering ancient buildings and settlements aims to:

- Give an introduction on history of architecture and various factors influencing it.
- Explore the interrelation between architecture and its principles.
- Develop a comprehension of the needs and aspirations of a given epoch as these were manifested in physical form, as well as to the reception of architectural ideas and buildings in such epoch and their impact on current thinking.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Recall the different factors that embrace architecture across the globe.	Understand 10%
CO2	Interpret the different paradigms in the culture and its influence on architectural history	Understand 20%
CO3	Illustrate the historic examples through comprehensive understanding of architectural elements.	Understand 10%
CO4	Discuss the trans-disciplinary concepts applied in the history of architecture.	Understand 10%
CO5	Examine the components of architecture based on context.	Understand 20%
CO6	Illustrate the architectural principles in the design of historic buildings and settlements	Apply 30%

*** Weightage depends on Bloom's Level, number of contact hours

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	70	70	70	70	70
Apply	30	30	30	30	30

Syllabus

The Beginnings of Architecture - From Caves to Cities- Basic elements of Architecture - Elements doing more than one thing - Architecture as identification of place and Primitive place types - Ideal Geometry and Geometries of being - Context influencing architecture- Role of environment and cultural aspects - Form and Space in Early dwellings units- Role of Horizontal and vertical planes in architecture, Organization of form - Space- Spatial Relationship interlocking of space, adjacent space, space within the space - Structural Elements enclosing and integrating Architecture - Experiences gained through sequences of spaces with references to light, form and texture. - Diagnosing / analyzing at **Unit Level:** Caves at Lascaux, Terra Amata (France), Cro Magnon (Ukraine) - **Cluster Level:** Lepenski Vir (Serbia), Skara Brae, Monte Verde (Chile) - **Settlement Level:** Settlement at Lake Biskupin (Poland), Catal Huyuk (Turkey). **The Architecture of Egypt, Mesopotamia and Indus** - Context influencing architecture- Role of environment (Sun, wind, earth and water) and cultural aspects (belief systems and social systems - its reflections on Architecture) - Organization of form and Space- Spatial Relationship- types of organization-central, linear, Radial, etc - Circulation movement through space, Path Space relationship, Form of the circulation space - **Unit Level:** Mastabas, Pyramids (Egypt), Suburban villa at Akhetan, Egypt), Ziggurats (Mesopotamia), Great Granary and Bath (Indus) - **Cluster Level:** Temple of Amun Karnak (Egypt), Citadel at Khorsabad (Assyria), Palace of Persepolis (Persia) - **Settlement Level:** Mohenjo-Daro and Harappa. **The Architecture of Greece and Rome:** - Context influencing architecture- Role of environment (Sun, wind, earth and water) and cultural aspects (belief systems and social systems - its reflections on Architecture) - Primary solids, regular and irregular forms, Additive and subtractive forms, centralized form, radial form, linear forms etc - Formal collision of geometry and surface articulation - Proportion and Scale with reference to material, structure and orders and principles in architecture - **Unit Level:** Pantheon, Colosseum (Rome) Theatre of Epidaurus

(Greece) - **Cluster Level:** Roman Forum, Greek Agora and Acropolis at Greece. **Medieval Architecture** - Context influencing architecture- Role of environment (Sun, wind, earth and water) and cultural aspects (belief systems and social systems - its reflections on Architecture) - Circulation movement through space, Path Space relationship, Form of the circulation space - Primary solids, regular and irregular forms, Additive and subtractive forms, centralized form, radial form, linear forms etc - Formal collision of geometry and surface articulation - **Unit Level:** Early Christian and Byzantine churches, Romanesque churches, Gothic cathedrals. **Renaissance Architecture** - Context influencing architecture- Role of environment (Sun, wind, earth and water) and cultural aspects (belief systems and social systems - its reflections on Architecture) - Organization of form and Space- Spatial Relationship- interlocking of space, adjacent space, space within the space- Proportion and Scale with reference to material, structure and orders and principles in architecture - Examples from the Contribution of Andrea Palladio, Christopher Wren, Filippo Brunelleschi and Leonardo Da Vinci.

Learning Resources

1. Jenkins Keith, Rethinking history, Routledge classics,2003
2. Irving L. Gordon, World History, Amsco school of publications, INC, New York, 2000.
3. Norbert Schoenauer, 6000 years of housing, WW Norton & Company, 2000
4. Lorna Oakes & Lucia Gahlin, Ancient Egypt, Anness publishing Ltd, 2007
5. Charles Gates, Ancient Cities- The archaeology of urban life in the ancient near east and Egypt, Greece and Rome.
6. Edith Tomory, A history of fine arts in India, Orient Longman, 2003
7. Francis D.K. Ching and others, A global History of Architecture, 2nd edition, John wiley and sons, Inc., 2011.
8. Sir Banister Fletcher's, A History of Architecture, University of London, The Athlone Press, 1996
9. Online courses
 - <https://www.edx.org/course/a-global-history-of-architecture-2>
A Global History of Architecture – offered by Massachusetts Institute of Technology on Edx
 - <https://www.edx.org/course/the-architectural-imagination>
The Architectural Imagination – offered by Harvard University on Edx
 - <https://www.coursera.org/learn/roman-architecture>
Roman Architecture – offered by Yale University on Coursera
 - <https://www.coursera.org/learn/roman-art-archaeology?>
Roman Art and Archaeology – offered by the University of Arizona on Coursera
 - <https://www.coursera.org/learn/age-of-cathedrals>
Age of Cathedrals – offered by Yale University on Coursera

Course Designers:

- | | |
|------------------------|-----------------|
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21AR120	FUNDAMENTALS OF BUILDING SYSTEMS	Category	L	T	P	Credit
		CFC	2	0	2	4

Preamble

The knowledge of structural systems, choice of materials and techniques of construction are determinant in the architectural design process, to realise the conceived design of a built form. The parameters that determine the type of structural systems, choice of materials and the techniques of construction are highly interrelated and it becomes important that students shall learn them as an integrated system for better comprehension.

This course explores the various materiality aspects of the primary building materials viz bricks, timber, steel and concrete, basics of structural systems and the components of a building. The course also addresses the interrelation between the materiality, constructability and structural system. The student shall learn the course through hands on exercise, workshops, guest lectures, group exercises and case studies.

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weight age* in %
CO1	Interpret the physics of primary building materials used in building construction, viz clay bricks, timber, steel and concrete.	Understand 10
CO2	Determine the condition of form realization based on relationship between mind & matter and substance and attribute	Apply 10
CO3	Interpret the relation between the functional and structural attributes of the building components in sub and super structure.	Understand 20
CO4	Determine the forces acting, load paths, load distribution systems and geometry of structures.	Understand 20
CO5	Predict the structural patterns to choose based on parameters like span, efficiency, material, cost, function etc.	Apply 20
CO6	Infer the relation between the materiality, constructability and stability in a design process.	Apply 20

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignments		Terminal Examination
	1	2	1	2	-
Understand	75	75	75	75	50
Apply	25	25	25	25	50

Syllabus

Introduction: Definition of Structures and Structural design - Structures in nature, viz trees, spider web, egg shell, soap bubble and human body. Basic functional requirements of building structures. Architectural structures – the relation between architecture and structural forms. Structural forms – representation and symbolism. Primary materials used in building from ancient to modern times. Building materials and milestones in architecture. Natural and processed materials. Material of construction: Physics of primary building material, viz brick, steel, timber and concrete. Criteria for material selection based on performance [functional and structural], quality [cost and sustainability] and environmental accountability. Building materials and context, viz place and culture. Assessment of structural capability of materials viz loads and action of forces. Material and expressions viz scale, form colour and texture. **Structural Systems in Architecture:** Function and structural assemblies of a building in sub and super structure viz foundation, plinth, lintel, walls, roofs and slabs, walls, columns and beams. Building components and their materiality, Structural systems types viz form, surface, vector and section active systems. Relation between building function and structures viz functional flexibility, articulation of space and circulation. **Structural systems and Statics:** Forces acting in a structural system viz axial force, bending moment, shear force and twisting force. Load and types of load acting in a building system. Load paths and structural actions. Structural frames, exterior and interior bearing walls, roofs and slabs. Geometry and structures. **Structural Patterns and Planning:** Structural patterns viz scale, proportion and dimension. Regular grids viz square, rectangle and radial. Irregular grids viz contrasting shape, edge, orientation. Transitional patterns and Patterns in context. Structural planning viz building design, building programme, codes, zonal regulations, economics. **Appropriate case examples to be cited for explaining basic concepts and ideas.**

Learning Resources

1. G.G.Schierle, Architectural Structures, Custom Publishing, University of South Carolina, Los Angeles, 1990

Course Designers:

- | | |
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21AR130	ARCHITECTURAL PROJECTIONS	Category	L	T	P	Credit
		CFC	1	-	3	4

Preamble

This course introduces the fundamental techniques of architectural drawing and helps to develop the appropriate skills for visualization and representation. The students get familiarized with drafting tools and accessories. It helps the students to comprehend and visualize the geometric forms thereby enhancing the skills to scaffold architectural drawing and design.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Infer the basic principles, tools and techniques required for basic architectural drafting.	Understand 10%
CO2	Acquire knowledge on lettering, dimensioning styles and sheet format.	Understand 10%
CO3	Illustrate the drawings through variations in line thickness and intensity in 2D drawings.	Apply 15%
CO4	Interpret simple and complex solid geometrical forms through visual representations.	Apply 15%
CO5	Develop the 2-dimensional drawings into 3 dimensional drawings using metric projection methods.	Apply 25%
CO6	Apply basic skills to measure and document simple objects or elements of architecture and communicate the details in the form of accurately scaled drawings.	Apply 25%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Assignments	Terminal Examination
Understand	20	20
Apply	80	80

Continuous Assessment

Worksheets (8)	:	80 marks
Documentation (2)	:	20 marks

Syllabus

Basics in architecture: Essentials and Principles of Architectural Graphics: Construction of lines, line value, line types, lettering, dimensioning, representation, format for presentation, etc.; Introduction to different types of Scales and its use in Architectural Drawings. **Drawings:** *Studio exercise on drafting Lines (Horizontal, Vertical & Inclined Line), Lettering (Upper & Lower case Letters).* **FUNDAMENTALS OF ARCHITECTURAL GRAPHICS & GEOMETRICAL DRAWINGS:** Importance of geometry in architecture: Introduction to various instruments and medium for architectural representations. Introduction to construction of basic geometric shapes and emphasis in architectural drawing **Drawings:** *Studio exercise on Projection of Line, Projection of Plane, Construction of Polygon and Ellipse (Two Types).* **Projection of Solids:** Orthographic Projections- Introduction to Projections • Concept, Principle and Methods of Projections • Orthographic Projections of Point, Line and Plane • Projections of Solids in different positions. **Drawings:** *Studio exercise on Orthographic projection of solids in various positions with respect to its surfaces, axis and its relation to Vertical and horizontal plane.* Introduction to Axonometric Projections. Difference between axonometric and orthographic projections. **Drawings:** *Studio exercise on axonometric projections of objects and simple building components.* **Measured Drawing:** Introduction to fundamentals of measured drawing, representation format for presentation methods and technique of measuring buildings and their details. Exercise on Measured drawing of simple objects like furniture, measured drawing of building components like column, door, window, cornice, etc., Measured drawing of the details in terms of construction, ornamentation. **Drawings:** *Documentation of simple spaces (plan, section and elevation).*

Learning Resources

- Francis D. K. Ching (1996) Architectural Graphics, Van Nostrand Reinhold.
- Atkins, B. (1986). *Architectural Rendering*. California: Walter Foster Art Books.

Course Designers:

- | | |
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21AR140	VISUAL ARTS	Category	L	T	P	Credit
		CFC	1	-	3	4

Preamble

The course aims to disseminate the fundamental knowledge of art as a medium to learn design. This course inculcates the skill of illustrating art and composition in various medium through demonstrations. The course enhances visual thinking and enables the students to conceptualize ideas through drawings.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage *** in %
CO1	Develop hand-mind co-ordination through basic exercises	Apply 10
CO2	Comprehend the monochromatic, split complementary and analogue colour scheme through the tints and shades of the colour wheel.	Understand 10
CO3	Acquire the skill of observation from still life study as form, scale, proportion, material, and volume	Apply 10
CO4	Develop the skills to capture the essence of subject through quick rapid sketches.	Apply 20
CO5	Develop visual and physical control of mediums used in the drawing process.	Apply 20
CO6	Acquire the skill of Visual communication and perception.	Apply 30

*** Weightage depends on Bloom's Level, number of contact hours,

Assessment Pattern: Cognitive Domain

Cognitive Levels	Assignment
Remember	-
Understand	10
Apply	90
Analyze	-
Evaluate	-
Create	-

Syllabus**Basics of Drawing:****6 Hours**

Introduction to Drawing. Elements and principles of drawing – Types of drawing – Visual effects of drawing – Scale drawing – Composition Exercises: Techniques of Pencil handling, lines, curves, circles and perspective lines.

Study of Colour:**6 Hours**

Introduction to Colour Theory. Practical exercise on Primary, Secondary and Tertiary colours Exercise on colour wheel. Exercise in complementary colours found in nature

Study of Sketching through Still Life:**12 hours**

Advanced learning of sketching - Simple objects – Compositional multiple objects Study of light, shade – shade and shadow - in pencil medium. Basic washes – 3D effects of still-life, nature and built environment using mono chromatic and multi colour.

Basic Rendering:**6 Hours**

Introduction, applying simple rendering techniques on furniture, flora, building elements - Pen and ink, Alcohol Markers.

Indoor and outdoor sketching**18 Hours**

Introduction of Tools and materials –Properties of paper, brush and other tools. Exercise involving Indoor and outdoor sketching– Spot sketching – Rapid sketch- Drawing from imagination – Study of 3 D effects through light and shade from nature- watercolour medium -Water soluble colour pencil –Mixed medium.

Architectural Rendering:**12 Hours**

Sketching a building in light and shade – outdoor study on Modern Architecture elements.-Rendering of building and clusters in Perspective views. Pen and ink – Mixed medium.

Exercises

Unit I	
HORIZONTAL LINES	CO1
VERTICAL LINES	CO1
DIAGONAL LINES (Upwards & Downwards)	CO1
CURVE LINES (Downwards)	CO1
CURVE LINES (Upwards)	CO1
MULTI-PERSPECTIVE LINES	CO1
PERSPECTIVE LINES (Downwards & Upwards)	CO1
Unit II	
PRIMARY COLOUR - Colour Wheel	CO2
SECONDARY COLOURS - Colour Wheel	CO2
TERTIARY COLOURS - Colour Wheel	CO2
Colour Gradation – Tint	CO2
Colour Gradation – Shade	CO2
COMPLEMENTARY COLOURS - Simple design	CO2
Complimentary Colour - Complex Design	CO2
Complimentary Colour - Pattern Design	CO2
Unit III	
Still Life - Single (Mono) Object with Line Drawing	CO3
Still Life - Light & Shade Drawing	CO3
Still Life – Watercolour	CO5
Still Life - Group Composition	CO5
Unit IV	
Architectural template drawing - basic rendering pen & ink	CO4
Unit V	
Indoor and outdoor rapid sketching	CO4
Indoor and outdoor pencil drawing with light and shade	CO5
Unit VI	
Modern building – pen and ink	CO6
Modern building – pen and ink and mixed medium	CO6

Learning Resources

1. Peter Stanyr, The Complete Book of Drawing Techniques, Arcturus Publishing Ltd, London, 2003.
2. Milind Mulick, Water colour, JyotsnaPrakashan, Mumbai.
3. Robert G. Well, Basic Rendering, Thames and Hudson. London.
4. <https://www.youtube.com/channel/UC1LMGOBet0j5zwCLNyLOFZw>
5. Websites : rapidfireart.com

Course Designers:

- | | |
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21AR150	COMPUTER AIDED DRAFTING	Category	L	T	P	Credit
		CFC	1	0	3	4

Preamble

The course introduces the students to learn the drafting and modeling techniques in 2D and 3D using Computer Aided Design application software. The course focuses on the discipline of Computer Technology, its types and appropriate software usage in Architectural design. This course helps the students to visualize the analytical and theoretical portions of design in digitized graphical modes.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Recognize the software, hardware and server storage service components of computer technologies in architecture. (Computer Knowledge)	Understand 10%
CO2	Recognize the Two-Dimensional and Three-Dimensional geometric and solid modeling techniques using appropriate 2D and 3D software.	Understand 10%
CO3	Demonstrate the proficiency of CAD tools to design and develop both 2D drawings and 3D models.	Apply 20%
CO4	Express the attributes of the design through proficient detailing and assembly modeling.	Apply 20%
CO5	Communicate the drawings with Precision and to compose associative data in Appropriate Templates	Apply 20%
CO6	Demonstrate the Technical Drafting skills and speed, peers and team mates in developing a concise drawing from 2d drawing to 3d Model	Apply 20%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	20	20	-	-	20
Apply	80	80	100	100	80

Syllabus

INTRODUCTION TO COMPUTER TECHNOLOGY IN ARCHITECTURE – Introduction to computer terminologies and operating principles of a computer system; Introduction to free and licensed software – their types and application in architecture and design; File management – opening, saving, storing, manipulation etc.; File formats and interdisciplinary software functionality; Contemporary advancements in computer technologies; Understanding a system configuration and installation of architecture/design software; Introduction to cloud computing and web services. **2D DRAFTING** – Introduction to basic drafting concepts/techniques using appropriate software; Understanding the software interface for both Windows and macOS; Exploring drawing settings and customization options – interface, workspace, toolbars, menu bars etc.; Introduction to command line; Introduction to layers, styles, dimensions, texts, templates, blocks, layouts, UCS etc. **3D MODELLING** – Introduction to the basics of 3D modelling using appropriate software; Advantages of using 3D modelling software and limitations; Understanding the software interface for both Windows and macOS; Exploring modelling settings and customization options – interface, workplace, toolbars, menu bars etc.; Introduction to modelling shortcuts; Introduction to layers, styles, dimensions, texts, templates, groups, components etc.; Introduction to applying materials and adjusting parameters; Importing, exporting and cross-platform software support

Learning Resources

1. AutoCAD, "Computer Aided Design guide for Architecture, Engineering and construction", process,2012.
2. Watt, "Fundamentals of Three-Dimensional Computer Graphics", Addison Wesley, Massachusetts, 1989.

Course Designers

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21AR160	FUNDAMENTALS OF DESIGN	Category	L	T	P	Credit
		PC	-	-	10	10

Preamble

Fundamentals of Design become the origin of design thinking in Architectural education. We will have students with varied skill sets in varied levels of proficiency. The skill sets include sketching skills, artistic inclination, solid techniques in illustration, model making, attention to detail, logical and visual thinking. FOD should try to lay a level playing field with in its peers.

This course provides the students with a good understanding of design elements and principles, simultaneously developing the knowledge on visual and basic design vocabulary. It should also inform different rules, principles and rethink function and performance to bring the good aesthete in students;

To communicate effectively about design projects, students shall be given very specific briefs as tools to identify and understand Design schemes. Schemes that involve primary elements, color and cognition, Abstraction as a language, planar interactions, Scale and proportions in action will be translated into design exercises. Exercises and the response to the briefs, entails critical thinking and induces capability to develop of effective narratives for design.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Analyze using logical and lateral thinking processes	Analyse 10%
CO2	Appraise various techniques (drawings/models etc) and the effectiveness of the solutions	Evaluate 10%
CO3	Develop skills to illustrate and think diagrammatically, applying the lessons learnt from architectural graphics	Create 20%
CO4	Create a visual composition through hands-on experience in designing a composition/ spatial design.	Create 20%
CO5	Inquire and comprehend into the possibilities of integrating form/shape and function/program	Analyse 20%
CO6	Demonstrate verbal and visual communication skills to help present design projects as a response to conditions.	Apply 20%

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, CO3 & CO4
Review 2		100*	CO1, CO2, CO3 & CO5
Review 3		100*	CO1, CO2, CO3 & CO6
Review 4		100*	CO1, CO2, CO3 & CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva-Voce	Sheets & models	100*	CO1, CO2, CO3, CO4, CO5, & CO6
*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

Syllabus

ELEMENTS - Characters of primary elements (Points, Lines, Planes) - Colour and Cognition (Bleed boards, gradient box, color wheels explaining color theory, illusion, light, texture) – Balance as a principle (use software/tool for presentation) - Introduction to Abstraction (whole to part) and representation of imagery (part to whole) • Interaction of elements (Intersection, formation, progressive planes). **PRINCIPLES - SCALE & PROPORTION** -Horizon, vantage point and human figure (sketching exercise/ distance to vision ratio diagrams) - Paper Space and Model Space (conversion of objects from drawings to models) – relating 1:1 scale model space to varying paper space through scaled diagrams - Proportion (Relationship between part and whole) – Balance as a principle. Different kinds of proportion systems (functional, precedential and

aesthetical)> Additive and subtractive forms>>> volumetric understanding. Articulation of forms. **CREATE/CONSTRUCT/GENERATE - THINKING SPATIALLY-** Levels (Flow, movement, circulation, approach, order, visual access/translation of planes to levels/roof, floor) - Enclosure (Environments – indoor /outdoor, fenestrations, access, visual/territory) - Space (functional, experiential, visual, territory, boundaries, syntax- space as a part of a functional whole, adjoining, cascading, integration) - Demonstrate the space using: 9 Square.

Learning Resources

1. Simon Unwin, "Exercises in Architecture: Learning to think as an architect", Routledge, January 2012
2. Ellen Lupton, "The ABC's of Bauhaus, The Bauhaus and Design Theory", Princeton Architectural Press, June 2000
3. James C. Snyder, Anthony J. Catarex, "Introduction to Architecture", McGraw Hill Inc., 1979
4. Francis D K Ching, Steven P Juroszek, "Design Drawing – 2nd Edition", Wiley and Sons, January 2013
5. Maitland Graves, "The Art of Colour and Design", McGraw Hill Book Company Inc. 1951
6. V S Pramar, "Design Fundamentals in Architecture", Somaiya Publications P Ltd, New Delhi, 1973
7. Charles Wallschlaeger&SynthiaBusic Snyder, "Basic Visual Concepts & Principles for Artists, Architects and Designers", McGraw Hill Publishing, USA, 1992
8. Paul Laseau, "Graphic Thinking for Architects & Designers", John Wiley & Sons, NY, 2001
9. Bryan Lawson, "The Language of Space", Architectural Press, 2001
10. Simon Unwin, "Analyzing Architecture", Routledge, London, 2003

Course Designers

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21AR210	ARCHITECTURAL PRINCIPLES - INDIAN ARCHITECTURE	Category	L	T	P	Credit
		CFC	2	0	0	2

Preamble

History is "the process of inquiry into the past of man in society" (E.H. Carr). History in this sense is a DESCRIPTION of the architectural facts. Theory attempts to provide an EXPLANATION for those facts. History and Theory of Architecture are connected disciplines. The subject looks at the reasons why buildings look the way they do and why architects have chosen to design their buildings in a particular way.

It also looks at the reasons why architectural styles have changed over time and the assumptions and attitudes of architects which influenced their thinking during particular periods and led to those changes.

This course, aims at covering:

- Knowledge about Indian culture, building art and construction techniques which influences an architecture student to develop designs that are rooted in the context.
- Architecture as the manifestation of culture, time and place in the Indian context.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage *** in %
CO1	Fathom the different factors that embrace architecture across India.	Understand 10%
CO2	Interpret the different paradigms in the culture and it's influence on architectural history	Understand 10%
CO3	Comprehend the architectural principles & design, in historic buildings and settlements	Understand 20%
CO4	Interpret the historic examples through comprehensive understanding of architectural elements.	Understand 10%
CO5	Interpret the trans-disciplinary concepts applied in the field of history of architecture.	Understand 20%
CO6	Appraise the components of architecture based on context.	Apply 30%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	70	70	-	-	70
Apply	30	30	40	40	30
Analyze	-	-	60	60	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

The Beginnings of Architecture: Context influencing architecture- Role of environment (Sun, wind, light, earth and water), Cultural aspects- Religious principles dictating architecture. Organization of form and Space – Role of Horizontal and vertical planes in architecture, Additive and subtractive forms in architecture. Experiences gained through sequences of spaces with references to light, form and texture - Construction techniques employed in Rock cut architecture. Examples: **Unit Level:** Caves at Ajanta and Ellora-Kailasanatha temple (Rock cut); **Cluster Level:** Viharas and other residential spaces, Nalanda university, Sanchi stupa. **Introduction to Temple Architecture:** Context influencing architecture- Role of environment (geographical, climatic, and historical diversities), Cultural aspects (belief systems towards religious architecture) – decoration (details of figured sculpture as well as in the architectural elements) - semantic and symbolic relationship. Organization of form and Space- Architectural principles such as rhythm, repetition, symmetry, datum etc in temple architecture - Ordering Principles in temple architecture. Circulation movement through space, Path Space relationship, Form of the circulation space. Experiences gained through sequences of spaces with references to light, form and texture. Examples: **Unit Level:** Evolution of temple complex through horizontal and vertical expansion from temple No 17 till Virupaksha temple, Jaganath Temple @ Puri. **The Architecture of Mughals:** Context influencing architecture- Role of

environment (geographical, climatic and economic diversities), Cultural aspects (belief systems and social systems - its reflections on Architecture) and cross cultural influence (blend of Indian, Islamic and Persian elements). Organization of form and Space- types of organization-central, linear, radial, etc. Proportion and Scale with reference to material, structure and orders and principles in architecture. Examples: **Unit Level:** Humayuns Tomb, Taj Mahal; **Cluster Level:** Fatehpur Sikri (Agra); **Settlement Level:** Shahjahanabad. **Architecture of Provincials- Deccan:** Context influencing architecture- Role of environment (Geographical, climatic and economic diversities), Cultural aspects (belief systems and social systems - its reflections on Architecture) - Indo Islamic monuments. Cross cultural influences - amalgamation of Indo Islamic and Dravidian architecture. Proportion and Scale with reference to material, structure and orders and principles in architecture. Examples: **Unit Level:** Jami Masjid, Gulburga; Takth Palace, Bidar; Charminar, Hyderabad; Evolution of Tomb architecture. **Indo Saracenic Architecture:** Context influencing architecture- Role of environment (Political and regional diversities), Cross cultural aspects (synthesis of Indo-Islamic, Gothic Revival architecture). Construction techniques - Indian materials according to British structural engineering standards Proportion and Scale with reference to material, structure and orders and principles in architecture. Regional Examples – **Connemara Library Chennai, Egmore Railway Station, American college Madurai.**

Learning Resources

1. Percy Brown, Indian Architecture (*Buddhist and Hindu period*), Taraporevala and sons, Bombay, 1983.
2. Satish Grover, The Architecture of India (*Buddhist and Hindu period*), Vikas Publishing House, New Delhi 1981.
3. Percy Brown, Indian Architecture (*Islamic period*), Taraporevala and sons, Bombay, 1983.
4. Satish Grover, The Architecture of India (*Islamic*), Vikas Publishing House, New Delhi 1981.
5. Online courses
 - Introduction to History of Architecture in India - Indian Institute of Technology Madras , NPTEL and Indian Institute of Science Education and Research, Pune via Swayam https://onlinecourses.nptel.ac.in/noc21_ar04/preview
 - Ancient Indian Architecture Part I - <https://www.youtube.com/watch?v=QTh9I7WLxI4&list=PLxJNbXGrHdcU7JE3YXkjXpgWrLdlqb2fc&t=0s>
 - Ancient Indian Architecture Part II - Cave Architecture in India - <https://www.youtube.com/watch?v=oUssv4vEU4w>
 - Ancient Indian Architecture Part III - Rock Cut Architecture UPSC - <https://www.youtube.com/watch?v=WlCxPIv2IWE>

Course Designers:

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21AR220	CLIMATE RESPONSIVE ARCHITECTURE	Category	L	T	P	Credit
		CFC	2	0	2	4

Preamble

Climate plays a very important role in Architecture and Built Environment and it is one of the major determinants of built environment. This Course describes how climate affects building design in various Climatic conditions. It also discusses about the ideal design parameters and strategies to be developed for designing buildings across various Climatic conditions through Case examples and Lab exercises.

Course Outcomes

On the successful completion of the course, students shall be able to

COs	Course Outcome Statement	Weightage *** in %
CO1	Infer the influence of climatic factors on built environment	Understand 10%
CO2	Identify the comfort zones based on the climatic factors for tropical conditions using mathematical formulas and comfort charts.	Understand 10%
CO3	Apply the concepts of heat exchange process in buildings and thermal balance equations to analyze heat flow through different building skins	Apply 20%
CO4	Analyze the impact of shading devices on thermal performance of buildings using sun path diagrams and solar shading masks	Analyze 20%
CO5	Analyze various climate responsive design strategies for tropical climates using Mahoney Table to achieve the maximum human comfort.	Analyze 20%
CO6	Assess the effects of site, sun & wind on the built environment using physical models and climate analysis software	Analyze 20%

Assessment Pattern:

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	40	-	-	-	20
Apply	60	40	100	100	20
Analyze	0	60	-	-	60

Syllabus

Climate and Comfort - Role of climate with respect to shelter and importance of building climatology, Elements of climate and climatology data needed for planning of buildings, change of seasons and wind movements etc. Macroclimate and microclimate, Study of World climatic zones and Indian climate zone in specific. Thermal comfort factors, body heat exchange, - Effective temperature, Corrected Effective Temperature, calculation of overheated & under heated periods and comfort Zone. Interrelationships of climatic elements and psychometric chart. Exercises on Thumb rules for comfort ranges for different climatic conditions. Effective Temperature nomograph calculations using instruments to calculate outdoor and indoor temperature etc, leading to analysis on thermal comfort and plotting isopleths. **Thermal Property of building envelope** - Heat exchange process in buildings. Introduction to Thermal quantities - heat flow rate, conductivity (k-value), resistivity, convection, radiation. Conductance through a multi-layered body, surface conductance - transmittance - calculation of U-value. Concept of sol-air temperature & solar gain factor - Introduction to periodic heat flow in building, time lag & decrement factor. Exercises on heat flow in building, time lag & decrement factor. **Solar geometry and Sun shading** - Solar geometry and movement, sun path diagrams (solar chart), Solar angles, Shadow angles, solar shading masks etc. Method of calculating solar altitude, Azimuth angle and Shadow angle. Introduction to different types of shading devices and their uses. **Design for different climatic types in India** - Building design & lay out planning consideration for warm humid, hot humid, hot dry, composite & tropical upland climates, Cold and cloudy, Cold and sunny. Climatic data sets – analysis – Climate graph – the Mahoney tables & its recommended specification as Design strategies of climate responsive buildings with different case studies. Exercises and Special focus on Building design & lay out planning consideration for tropical climate with case examples. **Natural ventilation** - Ventilation and air flow principles, principles of natural ventilation - Stack effect due to the thermal forces, air change, wind flow around buildings and air flow patterns inside buildings. Wind velocity – wind rose diagram, wind pressure. Local factors in wind orientation, Flow pattern inside building using wind tunnels. Simple experiments to measure outdoor and indoor wind velocity and Exercises using wind rose diagram.

Course Designers:

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21AR230	GRAPHICAL VISUALIZATION	Category	L	T	P	Credit
		CFC	1	0	3	4

Preamble

The course exposes students to a range of graphic tools, techniques and conventions that designers use to communicate architectural ideas. Presentations, demonstrations, assignments and discussions in the studio encourage students to improve and enhance their graphic skills starting from simple basics to the more formal methods of presenting architectural drawings and details. Student will be equipped with Graphical skills which shall be useful in translating the graphical ideas into technically appropriate drawing presentations.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage *** in %
CO1	Infer the basic principles of perspective drawing techniques and complexity of object.	Understand 10%
CO2	Recognize the variable components of perspective drawing techniques and adapts them to different scales.	Understand 10%
CO3	Interpret the 2 dimensional architectural shapes into 3 dimensional forms of basic building elements.	Apply 25%
CO4	Demonstrate the Sciography of objects in different conditions under source of light.	Apply 15%
CO5	Illustrate the patterns for shade and shadows of basic geometric shapes and buildings.	Apply 15%
CO6	Acquire the skills of technical documentation of a building through measured drawings, photographic and principles of application.	Apply 25%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Assignment
Remember	-
Understand	20
Apply	80

Continuous Assessment

Worksheets (5)	:	35 marks
Documentation (3)	:	15 marks

Syllabus

Perspective drawings of simple objects - Introduction to perspectives, difference between views & perspectives, Concept of vanishing points- Anatomy of Perspectives – Objects, study of picture plane, station point, vanishing point, Eye level, Ground level etc., its variation & effects. - Different types and Concept of One point, Two point and Three Point Perspectives and it's applications in manual Perspective drawings. **Perspective drawings of complex objects**- Perspective drawing of complex objects - Placement of objects of given height at a desired place like human figures, trees, street furniture, etc in perspective drawings- One point perspective of interiors and sectional perspectives- Two point perspective of interiors and sectional perspectives- Errors of standard projection method, Improvement on it- **Sciography** - Introduction to Sciography, Principles of shade & shadow - Shadows of planes & simple solids due to near & distant sources of light - Shadows of architectural elements- Construction of sciography on building, Application of sciography on pictorial views - **Building Documentation** - Building Documentation in terms of

specifications, technical drawings, instructions on measurements and other relevant documents- Explore through models and miniatures using software - sketch-up with added plugins.

Learning References:

1. Atkins, B. (1986). *Architectural Rendering*. California : Walter Foster Art Books.
2. Batley, C. (1973). *Indian Architecture*. Bombay : D. B. Taraporevale Sons.
3. Bhatt, N. D. (2003). *Engineering Drawing*. Anand :Charotar Publishing House.
4. Ching, F. D. K. (2009). *Architectural Graphics*. 5th Ed. Hoboken : John Wiley & Sons.
5. Ching, F. D. K. (2011). *A Visual Dictionary of Architecture*. 2nd Ed. Hoboken:John Wiley & Sons.
6. Dinsmore, G. A. (1968). *Analytical Graphics*. Canada :D.VanNostrand, Company Inc.
7. Halse, A. O. (1972). *Architectural rendering; the techniques of contemporary presentation*. 2nd Ed. New York : McGraw-Hill.
8. Holmes, J. M. (1954). *Applied Perspective*. London : Sir Isaac, Piotman and Sons Ltd.
9. Narayana, K. L. and Kannaiah, P. (1988). *Engineering Graphics*. New Delhi : Tata McGraw-Hill.
10. Online Resources
 - Perspective made easy by Ernest R Norling :
<https://ia801309.us.archive.org/12/items/PerspectiveMadeEasy/Norling%20-%20Perspective%20Made%20Easy.pdf>
 - Shades and Shadows by ICS STAFF :-
<https://www.huduser.gov/portal/sites/default/files/pdf/Shades-and-Shadows.pdf>
 - <https://onlineartlessons.com/tutorial/perspective-drawing-tutorial/#perspectiveprojection#engineeringdrawing#perspectiveprojectionmanaspatnaik>
Perspective Projection | Concept and One Point Perspective | Part 1 | Engineering Drawing
 - <https://materiamemoria.blogspot.com/2018/05/perspective-drawing-nptel.html>
 - <https://www.andrew.cmu.edu/user/ramesh/teaching/course/48-175/lectures/9.ShadesAndShadows.pdf>
 - <https://www.cgmasteracademy.com/courses/64-perspective/>
 - <https://www.cityofsalem.net/CityDocuments/residential-building-plans-documentation-checklist.pdf>
 - A history of Building Documentation and why BIM is the future :
 - <https://www.youtube.com/watch?v=Bu2wjO-IH-o4>

Course Designers:

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21AR240	ARCHITECTURAL WORKSHOP	Category	L	T	P	Credit
		CFC	1	0	3	4

Preamble

The course aims to disseminate hands on knowledge in art to explore both two dimension and three dimension aspects. It strengthens artistic creativity on architectural model making.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage *** in %
CO1	Describe the model making using various materials and medium.	Understand 10
CO2	Observing Joinery details in Carpentry	Apply 10
CO3	Demonstrate the skill of detailed presentation model making using various materials and medium.	Apply 20
CO4	Demonstrate the skill of simple wooden model making	Apply 10
CO5	Communicate the design ideas through conceptual models	Apply 20
CO6	Develop 3 dimensional models with precision and clarity	Apply 30

Assessment Pattern: Cognitive Domain

Cognitive Levels	Assignment
Understand	10
Apply	90

Syllabus**Introduction on model making**

Introduction of model making – materials, scale, tools and medium – Basic forms – Cube, Cone, Pyramid.

8 Hours**Architectural Model Making**

Need for architectural models. Role of Conceptual models in design. General practices in model making. Types of models: block, Use of Paper, Mount board, cardboard, softwood in architectural models.

36 Hours**Architectural Basic Wood Models**

Simple exercises in cutting, finishing and joinery with simple blocks, composition of basic geometrical forms etc. Simple Joinery details in wood.

16 Hours**Exercises**

Unit I	CO1, CO3
Basic Form making (Cube, Cuboids, Cone, Pyramids)	
Unit II	CO1, CO3, CO5, CO6
Architectural Conceptual Model Architectural Plan Model Architectural Section Model Architectural Elevation Model Architectural Detailed model	
Unit III	CO2, CO4, CO6
Basic Geometrical block models using wood (Cube, Cuboids, Cone, Pyramids) Composition of geometrical wood models	

Learning Resources

1. Ching, F. D. K. (2009). Architectural Graphics. 5th Ed. New Jersey: John Wiley & Sons.
2. Criss. B. M. (2011). Designing with models: A Studio guide to Architectural Process Models. 3rd Ed. Hoboken: John Wiley & Sons.
3. Kieran, S. and Timberlake, J. (2008). Lobolly House: Elements of a New Architecture. New York: Princeton Architectural Press.
4. Morgan, C. L. and Nouvel, J. (2002). The Elements of Architecture. London: Thames & Hudson.
5. Werner, M. (2011). Model Making. New York: Princeton Architectural Press.

Course Designers:

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Board of Studies Meeting approved on 19.06.2021

Approved in 61st Academic Council Meeting on 03.07.2021

21AR250	DIGITAL VISUALIZATION	Category	L	T	P	Credit
		CFC	1	0	3	4

Preamble

This course introduces the students to communicate their Design in Digitalized graphic modes with accurate visualization of Spaces considering the appropriate lighting, textures and Materials to create convincing depictions. The lecture-based classes focus on the discipline of Digital Architectural visualization utilizing Computer Drafting, Modeling and Rendering techniques in both 2D and 3D. It also helps the student to develop skills in Professional design development and dissemination of Digital portfolio presentations integrating the Digital design trend strategies.

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognize the system configuration as per software specification with adaptable rendering plug-in to enhance the 2d and 3D Architectural presentation drawings in a realistic way	Understand 10%
CO2	Recognize the appropriate presentation techniques and its properties with respect to the Architectural set of drawings.	Understand 10%
CO3	Demonstrate proficiency of appropriate software's Tool usage and its Plug-ins to achieve a Realistic Rendered drawings in both 2D and 3D	Apply 20%
CO4	Demonstrate proficiency of rendering properties to achieve realistic outputs in 2D Architectural drawings	Apply 20%
CO5	Communicate the drawings of precision in drafting, modeling and detailing with block and Components usage in appropriate scale in both 2D and 3D	Apply 20%
CO6	Demonstrate the Technical Drafting skills, speed with peers and team mates in developing a concise drawing using rendering properties & Plug-in techniques to achieve realistic outputs in 3D Modeling	Apply 20%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	20	20			20
Apply	80	80	100	100	80

Syllabus

INTRODUCTION TO DIGITAL RENDERING Introduction to Color composition and architectural rendering - Color study, Texture and tones ; Introduction to 2D and 3D Rendering softwares, plugins and configuration required for enhancing presentation drawings. Introduction to Vector Graphics and Raster Graphics Importance of Rendered presentation of drawings such as Concept, Site plan, floor plans, section, elevations and views. **2D - RENDERING** -Introduction to the software - User interface -Drafting Settings - drawing objects - Layer utilities- line weight - line color - line type - Hatching techniques and its setting - transparent overlay - Text and dimension - Block usage and Library - Layout and Plot setting. **3D - RENDERING** Introduction to Rendering Plugins in Architecture - Various Types of Plugins - User Interface setting and options Applying materials, textures, components, blocks -. Understanding texture, material mapping, Appropriate Positioning of Blocks, Web Library Source, environmental setting - Geo - location Rendering and scene setting; Eye level and Camera Positioning and light settings to create a photorealistic picture. Exercise to identify and visualize a single space design using above said 2D and 3D utilities.

Learning Resources

1. AutoCAD, "Computer Aided Design guide for Architecture, Engineering and construction", process, 2012.
2. Watt, "Fundamentals of Three-Dimensional Computer Graphics", Addison Wesley, Massachusetts, 1989.

Course Designers

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Approved in 61st Academic Council Meeting on 03.07.2021

21AR260	MICRO PERSONAL SPACE DESIGN	Category	L	T	P	Credit
		CFC	0	0	10	10

Preamble

The challenge of Architectural design lies in resolving a wide variety of functional and aesthetic requirements into a coherent and satisfying structure. The objective of this studio is to induce logical aspects such as materiality, tectonics, function, anthropometry, ergonomics etc. into the designed personal space/product. The student is expected to develop a keen eye for detailing, product definitions and spatial qualities this semester.

Prerequisite

Completed the course **21AR160 - Fundamentals of Design (Sem I)**

Course Outcomes

On the successful completion of the course students will be able to...

COs	Course Outcome Statement	Weightage*** in %
CO1	Observe built environment and its complexity and recognize the logical attributes associated with it.	Understand 10%
CO2	Review the elements of structure, form and architecture for spatial efficiency and experience.	Apply 10%
CO3	Investigate materiality and tectonics as a solution for context based problem	Apply 10%
CO4	Empathize with the context – user, climate, society, culture and environment	Analyze 10%
CO5	Perceive and strategize the design intention with respect to scale, proportion, function and meaning	Create 40%
CO6	Communicate the design ideas legibly through drawings and visual representations	Apply 20%

*** Weightage depends on Bloom's Level, number of contact hours,

Assessment Pattern: Cognitive Domain

Cognitive Levels	Model Examination	Terminal Examination
Remember	-	-
Understand	10	10
Apply	40	40
Analyze	10	10
Evaluate	-	-
Create	40	40

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Generate possible solutions by identifying issues and possibilities through exposure to the professional fields/ sites/ field visits.	100*	CO, CO2
Review 2		100*	CO1, CO2, CO3, CO6
Review 3		100*	CO1, CO2, CO3, CO4, CO6
Review 4		100*	CO1, CO2, CO3, CO4, CO5, CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva-Voce	Design deliverables	100*	CO1, CO2, CO3, CO4, CO5, CO6
*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

List of Experiments/Activities with CO Mapping

The studio projects will be based on the streams of Materiality, Tectonics, Function and Anthropology/Ergonomics.

Materiality studio will focus on establishing the relationship between the visual quality and the structure in architecture by understanding different material properties. Material use and detailing completes the visual language and disposition intended by the Architect; Materials complement the form, engage users, and add depth and richness to architecture. These will be explored in this studio.

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Example projects: Projects that will help student explore on Materiality ex., Minimal resource studio – ‘minimalist’ residential designs, Use of reductive design elements, Like Pods, Cabins, Lounges, Minimalist residence .

Tectonics studio will focus on combining the design of productive space with the tangible realities of gravity, material properties, and assembly sequences. The study of architectural tectonics can help to illuminate the partnership between these elements in the creation of the designed spaces.

Example projects: Tectonics intense scenarios, Make shift environments, shops on cart, pavilions, Temporary-stay pods, Add on structures.

Function studio, In relation to the built environment, the term ‘function’ refers to the purpose of a building or structure. It can also relate to the proper operation, process or performance of something and how it works. Products, materials, components and systems, can be assessed in terms of their functionality, that is, the suitability and capability with which they serve a particular purpose or practicality for which they were intended.

Example projects: The scope of this studio is wide. One example could be - Understand the working of a product and explore the opportunities of its integration in design of Architectural spaces / products.

Anthropometrics/Ergonomics studio, Anthropometrics and Ergonomics represent a multi-disciplinary human-centred discipline that is defined as the discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. This studio incorporates principles of anthropometrics and ergonomics into building design to emphasize the significance of user-based and human-centred approaches.

Example projects: The studio offers numerous possibilities with respect to working, living and rest spaces. Ex - Liminal space studios -Transitional space designs, user based designs. Such as Stairwell, respite rooms, working spaces.

Learning Resources

1. Prammar V.S., Design fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Nelhi, 1973.
2. Francis D.K.Ching, “Architecture: Form, Space and Order, Van Nostrand Reinhold Co., (Canaa), 1979.
3. Exner V., Pressel D., “Basics Spatial Design”, Birkhanser, 2009.Ernest Burden-Elements of Architectural Design- A visual resource, Van Nostrand Reinhold, 1994.
4. Robert Powell, “Tropical Asian House”, Select Books, 1996
5. Terence Conran, “The Essential House Book”, Conran Octopus, 1994
6. Sam F. Miller, “Design Process: A Primer for Architectural and Interior Design”, Van Nostrand Reinhold, 1995.
7. De Chiara and Callender, Time-Saver Standards for Building Types, Mc Graw Hill Co., New York, 1973
8. Nufert Ernst, Architects Data, Blackwell Science Ltd., Britain, 1980
9. Julius Panero, Martin Zelick, Human Dimension and Interior Space, Whitney Library of Design, Canada,1979

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21AR311	RESIDENTIAL BUILDING SERVICES	Category	L	T	P	Credit
		CFC	3	0	0	3

Preamble

Building services are the systems installed in building to make them functional, comfortable, efficient and safe. They include Water Supply, Sanitation, Electrical & Artificial Lighting, Fire Safety, HVAC (Heating, Ventilation and Air Conditioning), ICT (Information and Communication Technology) and so on. The knowledge of building services is necessary to meet out the functional requirements of a building. This course, aims at delivering the knowledge about basic building services (MEP – Mechanical, Electrical & Plumbing) that a student needs, before designing a residence in a sustainable manner.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

CO's	Course Outcome Statement	Weightage ***in %
CO1	Interpret the Water Supply and Sanitation system necessary for Residential buildings.	Understand (30%)
CO2	Comprehend the electrical load & layout for Residential buildings.	Understand (15%)
CO3	Infer the Fire Safety, HVAC and ICT requirement for Residential buildings.	Understand (15%)
CO4	Identify and comprehend Sustainable Practices in Residential building design.	Understand (10%)
CO5	Incorporate Plumbing Services based on the scale/complexity of the Residence.	Apply (20%)
CO6	Incorporate Electrical Services and Systems based on the scale/complexity of the Residence.	Apply (10%)

*** Weightage depends on Bloom's Level, number of contact hours

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	70	70	-	-	70
Apply	30	30	50	50	30
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-

Syllabus

INTRODUCTION TO BUILDING SERVICES - Need and importance of building services in Architectural Design – introduction to MEP (Mechanical, Electrical & Plumbing) services – Integration of MEP in Architectural Design. **WATER SUPPLY** - Water Supply Requirements for Residential Buildings as per IS Codes & NBC– Sources of Water – Quality of Water - Potable Water – Water Supply System – Treatment of Water - Water Distribution System - Service Connection -Storage of Water - Overhead tanks, Underground tanks at domestic level. Water Purification Systems at domestic level – Filtration, Chlorination, Reverse Osmosis System, etc. **SANITATION** - Principles of Sanitation – Refuse, Sewerage – Conservancy System, Water Carriage System - Patterns of refuse collection – Refuse Disposal – Recycling, Composting, Incineration, Sanitary Landfill – Service Connection. Sanitation in unsewered areas - Septic tanks, Inspection Chambers etc. **PLUMBING SYSTEMS IN RESIDENTIAL BUILDINGS** - Basic principles of plumbing - Sanitary fittings and their requirements for a Residential Building - wash basins, water closets, sinks etc. Different types of traps according to shape and use – anti siphonage pipe, cowl, soil pipe, vent pipe, waste pipe. Choice of plumbing system - Single stack system, One pipe-partially ventilated system, One pipe-fully ventilated system, Two pipe system - Size of vent pipe. Rainwater pipes for roof drainage, Rainwater Harvesting and Storage Sumps. **EXERCISE:** Plumbing layout (Water Supply, Drainage and Rain water harvesting system) of a Residence/ Flat in Residential Apartment. Design and Detailing of Toilets and Kitchens. **ELECTRICAL SERVICES** - Basics of Electrical services - Service connection - wires and conduits - Single phase and

three phase supply - conventional symbols **Domestic electrical distribution systems:** Distribution from grid to facilities. Distribution boards, meters, switch boards. **Domestic electrical protection systems:** Earthing for safety – Types of Earthing, Circuit breakers, lightning conductors.- Need for alternate sources of electricity – Photovoltaic cells *EXERCISE:* Electrical load estimation and electrical layout of a small building/ Residence. **INSIGHT TOHVAC, Fire Safety & ICT** Need for air-conditioning, Fire Safety & ICT - Significance of ventilation – Relative Humidity, temperature, air changes rates, cleanliness Broad classification of Air conditioning - Air cooled and Water cooled - Window AC, Split AC, Cassette type - **Components in Air Conditioning System** - Compressors - condensers – Evaporators. Rule of thumb based sizing for residential applications - Configuring/ sizing of mechanical equipment - Installation guidelines for a small residential building. Fire Safety & ICT -Types of Fire – Smoke Detection Systems - Fire Fighting & Extinguishing Systems – Equipments for Fire Safety – ICT in Residence – Home Automation – Equipments for ICT in Residential Buildings.

Learning Resources

1. S.C.Rangwala, Water Supply And Sanitary Engineering, Charaotar Publishing house, Anand 388601, 1989. (Edition : 29th Revised and Enlarged Edition : 2016 ISBN : 978-93-85039-20-1)
2. National Building Code 2016, Bureau of Indian Standards.
3. Aly S. Dadras, Electrical Systems for Architects, McGraw-Hill, Jan-1995.
4. M.H.Lulla , Air-Conditioning for Students of Architecture; ASHRAE standards.

Online courses

1. Water Supply Engineering By Prof. Manoj Kumar Tiwari, IIT Kharagpur - https://onlinecourses.nptel.ac.in/noc22_ce07/preview

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21AR320	DESIGN THINKING AND PRINCIPLES OF DESIGN	Category	L	T	P	Credit
		CFC	2	0	0	2

Preamble

The overall purpose of the course is to support each student to establish a personal, reflective, and examined intellectual position in relation to design as a process of inquiry, thought, and action. This course provides the theoretical basis and fundamental principles for design. Through this course the students shall explore creativity and innovation with respect to ideation.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognize the concept of design, and the processes in design	Understand10%
CO2	Identify qualities, skills and Types of Thinking and approaches for design problem solving	Understand10%
CO3	Apply diagrammatic tools, skills from design case examples	Understand20%
CO4	Apply Solutions for wicked problems based on systems thinking-Case studies	Apply 20%
CO5	Apply Context based strategies for creative innovation –Site form, Structure, Material, services and Technology	Apply 20%
CO6	Apply architect's design philosophies from case examples for efficiency and appropriateness	Apply 20%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	40	20	-	-	-
Understand	40	20	40	40	40
Apply	20	60	60	60	60

Syllabus

Introduction to Design thinking - Definition of Design, concept of design – basics of architectural design – Design in various fields – How it operates. Design process and its uniqueness, Quality of the design process- Various stages in Design Process. Stakeholders in a Design process Matrix-Constraints in design process. Design Thinking-What is expected out of a designer – Abilities Designer must possess – Set of skills needed – Nigel Cross-Types of Design Thinking-Inductive, Abductive, Deductive. Role of Systems Thinking. **Design problems and Problem solving** - Design problems and Traps for an amateur designer- Nature and qualities of Design Problem. Approaches for design problem solving – Design tools/ Influence of tools in design process. Diagrams as a tool for designing, thinking with Sections and Views. Idea Development – Role of Form, Importance of thinking in the third and fourth dimension. Design as a wicked problem and its qualities. - Richard Buchanan - Case examples. **Strategies/principles in Problem solving** - Different approaches to design problem solving Broadbent Theory –Pragmatic, Iconic, Canonic, Analogic-Case examples. Broadbent Theory-Narrative Design, Architectural Symbolism, Fantasy Design -Case examples. Structure, Site form, Material, Technology as design Principle-Case examples for each with reference to architect's process of design. **Case Studies-Architects works** - International context-Enquiry into Le Corbusier's Buildings – Promenade and Montage-Strategies and priorities in Design. Indian Context-Enquiry into Charles Correa's housing language - Incrementality, Identity, Pluralism, Equity, Cost as priorities. Case studies based on: Strategies and priorities in Design - Design Inquiry, Design thinking and Design action – Attempt to retrace the design process of the designer by conventional diagrammatic tools like Zoning, bubble diagrams etc. – Understanding the restriction of each tool.

Case studies & Exercises

- Exercises** - Undertaking a critical enquiry on relevant readings of Case studies focusing on the Design Process and its appropriateness with a help of a case example of an Architect.
- Working as groups-** Brainstorm and apply systems thinking for solving a wicked problem and arriving at concept map and flow charts.

Learning Resources**Text Books**

- Bryan Lawson – How Designer's Think, Architectural Press Ltd, London 1980.
- Bryan Lawson – What Designer's Know, Elsevier Architectural Press, Oxford 2004.
- Edward De Bono, Lateral Thinking.

Course Designers:

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21AR330	HORIZONTAL SPANNING SYSTEMS	Category	L	T	P	Credit
		CFC	2	0	2	4

Preamble

Architecture requires a technical understanding that involves a strong structural knowledge. This knowledge base acts as a tool for unhindered creative solutions for complex problems related to structural design and execution. This course provides insight into the domain of structural engineering in an architectural perspective.

This course explores the Horizontal spanning systems-its types and materials used as structural members. The span range, limitations of building materials like concrete, steel and wood as structural members are discussed in detail that eventually helps in determining a suitable structural frame work for a given space.

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weightage [%]
CO1	Recognize the mechanisms involved in the horizontal spanning system.	Understand 20%
CO2	Differentiate between medium and long span structures.	Understand 10%
CO3	Explain the potentials of long span structures	Understand 10%
CO4	Choose spanning system based on the material.	Apply 20%
CO5	Calculate the span using the thumb rules.	Apply 30%
CO6	Solve conceptually the issues involved in horizontal spanning systems.	Apply 10%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Plates and Assignments								Terminal Examination
	1	2	1	2	3	4	5	6	7	8	
Remember	20	0	-	-	-	-	-	-	-	-	-
Understand	60	60	10	15	10	15	15	15	10	10	60
Apply	20	40	-	-	-	-	-	-	-	-	40

Syllabus

Horizontal spanning systems- Need for horizontal spanning systems in buildings, Understanding of Transverse load, Concentrated & Distributed load, Live & Dead load. Behavior of horizontal systems towards transverse load. Understanding Concepts of span, Neutral axis, Bending stress, vertical sheering stress, and Transverse shear. Behavior of long beams & short beams, Beam depth & its relation to bending stresses and Lateral buckling Demonstration of the above concepts using live & simulated models. Types of spanning elements and Span range – Beams (Timber, steel, concrete), Slabs(Concrete-one way slab and two way slab, waffle slab) Decking, Joists(Timber, steel). Simulation based lecture sessions and hands on workshop on shear force, bending moment. **Concrete spanning systems-** Concrete beams-Design considerations and rule of thumb, Concrete one way slabs-Components (collector beams and feeder beams), Concrete Joist slabs, Flat plates and Flat slabs, Concrete Two-Way Slabs with Beams, Waffle slabs- Design considerations and rule of thumb-case examples. **Introduction to pre cast concrete slabs and hollow core slabs-**overview on applications, materials and methods of manufacturing, advantages & disadvantages. **Steel spanning systems-** Steel Beams and Girders- Types of sections-Spanning considerations. Structural behavior of connections- Types of connections- Pinned connections, Fixed connections, Riveted connections, Bolted connections, Welded connections. Decking types-Metal, Precast concrete slabs, Structural wood panels. One-Way spanning System with steel beam, steel beam and girder system, steel Trussed system and open-web joist – Design considerations- case examples. Introduction to IS codes- (IS800-2007) and steel tables. **Wooden spanning systems** – Wood Construction – Framing systems, wooden beam types- Solid Sawn Lumber, Glue-Laminated Timber, Parallel Strand Lumber, Laminated Veneer Lumber. Wood construction – Components-Plank-and-Beam Systems, Wood Decking(Types, span & Depth-thumb rule), Wood Joists(span & Depth-thumb rule),Prefabricated Joists and Trusses. Connections in wood construction - wood-to-wood, wood-to-metal, and wood-to-masonry. **Structural planning- Design Strategies-**Irregular bays, corner bays-Treating corner bays in different construction materials viz., Concrete, steel, Timber. **Long span structures-** Long span structures-Introduction & overview with case study references, Components involved in long span structures among all types of structural systems, Design considerations in long span structures and works of renowned Architects. One way system – Beam, Two way system – Plate, shell.

Learning Resources

1. Building Construction Illustrated by Francis D K Ching, CBS publisher and distributors.
2. Construction methods, materials and techniques by William P.Spence.

3. Structural Design- A Practical Guide for Architects- Rod Underwood, Michele Chiuni.
4. Simplified engineering for architects and builders
5. S.C.Rangawala, Engineering Materials, Charotar Pub. House, Anand, 1997.

Course Designers

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21AR340	MATERIALS AND COMPONENTS	Category	L	T	P	Credit
		CFC	1	0	2	3

Preamble

This course intends to expose the students to various building materials and understand the properties and application and the use of materials in buildings. This course gives a basic knowledge of the building components like doors, windows-their design and detailing their material choices. The course intends to educate the students about the concepts of waterproofing, damp proofing and thermal insulation will also be studied in detail.

Course Outcomes

On the successful completion of the course students will be able to

CO's	Course Outcome Statement	Weightage*** in %
CO1	Acquire basic knowledge on Doors, Components of Door, Parts of Door Frames, Parts of Door Shutters, Gate, Rolling shutters, Classification of Door with respect to the Material Specification	10% (Understand)
CO2	Acquire basic knowledge on Window, and grill Components of Window Frames, Parts of Window Shutter, Grill, Classification of Windows with respect to the Material Specification	10% (Understand)
CO3	Acquire basic knowledge on, Components of Staircase, Requirements of a Good Staircase, Classification of Staircase based on materials and construction.	10% (Understand)
CO4	Acquire knowledge on the various causes and effects of Damp Proofing & Water Proofing.	10% (Understand)
CO5	Illustration the construction techniques in the Application of Damp Proofing and Water Proofing in a Building	10% (Understand)
CO6	Illustrate the construction technique of doors, windows, Gate, Grilles, Staircase with the help of construction details and drawings based on typology and material selection.	50% (Apply)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Plates						Assignments		Terminal Examination
	1	2	1	2	3	4	5	6	1	2	
Remember	0	0	-	-	-	-	-	-	-	-	-
Understand	50	50	10	10	10	10	10	10	10	10	50
Apply	50	50	-	-	-	-	-	-	-	-	50

Syllabus

Doors-Introduction to Doors, Components of Door, Parts of Door Frames, Parts of Door Shutters, Classification of Door with respect to the Material Specification such as Timber, Steel, Aluminum, Plastic, Composite materials. **Windows**-Introduction to Window, Components of Window Frames, Parts of Window Shutter, Classification of Windows with respect to the Material Specification such as Timber, Steel, Aluminum, Plastic, Composite materials. **Gates, Grilles and shutters**-Introduction to Gates and Grilles, Components of Gates, Parts of Gates, Classification of Gates with respect to the Material Specification such as Steel, Stainless Steel, Cast Iron, Aluminum, Combination with Timber Panels etc. Rolling Shutter - Parts of Rolling Shutter, Types of Rolling Shutter, and Classification of Rolling Shutter with respect to the Material Specification, Aluminum, Manual Operated Rolling Shutter, and Motor Operated Rolling Shutter-Case Examples. **Staircase**-Introduction to Staircase, Components of Staircase, Requirements of a Good Staircase, Classification of Staircase with respect to the Material Specification such as Timber, Steel, R.C.C. Types of Staircases - Straight Flight, Open well, Dog Legged, Helical, Spiral etc. Staircase - Timber, Parts of Staircase, Types of Timber Staircase. Staircase - Steel, Parts of Staircase, and Types of Steel Staircase - Dog Legged, Spiral. Staircase - R.C.C., Parts of Staircase, Types of Staircases with R.C.C. - Dog-legged, Open well staircase, R.C.C cantilever staircase, steel Staircase. Handrails, Parts of Handrails, Handrails of different materials. **Damp Proofing & Water Proofing**-Introduction to Damp Proofing & Waterproofing, Causes, Effects, Methods. Materials used for Damp Proofing Course-Materials used for Waterproofing Course-Application of Damp Proofing and Water Proofing in a Building.

Learning Resources

1. Building construction metric by W.B.Mckay, Volume I- III, Longmans U.K,1981

Course Designers:

- | | |
|---------------------------------------|-----------------|
| 1. Prof.S.Santhana Iyyappa Sundararaj | pothi@tce.edu |
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21AR350	SITE PLANNING AND SITE SERVICES	Category	L	T	P	Credit
		CFC	2	0	2	4

Preamble

Site planning is a systematic approach with major emphasis on Site Inventory, Site Analysis, Site Synthesis, Site Level Circulation, Spatial development and Programme Formulation. The subject focuses on the procedures involved in Site Surveying, Preparation of Site Layouts, Process of Site Analysis, planning of building services at site level, Site Synthesis and Development of Programme Formulation.

Course Outcomes

On the successful completion of the course, students shall be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognize the basic surveying process	10%
CO2	Deduce the distinct stages of site planning process	10%
CO3	Identify the aspects pertaining to circulation form, spatial development and site services	20%
CO4	Demonstrate the site planning process for a given context involving all the stages from site inventory to site structuring	20%
CO5	Demonstrate the integration of site services in the site planning process	20%
CO6	Examine a given context for suitability using appropriate tools and methods/techniques	20%

Assessment Pattern:

Cognitive Levels	Continuous Assessment Tests		Plates and Assignments				Terminal Examination
	1	2	1	2	3	4	
Understand	40	40	-	-	-	-	40
Apply	40	40	50	50	50	50	40
Analyze	20	20	50	50	50	50	20

Syllabus

SITE PLANNING PROCESS - Site Planning process - Problem solving approach - program based to site based design and Programme Formulation Exercise: Preparation of Programme Formulation with Spatial Requirements at Site Level with Area Statement. **SITE SURVEYING** -Introduction to Surveying and Leveling, Methods of Surveying and Leveling, Introduction to Landforms, Methods to Study and Analyze the Contours in various landforms, Equipments used for Surveying and Leveling, tools and methods involved in preparation of Site Layouts, Modern surveying Instruments such as Total Stations drone, and their application. Introduction to marking plans, layout plans and centre-line plans. Importance and procedure for making these drawings and dimensioning. Procedure and precautions of setting out a plan on site. Understanding the above through site visits to real projects. **SITE INVENTORY** - Detailed understanding of context of the site. Site as offering potential/ limitations to architectural design. On site and off site factors. Site Inventory – Physical, Biological attributes and cultural attributes **SITE ANALYSIS& SITE SYNTHESIS** - Importance of site analysis. Analysis of natural, cultural and aesthetic factors. Factors to include topography, hydrology, soil, vegetation and its types, climate and microclimate, Vegetation, landforms and water as modifiers of microclimate, surface drainage, accessibility, size and shape, infrastructure, sources of water supply and means of disposal system, visual aspects, context of built environment. Introduction to detailed analysis involving aspects like contours, slope analysis, grading process, grading criteria, functional and aesthetic considerations. Principles of positive drainage and grading for drainage, Location and design of sewage treatment plants, Methods to control soil erosion. Introduction to master plans, land use for cities, development control rules. Site selection criteria for different building typologies. Impact of building developments on the surroundings including aspects such as traffic, noise, pollution, microclimate, etc., especially in the context of large scale projects. Understanding the above through real projects/ case studies. Introduction to various tools to conduct Site Analysis. Maps of matrix analysis and composite analysis methods. Introduction to Site Synthesis and Site Development. Understanding the above through real projects/ case studies. Exercise: Site Analysis of the Project with Site Synthesis. **SPATIAL**

DEVELOPMENT -Spatial development – relationship of space and mass, enclosure and spatial perception, sense of place – issues of placeness, spatial design – base and overhead plane. Site circulation -Circulation at Site Level, Design considerations for circulation networks. Modes and components of Circulation - Pedestrian and Vehicular, Pedestrian circulation: movement, material, linkage and visual system, spatial experience, planning and design considerations. Vehicular circulation – types of roads, hierarchy of roads, road networks, Turning radii, street intersections and safety, parking regulations, planning and design considerations. Introduction to DCR, local/ regional planning Guidelines (ecological, environmental and heritage, statutory bodies) and Indian Standards on site planning. Understanding the above through real projects/ case studies. Site suitability analysis **SITE PLANNING & SITE SERVICES** - Facilities and Service - Infrastructure - Planning and Standards, Introduction to NBC 2016 and IS Codes - Space Allocation and Spatial Planning of Services Centers at Site Level such as Transformers & Sub Station, Water Treatment Plants, Sewage & Effluent Treatment Plants, HVAC - Units and Cooling Towers, rain water harvesting. Incorporation of services such as drinking water pipelines, Fire Fighting Tanks and fire hydrants, Safety and Surveillance Systems, communication and networking facilities at site. (Space location – planning aspects) Exercise: Preparation of Service Layouts and Service Coordination Drawings with MEP at Site Level through case studies.

Learning Resources:

Textbooks:

1. John I.Motloch, Introduction to landscape design, John Wiley and Sons, Inc.
2. John Ormsbee Simonds, Landscape architecture – A manual of site planning and design Mc.Graw Hill, 1977
3. G.K.Hiraskar, Basic civil Engineering, Danpat Rai Publications (P) Ltd, New Delhi.
4. Kevin Lynch, "Site planning, MIT Press, Cambridge, MA, 1984.
5. Edward.T.White., "Site Analysis", Architectural Media, 1983
6. B.C.Punmia, Ashok K.Jain, "Surveying", Vol.I, Firewall Media, 2005.
7. Joseph De.Chiarra and Lee Coppleman, "Urban Planning Design Criteria", VanNostrand Reinhold Co., 1982
8. Storm Steven, "Site engineering for landscape Architects", John Wiley & Sons Inc, 2004.
9. Second Master Plan –Development Regulations –CMDA, 2008

Course Designers:

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21AR360	PERSONAL SPACE DESIGN	Category	L	T	P	Credit
		PCC	-	-	10	10

Preamble

The building we live and work have a direct impact on us and it is crucial we understand the various factors involved and respond consciously and sensibly in the creation of spaces by understanding the context , layout , material finishes, cost, function, technologies and contribute towards occupant health, comfort, mood, and productivity. This Architectural studio aims to encourage students to explore individual's relationship and response to immediate built environment , establish the importance of human-behavioural influences and evolve built form as a physiological response to context like site, climate and psychological response to the external environment apart from relationship between Physical, Social, Cultural, Economical and Technical response to context.

Multi-User , Single Space design - User-specific building typologies, Residence, Clinic, leisure cottage, Prayer hall, Meditation hall, Cafe, etc

Prerequisite

Completed the course **21AR260 - Micro Personal Space Design (Sem II)**

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Recognize the various standards, functional activities and hierarchy of activities in multi-user single spaces	10%(Apply)
CO2	Explore context, building material, interior detailing of a space	10%(Analyze)
CO3	Inquire and comprehend influencing factors into the possibilities of integrating form/shape and function/program	10% (Analyze)
CO4	Comprehension of appropriate technologies in evolving built form structures	20%(Evaluate)
CO5	Create building designs as a response to immediate environment	40%(Create)
CO6	Demonstrate verbal and visual communication skills to help present design projects as a response to context.	10%(Apply)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, CO3 & CO4
Review 2		100*	CO1, CO2, CO3 & CO5
Review 3		100*	CO1, CO2, CO3 & CO6
Review 4		100*	CO1, CO2, CO3 & CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva-Voce	Sheets & models	100*	CO1, CO2, CO3, CO4, CO5, & CO6
*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

Syllabus

The studio projects will be based on the streams of Climate Sensitive Design, Regional and Contextual response.

Climate Sensitive Design studio will focus on establishing the relationship between climatic conditions and built form in architecture by judiciously understanding the factors that directly or indirectly influence the climate. The studio will explore relevance to context, orientation, form, shading devices and strategies, etc in producing climate sensitive design and approaches.

Example projects: Projects that will help student explore on factors contributing to climate sensitive design., Residences, Cafe, clinic, etc

Regional responsive studio will focus on understanding the various building materials available and adopted in response to the context and explore the technicality and the versatility each material provides to achieve the desired design and detailing. The studio will also explore the market availability, merits and limitations along with labour/craftsmanship in the current context. Materials ranging from traditional, vernacular to contemporary will be dealt with.

Example projects: Projects that will help student explore on aspects of materiality and cost, Residences, Self-help centers, PHCs, etc

Learning Resources

1. De Chiara and Callender, Time-Saver Standards for Building Types, Mc Graw Hill Co., New York, 1973
2. NufertErnst, Architects Data, Blackwell Science Ltd, Britain, 1980
3. Julius Panero, Martin Zelick, Human Dimension and Interior Space, Whitney Library of Design, Canada, 1979
4. B.Givoni, Man, Climate and Architecture, Applied Science, Banking, Essex, 1982.
5. M.Evans-Housing, climate and Comfort-Architectural Press, London, 1980
6. Kenneth Frampton, "Towards a Critical Regionalism: Six Points for an Architecture of Resistance", in *The Anti-Aesthetic. Essays on Postmodern Culture* (1983) edited by Hal Foster, Bay Press, Seattle.

Course Designers

- | | |
|---------------------------------------|-----------------|
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21AR410	NON RESIDENTIAL BUILDING SERVICES	Category	L	T	P	Credit
		CFC	3	0	0	3

Preamble

Essentially, building services design is the process of ensuring that our building is fully equipped for use, and how the mechanical, electrical and plumbing elements of our building come together to provide a comfortable functional, efficient and safe environment.

This course, aims at delivering:

- Knowledge pertaining to building services that a student needs, before designing a commercial/ institutional buildings both large scale and small scale (excluding skyscrapers)
- Overall understanding of designing a commercial/ institutional buildings in a city with sustainable practice.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Acquire knowledge on MEP services applicable to multi-storeyed buildings	Understand 20%
CO2	Infer the basics of air-conditioning, fire safety and their installations in multi-storeyed buildings	Understand 30%
CO3	Infer the knowledge of lifts, escalators, travellers	Understand 10%
CO4	Interpret various building codes and standards relating to HVAC, fire safety, and lifts applicable to multi-storeyed buildings.	Understand 20%
CO5	Interpret the knowledge of air-conditioning systems for various project typologies	Apply 10%
CO6	Demonstrate the application of fire fighting in their architectural design project	Apply 10%

*** Weightage depends on Bloom's Level, number of contact hours,

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	60	60	40	40	60
Apply	40	40	60	60	40

Syllabus

PLUMBING SERVICES - Water supply: Water requirement for buildings other than residences (firefighting, domestic and other purposes) – quantity, storage capacity and pressure required – as per IS Codes & NBC, overview to CPHEEO standards for water supply and sewerage - Water treatment – Primary, Secondary and Tertiary treatment, Conveyance and Distribution of Water Within the Premises, at city level and neighbourhood level from treatment plant to individual unit. Types of water distribution networks. Distribution Systems in Multi-Storeyed Buildings - Direct Supply System from Mains, Gravity distribution system, Pressurized distribution system, Combined distribution system - Zoning of Distribution Systems - Drainage and sanitation: Systems of Drainage - Combined system, Separate system, Partially separate system, Storm Water Drainage - Discharging into a watercourse/ to a public storm water drain - Siphonic drainage system - Sewage treatment plants - Sewage Treatment Technologies - Oxidation ponds/lagoons, Trickling filters, aeration with activated sludge, Treatment of waste water and usage of recycled water - Solid waste management: Venting system for high rise buildings - Refuse Chute System - Opening for Feeding of Refuse Chute as per IS codes & NBC - Dumb-Waiter or Service Lift - **ELECTRICAL SERVICES** - Electrical load calculations - Electrical Scheme w.r.t load calculation for a commercial building, Emergency Power Backup System - Inverters, Phase changeover –**transformers**, Substation and Switch rooms - Location and Other Requirements as per NBC - **PRINCIPLES AND SYSTEMS OF AIR CONDITIONING** - Significance of psychometric chart in HVAC design, comfort levels, Refrigeration Type - Vapour Compression Refrigeration cycle, overview of ASHRAE and ISHRAE standards - Components in Air Conditioning System -Refrigerant Control devices - Electric motors - Starters - Air handling Units - Chiller, fan coil units, Fans ,Pump sets -

Cooling towers , Space requirements and locating criteria of the components in the air conditioning system - Air Conditioning Systems - Packaged air conditioners - Central Direct Expansion Plants , Chilled Water Plants, Sub-systems of air conditioning - water recirculation system, fresh air system, return air systems, fire safety systems , fire dampers, water piping sizes , air duct : sizes , shapes , & aspect ratio - Air Distribution - Single large system (single zone), Multiple small system (multi zone) - Costing of Air-conditioning systems - Rule of thumb based estimates (approximate range with reference to a particular time period) - Applications - Hotel Guest rooms - museums & libraries - Banks - Broadcasting studios - churches - Departmental stores - Hospital operating rooms - Hotel Public spaces - Offices - Restaurants - Theatres, Marriage halls, Auditoriums, and Resorts - **FIRE HAZARDS AND PROTECTION** - Introduction to fire - Smoke, flame, combustion, fire triangle, fire tetrahedron, development of fire, causes of fire, classification of fire - Fire protection - Design for fire safety - NBC standards, Occupancy type, load, fire resistance, fire extinguishing systems , construction type, Fire zone - Fire detection and control equipments - Heat and smoke sensors, Fire alarms System - Firefighting Equipments - Sprinkler systems, Fire escape, Materials and finishes, Exits /Assembly, Egress, Building separation, and alternate methods - Fire services - General requirements, Pump and Water Storage and supply for firefighting, Fire dampers , Ducts, Lighting and ventilation, Hose and Hose Fitting, Dry and wet risers - **VERTICAL CIRCULATION - LIFT**: planning and design guidelines – round trip time - Configuration of Lifts: number, speed, capacity(dimension), layout/ arrangements - lift lobby design - as per NBC - Type of lifts for specific Buildings – Hospital bed lift, Goods lift, Office buildings, hotels and apartments lift, etc. - Lifts Accessible for Persons with Disabilities, Machine room lifts, Machine room-less lifts, Hydraulic Lifts - Civil and Electrical requirements for lifts - Recommended Dimensions of Machine Room Height, Overhead, Pit Depth for Passenger, Goods, Stretcher/Hospital Lifts with Machine Room as per NBC - Fire Protection Requirements of Lifts - Emergency power provisions - **ESCALATORS AND MOVING WALKS**: Design guidelines, arrangement and planning (Space requirements) - Types, Number and Location of escalators/moving walks - Capacity/usage type (persons per day/heavy duty, medium duty, light duty), Angle of inclination in degree, Rise in m, Nominal speed in m/s, Step width in m - Case Example to explain various service core configuration – w.r.t plumbing, sanitation and vertical circulation.

Learning Resources

Text Books

1. M.H.Lulla , Air-Conditioning for Students of Architecture; ASHRAE standards
2. Refrigeration and air-coonditioning by Manohar Prasad
3. Manual of Tropical Housing by Koenisberger
4. N SessaPrakash, Manual of Fire Safety
5. National Building Code 2016, Bureau of Indian Standards
6. Electricity for architects project consultants and builders by B.Rajaroo

Reference Books

1. Refrigeration and air conditioning by CP.Arora
2. Basic refrigeration and air-conditioning by PN.Ananthanarayanan
3. Electricity in buildings- good practice guide by McGraw Hill
4. Electrical safety , fire safety engineering and safety management by S.Rao , RK.Jain, Prof.HL.Saluja
5. Francis D.K.Ching / Steven R.Winkel Building Codes Illustrated
6. David V.Chadderton Building Services Engineering

Online courses

1. Fire protection, Services and Maintenance Management for Building
<https://nptel.ac.in/courses/105/102/105102176/>

Course Designers:

- | | |
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21AR420	ARCHITECTURAL PRINCIPLES – REGIONAL ARCHITECTURE	Category	L	T	P	Credit
		CFC	2	0	0	2

Preamble

To provide an insight into the regional architecture specifically religious architecture and how they influenced their built form. Combined influence of geology, geography, climate, beliefs, religion and culture on Architecture must be highlighted so as to appreciate how Architecture is embedded in place of specific context.

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage*** in %
CO1	Infer the basics of how different architectural styles evolved within a region with respect to social, political, economic and mythical values of the society.	Understand 10%
CO2	Recognize the different orders (pillars) and styles of architecture under various regional dynasties.	Understand 10%
CO3	Categorize the Architectural Principles in the development of Temple complexes in Particular context.	Apply 20%
CO4	Illustrate the historic examples through comprehensive understanding of architectural elements.	Apply 20%
CO5	Analyze the various built and natural heritage elements of settlement planning with respect to dynasties.	Analyze 20%
CO6	Appraise the cross-cultural influences within a regional boundary by various dynasties.	Analyze 20%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	20	20	-	-	20
Apply	40	40	50	50	40
Analyze	40	40	50	50	40

Syllabus

INTRODUCTION TO REGIONAL ARCHITECTURE- Evolution of Regional Architecture and factors influencing regional architecture. Genesis of ideas & concepts; Socio-political background, Climatic & geographic influence, Material Influence and Construction technology. Design principles, Typology, Evolution and Orders (pillars). Role of Shilpasasthras in settlement planning. Study of Religious architectures and Palaces at regional level (Chola, Pandya, Vijayanagara etc.). **ARCHITECTURE OF PANDYAS** - Context influencing Architecture – role of environment (geographical, climatic, historic diversities), Cultural aspects (belief systems), Organization of form and space– development of temple citadel and entrance gateways- gopurams, Ordering principles in Temple Architecture, movements and Kinesthetics, Late Pandya Style: Evolution of Gopurams and Complexity in Temple plan - Madurai Meenakshi Temple. **ARCHITECTURE OF CHOLAS** - Environment and Socio-Cultural aspects influencing architecture, Over all composition of built forms, Spatial organization- linear forms of planning, Proportion and scales with reference to material structure and ordering principles of Vimana in temple Architecture ex: - Brihadeeswara temple. **ARCHITECTURE OF NAYAKS** - Over view of Nayak Architecture, contextual adaptations, temple town planning, Circulation as organizing element: building approach, Path space relationship in Sri Ranganathaswamy Temple at Tiruchirapalli, Cross cultural influences – amalgamation of Dravidian and Islamic style in Thirumalai Nayak Palace in Madurai. Planning of cities, mandapams and other structures in Nayaks period.

Learning Resources

- Henri Steirlin, Hindu India from Khajuraho to Temple city of Madurai, Taschen's World Architecture, 1998.
- George Mitchell, Temple Towns of South India, The Marg Foundation, 1993.
- K.R.Srinivasan, Temples of South India, National Book Trust, 2010.

Course Designers:

- | | |
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Board of Studies Meeting approved on 07.05.2022

Approved in 63rd Academic Council Meeting held on 25.06.2022

21AR431	VERTICAL SPANNING SYSTEMS	Category	L	T	P	Credit
		CFC	2	0	2	4

Preamble

Architecture requires a technical understanding that involves a strong structural knowledge. This knowledge base acts as a tool for unhindered creative solutions for complex problems related to design and execution. This course provides insight into the domain of structural engineering in an architectural perspective.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weightage ***in %
CO1	Enumerate the lateral stability in a building	Understand (20%)
CO2	Infer the working principles of the column and wall systems in a building	Understand (10%)
CO3	Infer the working principles of the roof systems in a building.	Understand (20%)
CO4	Demonstrate the conceptual structural system in a beam and roof system	Apply (20%)
CO5	Calculate the span and load transfer capacity of a structural system using the thumb rules	Apply (20%)
CO6	Interpret the methods of designing structural members using various building materials	Apply (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Plates and Assignments								Terminal Examination
	1	2	1	2	3	4	5	6	7	8	
Remember	0	0	-	-	-	-	-	-	-	-	-
Understand	50	50	10	15	10	15	15	15	10	10	50
Apply	50	50	-	-	-	-	-	-	-	-	50
Analyze	-	-	-	-	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-	-	-	-	-

Syllabus

COMPONENTS OF VERTICAL STRUCTURAL SUPPORT SYSTEMS: Importance of vertical support systems- Building Scale and structural systems. Types of support systems - Structural frames, Concrete and Masonry Bearing walls, Metal and Wood Stud Walls. Structural Requirements of Vertical Support system - Tributary loads, Load Accumulation and Vertical Continuity. Structural failure – redundancy. **STRUCTURAL BEHAVIOUR OF COLUMNS:** Physical and functional attributes - Equivalent length, slenderness ratio, buckling and crushing failure, critical loads of Columns. Types of columns - long, short and column reinforcement, Materials in construction of columns - Concrete, Steel, Timber, Compound and Composite columns and thumb rules. **STRUCTURAL WALL SYSTEMS:** Types of structural wall systems - Concrete and Masonry Bearing Walls, Metal and Wood Stud Walls. Partition walls and materials. Thickness and structural behavior of load bearing wall. Construction details and thumb rules for load bearing wall types - Bearing walls (concrete and masonry), stud framed walls, curtain walls. Relationship of Curtainwall to structural frames – Curtainwalls in Front of structural frames, In-Plane Curtainwalls, Curtain wall Behind the Structural frames. **STRUCTURAL ROOF SYSTEMS:** Layering of roof and roof covering materials, Introduction to RCC design - Nominal mix, Design mix, Neutral axis, balanced, under & over reinforced sections. Different types of roof slab: Sloping roof (Roof beam parallel with Slope, Roof beam Perpendicular to Slope, Multiple Slope roof), Vaulted roof, Arched roof (Fixed Arch, Rigid arches, Two hinged arches, Three Hinged arches) and Trusses – Timber truss and steel truss. **LATERAL RESISTING FORCE:** lateral-force-resisting mechanisms: Structural bracing systems, Braced Frames, Eccentric Bracing, Multi bay arrangements, Moment frames, Shear walls, Diaphragms. Building configurations to resist lateral loads. Bracing design

at Reentrant Corners. **INTERGRATING HORIZONTAL AND VERTICAL SYSTEMS:** Thumb rule for the selection appropriate wall and roof systems for a given structural requirement, design of integrated structural systems.

Learning Resources

1. S.C.Rangawala, Engineering Materials, Charotar Pub. House, Anand, 1997
2. Building Construction Illustrated by Francis D K Ching, CBS publisher and distributors.
3. Construction methods, materials and techniques by William P.Spence.
4. Simplified engineering for architects and builders.

Course Designers

- | | |
|----------------------------|------------------|
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21AR440	BIM PROCESSES	Category	L	T	P	Credit
		CFC	1	-	3	4

Preamble

Building Information Modeling (BIM) in Design, Construction and Operations is quickly becoming the industrial standard approach to design, analyze and manage a building's life cycle. The course introduces the students to learn architecture oriented 'Information Modeling', consolidate the related fundamental theory and strengthen modeling skills using state-of-the-art BIM software. This course also helps the students to assess the impact and limitations of BIM in its real-life context, examine various interoperability and investigate the role of BIM technologies and methods in facilitating a more collaborative design framework.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognize impact of BIM, taking into account the benefits, interaction of information, process, technology and people; characteristics and functionality of Information Modelling.	5% (Understand)
CO2	Relate information shared between organizations including the understanding of geo-spatial, design, cost, time, collaborative and facility management through BIM implemented precedent studies.	5% (Understand)
CO3	Prepare essential attributes and background data to set up a well-informed Building Information Model.	10% (Apply)
CO4	Demonstrate proficiency of using building information modelling tools to develop a working functional model.	30% (Apply)
CO5	Demonstrate the ability to develop comprehensive models using in-built building components.	30% (Apply)
CO6	Illustrate skill to prepare working drawings using the developed BIM data and render professional quality architectural images.	20% (Apply)

Assessment pattern : Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment			Terminal Examination
	1	2	1	2	3	
Understand	-	-	10	10	10	10
Apply	-	-	90	90	90	90

Syllabus

INTRODUCTION TO BUILDING INFORMATION MODELLING – The Current AEC Business model - Inadequacy of Traditional Approaches - Information Modelling Today; The Fundamentals and Benefits of BIM - The Creative Process Then and Now; Consideration for Adaptation in Design Practice; Opportunities and Varied Capabilities of Parametric Modelling - New Methods New Tools. **BIM IN CONSTRUCTION INDUSTRY** – Introduction to the types BIM applications used by Construction Firms; BIM implementation in Off-site and Onsite construction industry; Application on quality - cost - time tradeoff; Adopting BIM in fabrication operations; Current Trends - developments - future vision. **SETTING UP A PROJECT** – Setting up interface - creation of sections - elevations and 3D views - duplicating plan views; project template - introduction to file formats. Setting up site location - coordinates, units, levels and grids. **MODELING WITH BASIC ELEMENTS** – Creating - Families – walls – floors – roofs - columns - structure. **MODELING USING COMPONENTS** – Creating - curtain walls - stairs – railings - openings, doors - windows - model-in-place components - mass family. **PRESENTATION AND VISUALIZATION** – Developing phases - options – schedules; Setting up - rooms – sheets; Visualizing - Populating - rendering.

Learning Resources

1. BIM Design: Realizing the Creative Potential of Building Information Modelling; Richard Garber; Wiley; 1st edition (11 July 2014)
2. Beyond BIM: Architecture Information Modeling; Danelle Briscoe; Routledge; 1st edition (14 October 2015)

Course Designers

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21AR450	SOCIAL SPACE DESIGN	Category	L	T	P	Credit
		CFC	0	0	12	12

Preamble

The built environment we live in and work impacts us and it is important that we understand and respond consciously to the factors involved in designing them. The studio focuses on guiding the students to comprehend the characteristics of a built environment, emphasizing to create **a Multiple user, multi-space small scale public/community structures** by understanding the user's relationship with the built social environment and socio-cultural needs. It addresses the students to focus primarily on Physiological Response to context like site, climate and other aspects including Physical, Social, Cultural, Economic and Technical response to the context.

Multiple users, multi-space public/ community structures: **Public Library, Primary School/Kindergarten, Elderly homes, foster homes, Museums, Cultural centre, etc.**

Prerequisite

Completed the course **21AR360 - Personal Space Design (Sem III)**

Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Recognize the various standards and factors influencing the multi space and multi-user design.	10 (Apply)
CO2	Inquire and comprehend the physiological, social, cultural and economic aspects that shape the built environment	10 (Analyze)
CO3	Relate contextual significance through the understanding of building materials, building construction techniques and interior detailing of spaces.	15 (Evaluate)
CO4	Relate the importance of historic and cultural values in evolving iconic built forms with that of the aspirations/ needs of the community/ end users.	15 (Evaluate)
CO5	Develop a socially inclusive, Multi space multi user design considering the contextual, cultural, social and economic significance.	40 (Create)
CO6	Demonstrate verbal and visual communication skills to help present design projects as a response to context.	10 (Apply)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, CO6
Review 2		100*	CO1, CO2, CO3, CO4 & CO6
Review 3		100*	CO2, CO3, CO4, CO5 & CO6
Review 4		100*	CO2, CO3, CO4, CO5 & CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva-Voce	Sheets & models	100*	CO1, CO2, CO3, CO4, CO5, & CO6

*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

Syllabus

The studio projects will be based on the streams of **Iconism and Monumentality, Context Sensitiveness & Energy efficiency.**

Iconic & Monumental Studio will focus on exploring efficiency through form. Iconic buildings are buildings that have historic or cultural values attached to it and symbolize the place whether built in city scale or country scale. Monumental buildings are large scale structures that plays an important role in shaping the Social, political and economic behaviour of human beings.

Example projects: Projects that will help student explore on aspects of Iconism & Monumentality., *Public Library, Primary School/Kindergarten, Banks, Cultural centre, Art galleries, Memorials, etc.*

Context sensitive & Energy efficient Studio will focus on understanding the properties, function and systems involved in effective functioning of the buildings. The studio will explore the appropriate technologies, strategies, various building materials available and adopted in response to the context and explore the technicality and the versatility each material provides to achieve the desired design and efficiency.

Example projects: Projects that will help student explore on aspects of context sensitiveness & Energy efficiency, *Public Library, Primary School/Kindergarten, Cultural centre, Community facilities, etc.*

Learning Resources

1. De Chiara and Callender, Time-Saver Standards for Building Types, Mc Graw Hill Co., New York, 1973
2. Nufert Emst, Architects Data, Blackwell Science Ltd., Britain, 1980
3. Julius Panero, Martin Zelick, Human Dimension and interior Space, Whitney Library of Canada, 1979
4. Leo Hansen, Culture and Architecture, an integrated History - Second edition, Cognella Academic publishing, 2017
5. Parker Pearson, M., & Richards, C. (Eds.). (1994). Architecture and Order: Approaches to Social Space (1st ed.). Routledge.
6. Foster, Nancy. (2015). Design Anthropology: Theory and Practice. Wendy Gunn, Ton Otto, and Rachel Charlotte Smith, eds. London: Bloomsbury, 2013.

Course Designers

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21AR510	BUILDING SCIENCE AND MANAGEMENT SYSTEMS	Category	L	T	P	Credit
		CFC	3	0	0	3

Preamble

Building science focuses on study, analysis and control of the physical phenomena – light and sound affecting architecture. Whereas, **building management systems** involve design, operation and monitoring of the mechanical, electrical, lighting and access controls required for the comfortable, safe and environmentally friendly operations.

This course has been designed to understand the concepts of building science and management systems, which includes natural lighting, artificial/electrical lighting, acoustics, building management/automation systems - their design/planning considerations.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Identify the relationship between Multidisciplinary services– BMS/BAS in a built environment.	Understand (10%)
CO2	Comprehend the fundamentals of day lighting, artificial lighting and their importance in building design.	Understand (20%)
CO3	Appreciate the science behind acoustics, principles of acoustical design for spaces/typologies which require good hearing conditions.	Understand (20%)
CO4	Demonstrate the knowledge in evolving lighting layouts and acoustical design for various project typologies.	Apply (30%)
CO5	Choose appropriate design strategies of daylighting and Acoustics to achieve optimum standards of comfort within a built environment.	Analyze (10%)
CO6	Relate and comprehend the integration of building management systems involved in buildings and their arrangement through case examples.	Understand (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Test		Assignment		Terminal Examination
	1	2	1	2	
Understand	60	60	50	50	60
Apply	30	30	40	40	30
Analyze	10	10	10	10	10

Syllabus:

Natural lighting - Light and its Characteristics, Day lighting principles, day light factor, Components of daylight factor- the sky component, the internal and external reflected Component, Daylight illuminance, recommended Illumination standards for different activities and Glare. Techniques of incorporating daylight in buildings (Windows, Translucent walls, courtyards, atria, light-pipe shafts, north lights, clerestories, skylights and domes) and different types of control devices (Horizontal shading devices, fins, louvers, blinds, awnings etc.) with relevant case examples. **Artificial/Electrical lighting** -Introduction to terminologies such as Luminance, Luminous flux, candela, Solid angle illumination, Utilization factor, depreciation factor, Laws of illumination. Principles of luminous efficiency and different light types such as incandescent, high- and Low-pressure lamps, CFLs, LEDs etc. Classification of lighting based on activities namely ambient, task, focal and decorative, etc and Luminaire types including direct, indirect and diffused. Numerical design calculations for illumination schemes. **Acoustics** - Physics of sound - Sound propagation; Sound Measurement; Reverberation time; Sabine's reverberation formula, reverberation time (tR) measurement of tR. Sound in enclosed space – Properties & behavior; Acoustical Defects; design measures - various sound absorbing material, their properties & its applications. Effects of noise - Environmental noise, Impact noise, Sound Transmission – airborne & structure borne noise, Noise control techniques in different building types. Acoustical design considerations/standards for specific spaces - Lecture hall and Auditorium. Sound amplification systems, acoustical treatment materials, Designing of shapes, volume, stage, seating capacity, flooring and false ceiling with relevant case examples. Measurement and calculation of tR. for Lecture halls and Meeting rooms. **Introduction to Building Management/Automation systems** – Components of BMS/BAS – objectives and working mechanism. Basic Knowledge about BMS/BAS integration with HVAC, Electrical, lighting, Access, Surveillance and Security systems with case examples.

Learning References:

1. Tregenza, Peter Wilson, Daylighting in Architecture and lighting Design, Routledge, 2011.
2. Claude L Robbins, Daylighting Design and Analysis, Van Nostrand Reinhold, 1986.
3. O.H.Koenigsberger, Manual of tropical Housing and building part I, London, 1980.
4. Lam, W, M, C, Sunlighting as form giver for architecture, Van Nostrand Reinhold, 1986.
5. Olgay A and Olgay V, Solar control and Shading devices, Princeton University Press, 1977.
6. Steffy Gary, Architectural lighting Design, Wiley, 2008.
7. Aly S. Dadras, Electrical systems for architects, McGraw Hill, 1995.
8. Gary Gordon, Interior lighting for designers, John Wiley & Sons, 2003.
9. Marshall Long, Architectural Acoustics, Academic press, 2014.
10. David Eagan, Concepts in Architectural Acoustics.
11. Moore, J.E, Design for good acoustics and Noise control.
12. Templeton, D., Acoustics in the built Environment.

13. Wood, A.B., A text book of sound.
14. Harold Burris – Meyer and Lewis Good friend, Acoustics for Architects – Reinhold.
15. Maad Bali, Dietmar A.Half, Smart building design – Conception, planning, realization and operation, Birkhauser.
16. Maurice Eyke, Building Automation Systems – A Practical Guide to selection and implementation.
17. Shengwei Wang, Intelligent Buildings and Building Automation, 2009.
18. IS 2189 – Selection, Installation and Maintenance of Automatic fire Detection and Alarm System – Code of Practice (3rd Revision) – Published by Bureau of Indian Standards.
19. National Building Code of India 2016 – Published by Bureau of Indian Standards.

Online Learning Resources:

1. NPTEL online courses - **Architectural Acoustics** by Prof. Sumana Gupta, Prof. Shankha Pratim Bhattacharya- IIT Kharagpur.

Websites:

1. SCHNEIDER Electric - Home automation lighting solutions.
[<https://www.se.com/in/en/>]
2. SIEMENS – Building automation and control systems.
[<https://new.siemens.com/global/en/products/buildings/automation/building-control-gamma-instabus/lighting.html>]

Course Designers:

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21AR520	ARCHITECTURAL PRINCIPLES – MODERN ARCHITECTURE	Category	L	T	P	Credit
		CFC	3	0	0	3

Preamble

The purpose of the course is to obtain knowledge about the social changes and the transformation in building typology, architectural styles, influence of industrial revolution and various movement during 19th and early 20th century. Combined influence of various factors such as visual perception, quality of architectural spaces, and composition of space in the evolution of modern architectural styles.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Infer the socio, economic and political factors influence the evolution of Modern architecture.	Understand (20%)
CO2	Interpret the principle of visual perception influenced by various art movements.	Understand (20%)
CO3	Relate the evolution of graphical design by experience of materials, products and technologies.	Apply (10%)
CO4	Articulate the development of quality of architecture spaces by various building elements.	Understand (20%)
CO5	Express the Spatial quality influenced by light, colour and texture in modern architecture.	Understand (20%)
CO6	Examine the volume of space influenced by geometry, order form and relation between form and function.	Apply (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	100	80	100	80	80
Apply	-	20	-	20	20

Syllabus

EMERGENCE OF MODERN ARCHITECTURE - transformations after industrial revolution- cultural transformation of classical styles, social transformation in urban development –open spaces, parks, garden cities. Modern principles of functionalism - minimalism, visual expression of materials and construction technology. Evolution of new building typologies-exhibition halls, offices etc. **VISUAL PERCEPTION AND GRAPHICAL DESIGN** - Architecture movement in post industrial revolution – influence of flora, fauna & natural motifs in stained glass, objects & furniture design – Art & crafts movement. Organic forms & influences of Japanese motifs in painting & graphical design – Art Nouveau Movement; Modern architecture – Europe – Expression and transparency of building materials. Design of furniture, lamps & product design – Bauhaus school of thought. Modern Architecture-America – Raw expression and honesty of materials, perception of new scale and vistas – Salk Institute. **QUALITY OF ARCHITECTURAL SPACES - BUILT ELEMENTS, LIGHT, COLOR & TEXTURE** - Architecture movement in post industrial revolution – Gothic influence, stained glass, furniture design and built elements – Red House, Glasgow school of art. Coloured and mosaic patterns – Parague Guell. Curved glass, steel elements, light influencing special qualities - Hotel Van Eetvelde, -Tassel house. Modern architecture – Europe – Built elements express true form –Bauhaus. Use of primary color for built elements, textures and furniture – De Stijle movement-Rietveld Schröder House. Horizontal planes and grid form -Barcelona Pavilion. Modern architecture – America – Evolution of vertical forms and light wells to qualify spaces - Guggenheim Museum, Geometric opening - Dhaka parliament building. **COMPOSITION OF SPACES – ORDER, BALANCE & PROPORTIONING SYSTEMS** Architecture movement in post industrial revolution – Influence of gothic order, pointed windows. Volume of spaces, asymmetry and symmetry balance - Red House, Glasgow school of art. Asymmetrical shape, arches and curves and balance. Biomorphic and organic geometry – Casa Milan and Casa Batllo. Modern architecture – Europe – Geometrical and cubical volumes, Order of Form following function-Minimalism. Fluidic interior flowing space – Villa Savoye, Bauhaus. Floating elements Rietveld Schröder House. Modern architecture – America – Merge of form and function. Emergence of hi-tech and deconstruction architecture movement with modern spatial order – Lloyd's building, Guggenheim Museum.

Learning Resources

- Francis D. K. Ching, Mark M. Jarzombek, Vikramaditya Prakash - A Global History of Architecture - John Wiley and Sons - 2007
- Sir Banister Fletcher - A History of Architecture, 20th Edition - CBS -2002.
- Marvin Trachtenberg, Isabelle Hyman - Architecture: From prehistory to post modernity - New York : H.N. Abrams – 2002
- William J R Curtis - Modern Architecture Since 1900 - Phaidon Press - 1996
- Kenneth Frampton - Modern Architecture: A Critical History - Thames and Hudson, London, 1994.

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21AR530	URBAN ARCHITECTURE DESIGN	Category	L	T	P	Credit
		PC	-	-	12	12

Preamble:

Urban architecture involves designing buildings for an urban setting like cities and metropolitan areas. It usually refers to multiple space, multi-level planning, multiple users, complex vertical circulation and services: Housing/Apartment, Star Hotel, Commercial retail outlets, Office complex, Hospital, Bridges etc,

An architectural project deals with various design challenges posed by function, construction, structural, services and aesthetics. Hence, understanding various materials / construction techniques and knowledge reg. building services like electrical, plumbing, fire safety and HVAC are essential for effectual designing of a building. This studio aims towards preparing students to design and detail architectural form/planning by incorporating both Energy and resource efficient construction practices and Building services in the given project and their implications in form, function and aesthetics.

Prerequisite:

Completed the course **21AR450 - Social Space Design (IV SEM)**

Course Outcomes:

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognize the various standards and factors influencing the built environment in an urban setting.	Apply (10%)
CO2	Interpret various Energy and resource efficient construction techniques and different building codes/standards relating to MEPF for multi-storey buildings.	Analyze (10%)
CO3	Apply methods of preparing bill of quantities for the given architectural project.	Apply (10%)
CO4	Assess appropriate construction techniques and efficient service layout in evolving/planning design relevant to context.	Evaluate (10%)
CO5	Develop design by implementing innovative construction practices and building services.	Create (50%)
CO6	Demonstrate verbal and visual communication skills through detailed working drawings/details to help present design projects.	Apply (10%)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, & CO4
Review 2		100*	CO1, CO2, CO4 & CO5
Review 3		100*	CO3, CO4, CO5 & CO6
Review 4 & Workshop		100*	CO3, CO4, CO5 & CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva Voce	Sheets and Models	100*	CO1, CO2, CO3, CO4, CO5 & CO6
*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

Syllabus:

The studio projects will be based on the streams of **Resource efficient building practices / Building services and detailing**.

In addition to both the streams, the studio will include a **3-day workshop** on **Bill of quantities**, their composition, **Costing** and preparation for a part of the developed design project.

Resource efficient Building Practices Design Studio aims to explore innovative construction techniques that prioritize resource efficiency in alternative to the conventional practices. Furthermore, the studio intends to assess and implement the appropriate construction techniques in developing design relevant to the given context and detail design with working drawings, joinery/construction details that exhibit the materials/ techniques adopted in design.

The studio will also focus on integration of building services along with the innovative construction techniques.

Resource efficient Building practices: *GFRG panels, Precast concrete formwork and flat slabs, Modular construction technique, Rammed earth, CSEB Blocks, Filler slabs, Ferrocement, Hourdi blocks etc.,*

Example Projects: *Projects that will help students to adapt Energy and resource efficient building practices. Housing/Apartment*

Building services and Detailing Design studio focuses on imparting knowledge about building services like Electrical, Plumbing, HVAC, Fire safety, their requirements according to the relevant codes/standards and their implications in terms of spatial planning. Additionally, the studio aims to detail out building services through basic working drawings – HVAC, Electrical, Plumbing, Fire safety layouts for the assigned project.

Example Projects: *Projects that will help students to explore building services design and detail. Star Hotel, Commercial retail outlets and Mixed-use complex*

Learning Resources:

- De Chiara and Callender, Time-Saver Standards for Building Types, Mc Graw Hill Co. New York, 1973.
- Nufert Emst, Architects Data, Blackwell Science Ltd., Britain, 1980.

3. Julius Panero, Martin Zelick, Human Dimension and interior Space, Whitney Library of Canada, 1979.
4. William spencer, Construction Materials, Methods, and Techniques: Building for a Sustainable Future, Delmar Cengage Learning, 2021.
5. Sebastian El khouli, Sustainable Construction Techniques: From structural design to interior fit-out: Assessing and improving the environmental impact of buildings, Edition Detail, 2015.
6. DK Ching, Building Construction Illustrated 5Th Edition, John Wiley, 2014.
7. DK Ching, Green Building Illustrated 1st Edition, John Wiley, 2014.
8. National Building Code 2016, Bureau of Indian Standards.
9. CP.Arora, Refrigeration and air conditioning, Tata McGraw-Hill, 2000.
10. PN.Ananthanarayanan, Basic refrigeration and air-conditioning.
11. Alexandra D., HVAC for ARCHITECTS and ARCHITECTURAL ENGINEERS: A Practical Guide to HVAC Design, 2020.
12. Neil S., Handbook of Electrical design details, Mcgraw Hill, 2003.
13. William, H.Clark, Electrical Design Guide for Commercial Buildings, McGraw Hill, 1998.
14. S.Rao, RK.Jain, Prof.HL.Saluja, Electrical safety , fire safety engineering and safety management, Khanna Publishers, 1997.
15. Deolalikar S G, Plumbing Design and Practice, McGraw Hill,1994.
16. Francis D.K.Ching / Steven R.Winkel, Building Codes Illustrated, Wiley, 2021.

Course Designers:

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21AR610	EMERGING BUILDING SYSTEMS AND PRACTICES	Category	L	T	P	Credit
		CFC	3	0	0	3

Preamble

This course introduces students to emerging and advanced building systems and contemporary practices. The course introduces students to the identification of opportunities for innovation and a broad range of good solutions to achieve efficiency in construction practices. Also, this course encourages students to explore alternative approaches and strategies for structural efficiency.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Comprehend the Contemporary building systems and practices for Long-Span Structures	Understand (10%)
CO2	Summarize the structural design principles for High-Rise structures	Understand (10%)
CO3	Familiarize with the various emerging construction technologies around the world	Understand (20%)
CO4	Differentiate and Compare alternative construction technologies to opt the most appropriate technology	Understand (20%)
CO5	Compare alternative construction technologies to opt the most appropriate technology	Understand (20%)
CO6	Discover alternate approaches to structural efficiency	Apply (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	100	60			80
Apply	-	40	100	100	20

Syllabus

Long-span structures -Overview of Long-Span Structures; Issues relating to long span structures: Structural Issues, Design Issues, Construction Issues; Basic types of long-span structures: One -way systems, Two-way systems - Long – span Beams: Glue-laminated, Steel, Concrete; Long-Span Trusses : Timber, Steel - Long-span Arches: Timber, Steel, Concrete; Long-span Cable Structures; Long-span Plate Structures: Timber and Concrete; Long-span Shell structures : Wood, Concrete -Two – way structures: Space frames, Waffle slabs, Ribbed domes, Domes **High-rise structures** - Overview of High-Rise structures; Design considerations; Forces on High- rise structures - Types of High-rise structures : Interior Structures, Exterior structures - Interior Structures : Braced Hinge frame, Rigid Frame, Braced Rigid Frame, Rigid Frame with Shear wall, Outrigger Structures - Exterior Structures: Braced Frame, Tube structure, Diagrid structure, Trussed tube, Bundled tubes, Space truss, Mega frame structure - Damping mechanisms : Active damping system, Passive damping system, Aerodynamic damping mechanism **Alternate & Innovative Construction systems** -Structural systems – Prevalent structural systems and Alternate structural systems; Difference between prevalent and alternate structural systems - Need for Alternate construction systems and their end-user benefits; Design considerations - Cast in-situ construction systems vs Industrial systems; Broad classification; Design considerations - Formwork systems; Types of form work systems- Lost Form work systems, Stay-in-place formwork systems. Engineered formwork systems - Sandwich panel systems; Precast Concrete construction systems; Post tension construction systems - Light gauge steel structural systems; Steel Structural systems; Pre-engineered Steel Structural System; Metal structural systems (Aluminium). **Structuring strategies for Complex Geometries** -Doubly curved Structures such as Manchester Airport, Healing Garden Pavilion, Ephemeral Cathedral, France; Free Form structures like TheGlasgow Museum of Transport - Complex geometries based on basic mathematical geometries with case examples such as: Milan E3 Exhibition Centre; Mercedes Benz Stadium, Atlanta; Louvre Abu Dhabi, UAE - Hybrid approaches with case examples like Mediciate Liege, EDGE Suedkreuz, Berlin .

Learning Resources**Reference Books**

1. Architects's Guide to Structures: Special Structural topics, edited by Paul W. McMullin, Jonathan S. Price and Sarah Simchuk, Routledge, 2018
2. The New Structuralism, AD, July/August, 2010
3. BMPTC, Alternate & Innovative Construction Systems for Housing , I.K International Pvt. Ltd, New Delhi
4. Francis D.K Ching et al, Building Structures Illustrated: Patterns, Systems and Design, John Wiley & Son, Inc, 2009

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21AR620	URBAN DESIGN THEORIES	Category	L	T	P	Credit
		CFC	3	0	0	3

Preamble

Traditionally, the most popular definition for urban design is that it is the interface between urban planning and architecture. Urban Design is the art of creating and shaping cities, from public spaces to neighbourhoods, it is the tool that makes cities inclusive, equitable, sustainable and connected. Operating at many scales, from micro to macro – Urban design involves a multidisciplinary approach including architecture, landscape, economics, law, engineering among others. For a B.Arch graduate it is important to learn about the process and outcome of creating localities in which people live, engage with each other, and engage with the physical place around them.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Understand the role of an urban designer and the role of project stakeholders in the urban design process	Understand (10%)
CO2	Understand Urban Design theories and concepts proposed by Pioneers for visual perception and safety	Understand (20%)
CO3	Summarize various urban design concepts and strategies based on sociology, senses and technology	Understand (10%)
CO4	Examine the Anatomy of urban spaces through different cultural context	Analyze (30%)
CO5	Compare the morphological qualities of the urban public spaces with the city's image	Apply (15%)
CO6	Construct the urban street pattern with the epitome of urban challenges and opportunities	Apply (15%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	40	40	100	50	40
Apply	30	30	-	50	30
Analyze	30	30	-	-	30

Syllabus

Introduction to urban design - Origin of urban Design – Role of an urban designer - Relationship between Architecture, Urban Design, Town Planning and allied fields – Stakeholders and their role in urban design process. Feeling and Remembering a space - Perception of city form and pattern - Mental mapping Exercises – Jon Lang's Basic human needs - **Urban Design Theories about visual perception** Broad Classification of Urban Design theories based on Sociology, Senses, Technology – Pioneers in Urban Design - Gordon Cullen's Townscape – Serial Vision, Deflection, Mystery, Texture, Juxtaposition, Here and There, Closed vista, Projection and Recession, Enclosure/Enclaves, Punctuation, Closure, Focal Point, Intricacy, Scale, Precinct, Anticipation - Kevin Lynch - Townscape elements – Path, Edges, Nodes, Landmark and Districts – Townscape element interactions – Imageability, Legibility - Visual survey and Analysis - Perception of city image- Lecture and Simple Exercises on Sensory Survey mapping – Urban morphological mapping **Urban Design Theories about safety** - Jane Jacob's Philosophies and Oscar Newman's defensible spaces - Jane Jacobs for New Urbanism, Everyday Urbanism, and Empirical Urban Morphology – Gerda R. Wekerle's Safety Security Needs in Urban Spaces - Understanding, organizing and articulation of spaces of Residential, Commercial, Parks and Industrial spaces - Understanding the articulation of spaces for various uses – Sketches and perception representations – Sketches and perception representations – Documenting urban issues – an overview on different study methods adopted by Urban designers - Simple Exercises on Survey techniques - pedestrian – Behavioural mapping, Suitability Analysis, Origin destination survey. **Urban Public spaces** - Urban Squares – Definition and Qualities – Types based on use and as classified by Cameillio Sittae and Paul Zucker – Qualities of a successful square - Urban public spaces, their organization, location and articulation in Greece, Roman, Medieval and Renaissance in west in brief – Square as a tool for urban transformation - Morphological qualities of urban squares – performative potential of squares Contemporary Case studies - examples of Melbourne and Barcelona - Overview of Ancient Indian Towns - early history, medieval, colonial and modern cities -public places urban spaces - Temple complex as a public space - Urban public spaces in Indian context - Case studies **Urban Streets** - Street elements - Streets and Intersection – Treatments and elements of a street - Inclusive Street design – Socially inclusive, gender inclusive – Philosophies of Amos Rapoport (Culture and streets) Qualities of Asian Streets - Case examples - A discussion on Characteristics of a successful street - Urban Streets Guiding Principles – NACTO's Urban Street design Guideline – ITDP's urban street design guideline

Learning Resources

1. Paul. D. Spirogen, "On the art of designing cities" M.I.T. Press, Cambridge 1968
2. Lynch. Kevin, "The Image of the city" M.I.T. Press Cambridge 1960 3 Gordon Cullen - The concise TOWNSCAPE - The Architectural Press - 1978.
3. Bacon. Edmund "Design of Cities", Thames & Hudson, London, 1967
4. Urban Design – A typology of procedures and products – Jon Lang
5. Urban open spaces – Helen Woolley
6. Safe cities – Gerda R. Wekerle
7. Urban Design – Jon Lang and others
8. The Death and Life of Great American Cities – Jane Jacobs
9. Amos Rapoport – Culture, Architecture and Design

<https://nacto.org/>
<https://www.itdp.org/>

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21AR630	CAMPUS DESIGN	Category	L	T	P	Credit
		PC	-	-	15	15

Preamble:

The built environment in which we live and work impacts us, and we must understand and respond consciously to the factors involved in the design. The studio focuses on guiding the students to comprehend the characteristics of a built environment, emphasizing the identity of the building, the knowledge of scale, proportion, and articulation of spaces to **create an image** for a building. It addresses the students to **focus and comprehend the response to the context – Physiological, Physical (Spatial, Structure, Services & Technology), Social, Cultural, and psychological response in the built environment.** Multiple users, Multi-space/Simple Multi level planning, Complex circulation: **Educational Institutions, Institutions for Research, Space for community living, Resorts etc.**

Prerequisite:

Completed the course **21AR530 - Urban Architecture Design (V SEM)**

Course Outcomes:

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognize and understand standards, functional activities and hierarchy of activities in simple multi-space multi-user with complex circulation network, having large span structures.	Understand(10%)
CO2	Inquire and comprehend the physiological, social, cultural and economic aspects that shape the built environment.	Analyze (10%)
CO3	Relate contextual significance- through the understanding of spatial experience (volumetric definition, scale, proportion, articulation etc.) that brings identity to the built form through an Architectural Language.	Analyze (15%)
CO4	Relate and correlate various influencing factors of design such as materials, construction techniques required for a large span structure.	Analyze (15%)
CO5	Evolve a Multi space- multi user design solution for an architectural programme involving complex circulation, large span structure, and complex site planning through a narrative/mimic design.	Create (40%)
CO6	Demonstrate verbal and visual communication skills to help present design projects as a response to context.	Apply (10%)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, CO3,CO5
Review 2		100*	CO2, CO3, CO4 & CO5
Review 3		100*	CO3, CO4, CO5 & CO6
Review 4 & Workshop		100*	CO3, CO4, CO5 & CO6

*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.

Terminal Examination

Viva Voce	Sheets and Models	100*	CO1, CO2, CO3, CO4, CO5 & CO6
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*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

Syllabus:

The studio projects will be based on the streams of Mimic Design/Place-making (Building the Un-built) Studio

In addition to both the streams, the studio will include a **2-day workshop on Site Survey and Inventory analysis** for a campus design.

Mimic-Design Studio places a significant emphasis on strategic thinking that seeks to effectively comprehend and interpret the design philosophies, methods, and architectural language that guided the work of notable architects. Furthermore, the studio extends to demonstrate these decoded principles through design interventions in the given context.

Example Projects: *The studio projects will draw inspiration, explore and adapt from prominent architect's design languages and principles.*

Place-making (Stitching the un-built fabric in the built realm) studio- The creative explorations in a design process to create place/identity by spatial experience, Form, Materials, etc.

The studio will focus to create built spaces that exhibit the essence of the intended program by integrating and organizing different places and elements, Form, Materials, spatial experience etc. It also emphasizes on incorporating open spaces and Transition spaces as a catalyst to provide a sense of direction, to accommodate functional needs of activities in response to the context, to create place/identity- an aesthetic quality by involving attractive surroundings and creating visual surprises.

The studio will involve conveying this theme through Visual narratives (the entire design process through various tools like diagrams, storyboards, collages) and spatial narratives (Spatial organization, form, circulation, material, structures, etc.) as a device to structure the design process and to design engaging settings that foster connections with the user. The studio will explore project intent, program, site context, users, and interpretation of this content into a theme.

Example projects: Projects that will help the student explore these aspects: **Educational Institutions, Institutions for Research, Space for community living, Resorts, etc..**

Learning Resources:

1. Campus design in India, Experience of a developing nation, Achyut Khanvinde and James Miller, Jostons American Yearbook Co.,1969.

2. Campus Design, Richard P. Dober, Reinhold Publishing Corporation, 1964.
3. Campus Architecture: Building in the groves of Academe, Richard P. Dober, Mc Graw Hill education, New York, 1996
4. Mies Van der Rohe, IIT Campus-Illinois Institute of Technology, Chicago, Werner Blaser, Birkhauser Verlag AG, 2002. De Chiara and Callender, Time-Saver Standards for Building Types, Mc Graw Hill Co., New York, 1973
5. Nufert Emst, Architects Data, Blackwell Science Ltd., Britain, 1980
6. Julius Panero, Martin Zelick, Human Dimension and interior Space, Whitney Library of Canada, 1979
7. Leo Hansen, Culture and Architecture, an integrated History - Second edition, Cognella Academic publishing, 2017
8. Parker Pearson, M., & Richards, C. (Eds.). (1994). Architecture and Order: Approaches to Social Space (1st ed.). Routledge.
9. Foster, Nancy. (2015). Design Anthropology: Theory and Practice. Wendy Gunn, Ton Otto, and Rachel Charlotte Smith, eds. London: Bloomsbury, 2013.
10. Narrative Architecture, A designer's story, Sylvian D blackeere, Routledge Publications, 2017.
11. BN Dutta, Estimating and Costing in Civil Engineering, CBS Publishers and Distributors, 2020

Course Designers:

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21AR710	PROJECT MANAGEMENT	Category	L	T	P	Credit
		CFC	2	1	0	3

Preamble

Projects are an integral part of one's life starting with management of daily tasks to large scale building design and construction. Every design and construction endeavour involves management of stakeholders, tasks, time, cost, and communication with challenges and uncertainties. This course introduces the students to the ten (10) knowledge areas of project management envisaged by Project Management Institute (PMI) in the published guide 'Project Management Body of Knowledge' (PMBOK).

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Comprehend the importance of project management and define the scope through time-cost-quality	Understand (20%)
CO2	Identify and manage the stakeholders including human resource through defined communication plan	Understand (10%)
CO3	Recognize the significance of risk management in project planning and execution.	Understand (10%)
CO4	Apply the project management techniques in time management for realistic project scheduling	Apply (20%)
CO5	Apply the project management techniques in cost management along with time for earned value management	Apply (20%)
CO6	Analyze and balance the trade-off between time-cost-quality through realistic scheduling, costing and resource balancing	Analyze (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	80	40	-	-	40
Apply	20	40	100	100	40
Analyze	-	20	-	-	20

Syllabus

INTRODUCTION – Need for Project Management, Project Management Knowledge Areas - Project Management Principles - The Project Life Cycle and Phases – influencing factors - Project Integration Management - Project Charter - Portfolio, Program and Projects – **PROJECT PLANNING** – Need of Project Planning - Project planning Phases and Processes - Project Manager (PM) Roles and Responsibilities - Identification of Stakeholders - Formation of Project Team - Roles, Responsibility and Communication plan –**PROJECT TIME, COST, AND QUALITY** – Golden triangle of Project Management Time-Cost-Quality equilibrium - Project Scope and Change Management - Work Breakdown Structure (WBS) - **PROJECT NETWORK ANALYSIS** – Development of Project Network with inter-relationship and standard set of rules - Time Estimation and Network development - Determination of the Critical Path – Project Updating - Bar Chart & Graphical Representations - CPM Model & Analysis - PERT Model & Analysis - **RESOURCE CONSIDERATIONS** – Resource Allocation and Loading – Resource Smoothing and Resource Levelling Analysis - **PROJECT COSTING** – Activity cost information - Network Cost System - Cost Time relationship - Cost Slope and Crashed Estimates - Direct and Indirect Costs - Earned Value Management - Determination of Least Cost and Least Time Solution - **RISK MANAGEMENT** – Introduction - Project Risks Identification, Analysis, Evaluation, Prioritization and Management - Response Plan, Contingencies and Reserves – **PROJECT CLOSE-OUT, TERMINATION AND FOLLOW UP** – Project Close-out - Steps for Closing the Project - Project Termination - Project Follow-up

NOTE TO THE INSTRUCTOR: The contents to be substantiated with case examples of real projects. To incorporate and relate the case studies to theory of project management.

Learning Resources

1. "A Guide to the Project Management Body of Knowledge (PMBOK Guide)" – Fifth Edition, An American National Standard, ANSI/PMI 990001-2008
2. Punmia B.C. and Khandelwal K.K., "Project Planning and Control with PERT/CPM", Laxmi Publications, New Delhi, 1989
3. Jerome D. Wiest & Ferdinand K. Levy, "A Management Guide to PERT/CPM", Prentice Hall India Learning Private Ltd, New Delhi, 1982
4. NPTEL course at <https://archive.nptel.ac.in/courses/110/104/110104073/> by Dr. Raghu Nandan Sengupta, Department of Industrial & Management Engineering, IIT Kanpur
5. Project Management For Architects- A Necessity or Just Career Option <https://www.re-thinkingthefuture.com/rtf-fresh-perspectives/a1001-project-management-for-architects-a-necessity-or-just-career-option/>

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21AR720	GEOMETRIC MODELING	Category	L	T	P	Credit
		CFC	2	0	0	2

Preamble

Geometric modeling is a branch of applied mathematical research and computational geometry that studies methods and algorithms for the mathematical description of shapes.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Define the coordinate system for the development of geometric models	Remember (20%)
CO2	Develop curves using parametric equations	Apply (15%)
CO3	Develop surfaces using parametric equations	Apply (15%)
CO4	Develop manipulating techniques for curves and surfaces	Apply (15%)
CO5	Implement the transformation over the 2D geometric model	Apply (20%)
CO6	Implement geometrical modeling in architecture	Apply (15%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	20	20	20	20	20
Understand	-	-	-	-	-
Apply	80	80	80	80	80

Syllabus

COORDINATE SYSTEMS: Geometric coordinate systems - Cartesian, Cylindrical and Spherical coordinate systems - Display coordinate systems - Global, Local, View and Screen coordinate systems. **MATHEMATICAL MODELING OF CURVES:** Definition - Parametric and non- parametric forms of analytical and synthetic curves. Analytical Curve modeling - Line Segment, Circle, Ellipse. Synthetic Curve modeling - Hermite Cubic Spline, Bezier, B-spline and Rational Curves. Curve manipulation techniques. **MATHEMATICAL MODELING OF SURFACES:** Definition - Parametric and non- parametric forms of analytical and synthetic surfaces. Analytical surface modeling - Parametric form of plane, loft, Cylindrical, Surface of revolution. Synthetic Surface modeling - Hermite Bicubic Spline, Bezier, B-spline, Coon's, triangular, blending Surfaces. Surface Manipulation techniques. **2D TRANSFORMATION TECHNIQUES:** Translation, Rotation, Scaling and Reflection principles. Principle of concatenated transformation. Application of geometrical modeling in architecture.

Learning Resources

1. Ibrahim Zeid, "Mastering CAD/CAM", Tata McGraw Hill Education (P) Ltd., Special Indian Edition, 2008.
2. Amarendra N Sinha and Arun D Udai, "Computer Graphics", Second reprint, Tata McGraw Hill Education (P) Ltd., 2009.
3. Michael E. Mortenson, "Geometric Modeling", Third edition, Industrial Press, 2006.
4. Rogers, "Mathematical Elements for computer Graphics", Tata Mcgraw Hill Education Private Limited, 2009.
5. Rajiv Chopra, "Computer Graphics: A Practical Approach, Concepts, Principles, Case Studies", First Edition, S.Chand and Company Ltd., 2011.

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21AR730	PUBLIC SPACE DESIGN	Category	L	T	P	Credit
		PC	-	-	15	15

Preamble:

The student will explore the integration of technology into the design of large public spaces at various scales, and will focus on structures, materiality, construction technology, digital processes, sustainable approaches, etc.

Prerequisite:

Completed the course **21AR630 - Campus Design (VI SEM)**

Course Outcomes:

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Understand the role of human behaviour in public space.	Understand (10%)
CO2	Identify the context and to explore solutions based on real world problems.	Analyze (10%)
CO3	Empathize the Structural innovations of design fundamentals, aesthetics, anthropometrics, systems, services, universal design and sustainability approaches.	Evaluate (20%)
CO4	Investigate the concepts of spatial efficiency and experience of public spaces.	Analyze (10%)
CO5	Synthesize and integrate the complex design process and probe into a creative solution	Create (40%)
CO6	Produce detailed professional drawings which are able to convey the technical as well as architectural requirements for construction of the project.	Apply (10%)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, CO3, CO5
Review 2		100*	CO2, CO3, CO4 & CO5
Review 3		100*	CO3, CO4, CO5 & CO6
Review 4 & Workshop		100*	CO3, CO4, CO5 & CO6

*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.

Terminal Examination

Phases	Deliverables	Marks	Course Outcomes
Viva Voce	Sheets and Models	100*	CO1, CO2, CO3, CO4, CO5 & CO6

*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

Syllabus:

Whether a park, library, museum, exhibition centre, or government office, public spaces can provide a vital respite from the pace of urban life, creating refreshed experiences for residents to enjoy. The design of Public Spaces requires a complex design approach, capable of combining different factors, from the urban configuration to its role in civil life, from exhibiting the contextual legacy to the exposition of state-of-the-art technology and innovations.

The studio projects will be based on either of the following streams:

- Integrated Architectural Design approach**

Integrated design is a comprehensive holistic approach to that which brings together specialism's usually considered separately such as Structural systems, Service integration, Material efficiency, Energy efficient techniques, reuse and recycling etc. It attempts to take into consideration all the factors and modulations necessary for a decision-making process and aims to achieve a more sustainable design. The design studios will also emphasis on building services on the public building design.

- Form and Structural innovations**

Carefully designed structural form can exhibit the stark beauty of controlled strength, even to the point of excitement. This design studio focuses on developing innovative architectural forms through understanding various material properties, and structural systems and attempts to highlight that the structural systems contribute to the overall composition of form in addition to load transfer. Explorations on long-span, retractable, and other innovative structures could be a part of the studio. The design studios will also emphasis on building services on the public building design.

Example Projects: Projects that will help students to adapt emerging building practices and explore structural innovations. Hospice Design, Library/Museum/Exhibition centre, Government office complexes, Transit hubs, Stadiums etc.,

Learning Resources:

- Santiago Calatrava: Drawing, Building, Reflecting Hardcover – 20 November 2018 by Santiago Calatrava (Author), Cristina Carrillo de Albornoz (Author)
- Supersheds: The Architecture of Long-Span, Large-Volume Buildings, Chris Wilkinson.
- National Building Code 2016, Bureau of Indian Standards.
- Design and construction of complex large-span structures, Jat Yeun Richard Liew, 2009
- Recent Advances in Analysis, Design and Construction of Shell & Spatial Structures in the Asia-Pacific Region, By Kok Choong,
- Mustafasanie Yussof, Jat Yuen Richard Liew, 2021

7. S.Rao , RK.Jain, Prof.HL.Saluja, Electrical safety , fire safety engineering and safety management, Khanna Publishers, 1997.
8. V S L POST -TENSIONING SOLUTIONS A Reputation For Excellence Since 1, Raphael Choong
9. CP.Arora, Refrigeration and air conditioning, Tata McGraw-Hill, 2000.
10. Sebastian El khouli, Sustainable Construction Techniques: From structural design to interior fit-out: Assessing and improving the environmental impact of buildings, Edition Detail, 2015
11. Sutherland Lyall, Masters of structures, Laurence king Publishing, 2002.
12. Anneette Lecuyer, Steel and Beyond, Birkhauser, 2003.

Course Designers:

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21AR810	PROFESSIONAL PRACTICE	Category	L	T	P	Credit
		CFC	3	0	0	3

Preamble

To understand the importance of the architectural profession, its regulatory bodies, scope of architectural services, building byelaws, regulation for projects of various nature and with a global perception and to develop competency in handling projects individually for running an architectural practice.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage* in %
CO1	Interpret the importance of architectural profession, role and management skills in architectural practice	Understand (10%)
CO2	Identify the roles and function of regulatory bodies, professional associations with regard to architectural practice.	Understand (20%)
CO3	Interpret various architectural services, terms and conditions of engagement, letter of appointment, scale of fee, and payment as per council of Architect.	Understand (20%)
CO4	Schedule an architectural competition at national and international level as per COA guideline regard to architectural practice	Apply (20%)
CO5	Associate the legal aspects of Arbitration, easement and various development regulations with regard to architectural practice.	Understand (20%)
CO6	Comprehend the global aspects of architectural practice and its emerging specialization.	Understand (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	100	80		80	80
Apply	-	20	100	20	20

Syllabus

INTRODUCTION TO THE ARCHITECTURAL PROFESSION- Development of architecture as a profession in India. Role and Importance of architectural profession in society-careers in architecture, roles beyond architecture .Registration as an architect-advantages and responsibilities. Opening when entering profession, Running an architectural practice- office management, organizational structure, accounts and tax liabilities. **PROFESSIONAL & REGULATORY BODIES FOR ARCHITECTURAL PRACTICE IN INDIA, CODE OF CONDUCT AND ETHICS-** Profession associations related to architecture and Role of Indian Institute of Architects, Roles & functions of Council of Architecture -Architects Act 1972 (Intent, objectives, provisions with regard to architectural practice) Code of conduct and ethics for architects as prescribed by Council of Architecture - punitive action for professional misconduct of an architect. **ARCHITECTS' SERVICES AND SCALE OF FEES AND COMPETITIONS** – Mode and methods of engaging an architect - Comprehensive services, partial services and specialized services-of an architect .Compensation methods for architecture services - scope of work & Scale of fees, and payment , Terms and conditions of engagement, types of contract and agreement as per Council of Architecture norms. Type of tenders-open and closed,-EMD,- conditions of tender documents Importance of architectural competitions; Types of competitions - Open, Limited, Ideas competition - Single and two stage competitions Council of Architecture guidelines for conducting architectural competitions – National & International competitions (Case Studies). **LEGAL ASPECTS, IMPORTANT LEGISLATIONS AND REGULATIONS-** Arbitration (definition, advantages, sole and joint arbitrators, role of umpires, award, and conduct of arbitration proceedings) Arbitration clause in contract agreement .Easement -types of easements, acquisition, and extinction. Copyrights and Patenting - Provisions of copyright acts in India and abroad. Copyright in the architectural profession. Tamil Nadu combined development and building rules-Land use, FSI, Zoning regulations, High rise and Non- High rise building rules & regulations. Persons with Disabilities Act – Coastal regulation Zone. **GLOBALIZATION AND ARCHITECTURAL PROFESSION-** Globalization and its impact on the architectural profession. (WTO and GATS)-Preparedness for global practice, Collaboration with foreign Architects in India. Emergency specializations in the field of architect-construction/project management.

Learning Resources

1. Publications of COA, Handbook on Professional Practice, the Architects Publishing Corporation of India, Bombay 1987.
2. Roshan Namavathi, Professional Practice, Lakshmi book depot, Mumbai 1984.
3. Architects act 1972
4. Dr. B.C. Punmiya and K.K.Khandelwal, Project Planning and control with PERT CPM, Laxmi Publications , New Delhi, 1987.

Course Designers:

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21AR820	ENVIRONMENTAL SCIENCE FOR ARCHITECTURE	Category	L	T	P	Credit
		CFC	2	0	0	2

Preamble

The alarming rate of exploitation of natural resources by mankind results in total environmental mismanagement. Hence the fundamental knowledge on environment and its science becomes utmost important for every citizen of our country. Architects as builders of future physical world have a great influence on global environment and have a great responsibility towards sustainable environments, need to be sensitive about what keeps the ecosystem sustainable for humans. The aim of the subject is to impart the basic knowledge on Environmental science and its management.

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Outline the characteristics of ecosystem and environment relating to architecture.	Understand (10%)
CO2	Illustrate the features of biodiversity its threats and conservation strategies.	Understand (10%)
CO3	Demonstrate the Concepts and Approaches to Ecological and Environmental Planning.	Understand (10%)
CO4	Identify the issues pertaining to different forms of nature leading to environmental degradation.	Apply (20%)
CO5	Experiment the issues in environment with Lifecycle Assessment Tool and Environment impact assessment tool.	Apply (20%)
CO6	Demonstrate the various components and methods involved in project consideration related to environment.	Apply (30%)

Assessment Pattern

Bloom's Category	Continuous Assessment Tests		Assignments		Terminal Examination
	1	2	1	2	
Understand	30	30	30	30	30
Apply	70	70	70	70	70

Syllabus

Ecosystem: Multidisciplinary nature of environment- need for public awareness-Eco-system-Concept, structure, function, components, laws of Ecology, Energy flow in eco system, Types of ecosystem, and their Loss and estimation. **Biodiversity:** Biodiversity and its conservation-biodiversity types, bio-geographical classification, Values of biodiversity - Hot spots of biodiversity-threats to biodiversity-Biodiversity Indices Role of individual in the conservation of natural resources – Introduction to Concepts and Approaches to Ecological Planning and Environmental Planning - Natural features of environment – lakes, ponds, hills, rivers, marshlands etc. case study related to its conservation – examples: Pallikaranai marshland, Pulicat lake restoration etc. – disaster management: floods, earthquake, cyclone and landslides. **Issues in Environment:** Introduction-Environmental Issues at Macro level and Micro level in India- Deforestation, Pollution, Climate Change etc. - (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards - Ecologically Disturbed Sites and Restoration-Case Examples- Water management system and techniques with case examples - Waste Disposal and Waste Management at Building Level & Site Level - Case Example - Social issue - sustainable development goals – ethics of environment – soil waste management: causes, effects and control measures of municipal solid wastes – role of an linear economy, circular economy , case examples: Japan economy, carbon economy and Hydrogen economy - Carbon - di- oxide trapping techniques and hydrogen related remedies – case examples : Global warming. **Architecture and Environment-** Introduction to Environmental Engineering-Environmental issues in Master Planning of New Proposal and Projects- Professionals involved in those projects such as Residential Townships, Industrial Campus & Townships etc.-Introduction to Environmental Law and Environmental Management- Environmental Legislation in India. Introduction to EIA – Environmental Impact Assessment-Components and Methods- Case Example- Projects involving considerations related to environment such as Eco Tourism Projects – Reports- Reports & Project proposal Drawings related to Project Proposal for Environmental Clearance- Contribution of Architects, Landscape Architects, Environmental Planners, Environmental Engineers.

Text Books

1. Perspective in Environmental studies A.Kaushi and CP Kaushi, New age International (P) Limited Publishers.2014
2. Suresh .K. Dhameja, Environmental Engineering and management, S.K.Khataria& Sons, Delhi, 2000.
3. B.K.Sharma&H.Kaur, An Introduction to Environmental pollution, GOEL Publishing House, Meerut First Edition, 1997 (Unit II & IV)

Reference Books

1. B.K.Sharma&H.Kaur, Environmental Chemistry, GOEL Publishing House, Meerut SecondEdition, 1995 (Unit II & IV)
2. Wright &Nebel, Environmental science towards a sustainable future, Prentice Hall of India Ltd, 2000.
3. Principles of Geographical Information Systems for Land Resource Assessment — P. A. Burrough.

Course Designers

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21AR830	ARCHITECTURAL DESIGN AND RESEARCH	Category	L	T	P	Credit
		PC	-	-	15	15

Preamble:

Architectural Design and Research deals with applying design research methods, processes, strategies, and practices to understand architectural design, and the other part concentrates on designing Hi-tech buildings with multiple spaces, multi-level planning, multiple users, complex vertical circulation, and services.

It offers an opportunity to look at the research component in architecture in various thrust areas and analyse the work either empirically (Quantitatively) or through extensive arguments (Qualitatively).

It also aims to look at the advent of new materials, construction techniques, and new technologies in the field of the construction industry and implement it to achieve structural/technical expressionism in Architectural design.

Prerequisite:

Completed the course **21AR730 - Public Space Design (VI SEM)**

Course Outcomes:

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Adapting the knowledge of research methodology / standards and factors influencing the built environment that is to be undergone in the project	Apply (5%)
CO2	Examine the aim and objectives of the research topic / project thrust area (various Hi-tech construction techniques and material properties)	Analyze (5%)
CO3	Investigate required primary and secondary data sets / initial development of design solutions through study analysis	Analyze (20%)
CO4	Assess and evaluate the data sets / Hi-tech building construction techniques and structural systems relevant to design	Evaluate (20%)
CO5	Infer the analysis and arrive at a design solution through the findings / implementing various aspects like construction practices, structural systems, and building services in the design	Create (30%)
CO6	Demonstrate the skills of documentation, analysis, synthesis, and evaluation of the research topic / verbal and visual communication skills to present the design project	Apply (20%)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, CO3
Review 2		100*	CO1, CO3, CO4
Review 3		100*	CO1,CO2,CO3,CO4, CO5 & CO6
Review 4 & Workshop		100*	CO1,CO2,CO3,CO4, CO5 & CO6
* During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva Voce	Sheets and Models	100*	CO1, CO2, CO3, CO4, CO5 & CO6
Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

Syllabus:

The approach to design based on research fits into the current trend, associated with quality assessment in architecture known as: **research by design and design by research.** *The studio projects will be based on the streams of Quantitative design / Qualitative design and Designing Hi-Tech Architectural Design.* The studio intends to do research in architecture as a process for evolving in-depth understanding of specific area through primary and secondary analytical techniques and presentations.

Studio based on Quantitative / Qualitative approach: This studio will aim at using quantitative techniques of analysis/evaluation/optimization/simulation etc, of tangible data to arrive at a design solution and to collect/ represent/ analyze/ intangible data and arrive at design solution with the help of qualitative analysis methods. Quantitative research is a method of systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques. Qualitative research is a source of universal methods for assessment of whole objects, as well as selected elements of the building: zones, interiors, outdoor spaces, and above all, it provides recognition of user's opinion.

Examples: *Quantitative: Daylight analysis, Indoor air quality, the productivity of occupants, occupant comfort level, building running cost, the flexibility of internal space. Qualitative: Safety in Housing, Image of a Public space, Gender Equality in Institutions, Happiness/ Liveability index of Public spaces, Inclusivity in Buildings.*

Studio based on Hi-Tech Architectural Design: This studio will aim at exploring different Hi-tech architectural features in the selected building typology with various complexities like multiple spaces, multi-level planning, multiple users, complex vertical circulation, and services.

Examples: Projects that will help students to adapt Hi-tech architectural style in Multi-use High rise structures, High rise Office complexes, Multispecialty Hospital, Multiplex, Stadium, Research centers, Trade centers etc

Studio Quantitative / Qualitative approach Methodology: The following has to be followed:

- The topic and methodology for the project will be finalized by end of the previous semester by the committee consisting of the Head of the Department, Design chair, Visiting Faculty, and Studio Co-ordinator.
- Based on the requirement of the project, up to 5 days on duty may be granted for the project.
- The project may be handled in groups of two and in extraordinary cases may be done in groups of three, as decided by the committee.
- The final submission will include the submission of their work as a research paper, along with a demonstration of design.

Studio Hi-Tech Architectural Design Methodology: The studio intends to

- Usage of new materials, construction techniques, and new technologies for the design
- To design and detail architectural forms by understanding the fundamentals of structural actions and material properties along with the appropriate construction techniques as an essential part of the design development.
- Along with a foundational understanding of building services like electrical, plumbing, fire safety, and HVAC for the effective functioning of the building.
- The project will be handled individually.

Learning Resources:

1. Iain Borden and Kaaterina Ruedi Ray; The Dissertation: An Architecture Student's Handbook; Architectural Press; 2006
2. JA Smith, P Flowers, M Larkin -Interpretative Phenomenological Analysis: Theory, Method and Research (English) FIR Edition- Sage Publication -2009.
3. John W Creswell; Research design: Qualitative, Quantitative and Mixed Methods Approaches; Sage Publications; 2011.
4. Linda Groat and David Wang; Architectural Research Methods – 2 nd edition ',John Wiley & Sons Inc,Hoboken,New Jersey, US , 2013.
5. Ranjith Kumar; Research Methodology- A step by step guide for beginners-3 rd Edition ; Sage Publications;2011
6. Wayne C Booth; Joseph M Williams; Gregory G. Colombo; 'The Craft of Research', 3rd Edition; Chicago guides to writing, editing and publishing;2008
7. De Chiara and Callender, Time-Saver Standards for Building Types, Mc Graw Hill Co. New York, 1973.
8. Nufert Emst, Architects Data, Blackwell Science Ltd., Britain, 1980.
9. Julius Panero, Martin Zelick, Human Dimension and interior Space, Whitney Library of Canada, 1979.
10. Bjorn N.Sandaker, The Structural basis of architecture, Routledge, 2019.
11. Alexander Tzonis, Santiago Calatrava: Structures in movement: the architecture of Santiago Calatrava, Meadows Museum / Southern Methodist, 2016
12. DK Ching, Building Construction Illustrated 5Th Edition, John Wiley, 2014.

Course Designers:

- | | |
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21AR910	PRACTICAL TRAINING	Category	L	T	P	Credit
		PC	-	-	25	25

Preamble

Architecture is a professional service that is incomplete without the practical exposure to how the profession operates in reality. This course aids the student to get first-hand exposure and experience in an architect's office as an intern/apprentice.

Prerequisite

Completed the course **21AR830 - Architectural Design and Research (VIII SEM)**

Course Outcomes

On the successful completion of the course, students will be able to:

COs	Course Outcome Statement	Weightage*** in %
CO1	Demonstrate the practical application of the design knowledge in a built environment.	Apply (10%)
CO2	Involve the logical and lateral thinking process for developing an effective solution to issues in the built environment.	Apply (10%)
CO3	Comprehend the design process in real-life solutions with hands-on training.	Apply (10%)
CO4	Involve technical knowledge and skills in the design process.	Evaluate (10%)
CO5	Acquire the professional conduct of a firm.	Apply (40%)
CO6	Involve in teamwork and coordinate with a team, perform his task and manage the team work in balance.	Apply (20%)

Assessment Pattern

SUB CODE	SUB NAME	CONTINUOUS ASSESSMENT (A)	VIVA-VOCE (B)	MAX MARKS TOTAL (A+B)	MIN MARKS FOR PASS
21AR910	PRACTICAL TRAINING	50	50	100	50

Syllabus

The Practical Training Programme would be done in offices empanelled by the Institution and in firms that are registered under the Council of Architecture. The choice of the place of training shall be Architectural Firms, Organizations, and Development Authorities etc. which are headed by Registered Architects.

Methodology

The students shall work for a period of minimum 90 business days and a maximum of 120 business days of the semester in an Architectural firm headed by a registered architect of more than 5 years of standing. At the end of the Practical Training, a portfolio of work done during the period of Practical Training along with certification from the offices is to be submitted for evaluation by viva voce examination.

Learning Resources

1. National Building Code 2016.
2. Council of Architecture Manual of Architectural Practice 2022.

Course Designers

- | | |
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21ART10	ARCHITECTURAL THESIS	Category	L	T	P	Credit
		PC	-	-	25	25

Preamble

The Architectural Thesis studio is the culmination of the journey of architectural education that encapsulates the ability of design exploration and skills of design execution.

Prerequisite

Completed the course **21AR910 - Practical Training (IX SEM)**

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Integrate the science of building physics, building services and safety, and structural systems.	10%(Apply)
CO2	Visualize and Comprehend built form in the whole through digital and manual models.	10%(Apply)
CO3	Solve and justify solutions to issues related to the architectural domain.	20%(Evaluate)
CO4	Respond with contextually appropriate culturally sensitive architectural design solutions.	10% (Apply)
CO5	Provide architectural solutions for complex, multi-dimensional, architectural programme.	40%(Create)
CO6	Communicate ideas, design, details through drawings and visual media or communication.	10%(Apply)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, CO3 & CO4
Review 2		100*	CO1, CO2, CO3 & CO5
Review 3		100*	CO1, CO2, CO3 & CO6
Review 4		100*	CO1, CO2, CO3 & CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva-Voce	Sheets & models	100*	CO1, CO2, CO3, CO4, CO5, & CO6
*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

Syllabus

The students shall work on a project of their area of interest in the field of Architecture. The thesis is the culmination of the journey of architectural education that encapsulates the ability of design exploration and skills of design execution. Students should decide on a thesis topic of their choice in terms of design potential and/or idea/issue exploration.

Methodology

The Architectural Thesis would be done by the student in the tenth semester with a Thesis Coordinator and a Supervisor allotted to each student. The choice of the topic of the architectural thesis project shall be approved by the Thesis Committee. The topic could be project based with specific areas of study/ approach or study/approach-based leading to a project. In the latter, care should be taken to choose topics that can lead to sufficient architectural design components. At the end of the Architectural Thesis, a portfolio of work done during the period of Architectural Thesis along with a Thesis Report is to be submitted for evaluation by viva voce examination.

Learning Resources

- De Chiara and Callender, Time-Saver Standards for Building Types, Mc Graw Hill Publishing Company, New York, 1973.
- Nufert Ernst, Architects Data, Blackwell Science Ltd., Britain, 1980.
- Linda Grant and David Wang, "Architectural Research Methods", John Wiley Sons, 2002.
- Donald Appleyard, "The Conservation of European Cities", M.I.T. Press, Massachusetts, 1979.
- Richard Kintermann and Robert, "Small Site Planning for Cluster Housing", Van Nostrand Reinhold Company, London/New York 1977.
- Miller T.G.Jr., "Environmental Sciences", Wadworth Publishing Co., 1994
- Geoffrey and Susan Jellicoe, "The Landscape of Man", Thames and Hudson, 1987.

Course Designers

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- Prof. S.Santhana Iyyappa Sundararaj pothi@tce.edu

ELECTIVE FOUNDATION COURSES

21ARFA0	VERNACULAR ARCHITECTURE	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

Vernacular Architecture will help the students to recognize the essence of architecture of vernacular buildings and settlements. The students will start emphasizing on Climate responsive Designs. The students will integrate the factors of Environment, Culture and traditional materials and techniques in their design. The students will learn a comprehensive application of Vernacularism in Contemporary building trends towards sustainable built environment.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognize the essence of vernacular architecture and approaches to vernacular Architecture	Understand (15%)
CO2	Understand the influence of climate on Indian vernacular buildings and settlements.	Understand (15%)
CO3	Recognize the exploration of locally available materials and construction techniques on Indian vernacular buildings and settlements.	Understand (15%)
CO4	Recognize the influence of context, culture and identity on Indian vernacular buildings and settlements.	Understand (15%)
CO5	Integration of principles of vernacular Architecture to enhance daylighting and ventilation in contemporary trends.	Apply (20%)
CO6	Analyze the impacts of the application of vernacularism in contemporary buildings towards a sustainable built environment.	Analyze (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	100	60	-		60
Apply	-	20	20	20	20
Analyze	-	20	80	80	20

Syllabus

Vernacular Architecture and Concepts: Definition of Vernacular Architecture. Importance and factors determining the Character of vernacular Architecture -Types of Vernacular Architecture and Study of vernacular Architecture - Various approaches and concepts used in the study of vernacular Architecture - Aesthetic, Anthropology, Architectural and Geographical, Spatial, Ecological approach - Behavioral, Culturalist, Historical and Conservation approach. **Vernacular architecture in North India:** Factors Influencing Vernacular Architecture- Settlement planning, street layouts, Typology, Forms, Cultural aspects. Landform, occupation, Traditions, materials, Construction Techniques, Symbolism and decoration. Architecture for Desert- Traditional Havelis in Rajasthan and Bhunga Houses - Banni Houses in Kutch regions and Pol houses of Ahmedabad. Architecture for water – Step wells. **Vernacular Architecture of South India:** Factors Influencing Vernacular Architecture- Settlement planning, street layouts, Typology, Forms, Cultural aspects. Landform, occupation, Traditions, materials, Construction Techniques, Symbolism and decoration. Kerala -Nallukettu, Ettukettu houses; Karnataka - Gutthu and kodava houses. Tamilnadu-Agraharams at Tanjore, Chettinad houses at Karaikudi - Architecture in Hilly region – Todas and Badagas. **Adaptations of modern architecture to local context** - Case studies of works of Architects like B V Doshi, Geoffrey Bawa, Laurie Baker, Sriram Ganapathy, Benny Kuriokose, Chithra Viswanath, Yatin Pandya, etc - Concepts derived from vernacular buildings and used in modern buildings.

References

1. Paul Oliver, Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997.
2. Taylor and Francis, Vernacular Architecture in the 21st century, 1999.
3. Sanjay Udamale, Architecture for Kutch, English edition, 1980
4. Channa Daswate, Dominic Sansoni, Srilanka style – Tropical design and Architecture, Periplus dition, 2006.
5. S.Muthiah, Meenakshi Meyappan, Visalakshy Ramasamy The Chettiar Heritage –published by The Chettiar Heritage.

Course Designers:

- | | |
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21ARFB0	HOUSING STANDARDS AND DESIGN	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

In this course, the students will delve into various aspects of housing design, including Socio-economic dimensions, Design formulation, Services and Infrastructure, Innovative technologies, Housing finance and Public Private Partnership models. The primary objective of the course is to equip the students with necessary skills and knowledge to create innovative and practical housing designs that will meet the needs of individuals and communities. By the end, the students will have gained a comprehensive understanding of the housing design process and be able to apply newfound expertise to real-world design challenges.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Relate the general terms in housing with the chronological order of policies and typologies	Understand (10%)
CO2	Estimate the Housing demand and supply, density for any	Understand (10%)
CO3	Discuss the various social dimension associated with housing and their impact on development	Understand (20%)
CO4	Identify the issues related with Informal settlement and their corresponding responses in housing	Understand (20%)
CO5	Interpret the Public Private Partnership models for affordable housing	Understand (10%)
CO6	Demonstrate the current Innovative strategies and Design approaches to housing	Apply (30%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	70	70	70	70	70
Apply	30	30	30	30	30
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

Introduction to Housing: Basic terms and housing typologies, Chronological Tracing of Housing Policies – Main challenges faced in implementing them, Global Housing Challenges. Introduction to housing stock, housing shortage, housing density, housing Demand, and Supply Assessment, Housing affordability index – factors affecting affordability, Housing quality and its determinants. **Social and Economic Dimensions:** Housing and social security, the role of housing in the development of family and community well-being, status and prestige related to housing, safety, crime and insecurity, deprivation, and social vulnerability. Gender dimensions of housing, housing for elderly. Contribution of the housing sector to national wealth, GDP and employment creation, and housing finance. **Informal Housing:** Definition of informal settlements in India - Problems and issues in the urbanization process - Housing for Slums, Housing policies for urban poor - Role of migration, social housing projects and best practices, case studies and examples. **Role of PPP in Housing:** Role of PPP in Housing – Key Objectives of using PPP in housing / Affordable housing. PPP Models for Affordable Housing. Risk for PPP in housing and possible mitigation strategies. PPP Framework for private land based subsidized housing in association with PMAY. Other government incentives for housing. **Housing Technology and Innovative Design Approaches:** Emerging technological perspectives for house construction, infrastructure, and housing area planning - PREFAB, Aluminium Formwork systems, 3D Printing and

Prototyping. Infrastructure and Services for largescale Projects & Housing– Road Networks, Water Supply, Drainage, Sanitation, Power and Solid Waste Management, Green Infrastructure strategies. Formulation of Housing Design Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems) for various income group housing schemes. HUDCO's innovative design approach. Affordable housing strategies and housing concepts developed by various pioneers in the design field. Assignment 1: Examine how architects (Indian / Foreign) have addressed the growing needs for affordable housing, including strategies for reducing costs without sacrificing quality or design. Assignment 2: Review an alternate construction technology used in mass housing and correlate the different attributes.

Learning Resources

1. Joseph de chiara & others - Time Saver Standards for Housing and Residential development, McGraw Hill Co., New York, 1995.
2. Richard Untermanu & Robert Small, "Site Planning for Cluster Housing", Van Nostrand Reinhold Company, London/New York, 1977.
3. Bernard Leupen and Harald Mooij, "Housing Design: A Manual", Rai publishers; 2nd ed.2012.
4. David Levitt, "The Housing Design Handbook: A Guide to Good Practice", Routledge, 2009.
5. Manuel Gausa, 'Housing: New Alternatives, New Systems', Birkhäuser Basel 1999.
6. HUDCO Publications - Housing for the Low income, Sector Model.
7. Leuris S, 'Front to back: A Design Agenda for Urban Housing', Architectural Press, 2006.
8. S.K.Sharma, 'Mane - A New Initiative in Public Housing', Housing & Urban Development Corporation, 1991.
9. A.K.Lal, 'Handbook of Low Cost Housing', New Age International Private Limited, 1995.
10. Challenges of Slums: Global report on human settlements –UN HABITAT- 2003.
11. Marie-Caroline, "Megacity Slums: Social Exclusion, Space and Urban Policies in Brazil and India (Urban Challenges: Volume 1)", Imperial College Press, 2013.
12. Christian Schittich (ed), "High Density Housing; Concepts, Planning, Construction", Birkhauser, 2004

Course Designers:

- | | |
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21ARFC0	ARCHITECTURAL CONSERVATION	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

To expose students to the interdisciplinary nature of conservation, so as to ensure students develop the skills required to function as responsible professionals. "Architectural Conservation" will equip students to make proper decisions in addressing the complexities of historic buildings, and heritage cities of India.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Comprehend the importance of Architectural heritage and need for Conservation.	Understand (10 %)
CO2	Comprehend the various stages of Architectural intervention in a heritage building.	Understand (20 %)
CO3	Recognize the various documentation tools and techniques.	Understand (10 %)
CO4	Critically Analyze and assess the built form and desire values in the present context.	Analyze (30 %)
CO5	Apply appropriate techniques for Conserving buildings/ precincts through various agencies.	Apply (20 %)
CO6	Integrate the conservation principles in the Heritage precinct / City/ Urban Planning concepts.	Apply (10 %)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	40	40	40	40	40
Apply	30	30	30	30	30
Analyze	30	30	30	30	30
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

INTRODUCTION TO CONSERVATION - Understanding Heritage - Types of Heritage, Heritage conservation – Need, Debate and purpose - Heritage conservation in India – issues & challenges. Defining Preservation, Restoration, Conservation and Adaptive reuse. Distinction between Architectural and Urban Conservation– Principles of Conservation – Conservation ethics. **DATA COLLECTION AND DOCUMENTATION TECHNIQUES** - Introduction to methods of physical and digital documentation - Lidar, Measured drawing and Photogrammetry - Different methods of data collection (primary & secondary) & Data Analysis - Listing & Drafting a report / Inventory and presentation -Tangible and Intangible Heritage - Assessing architectural character. **AGENCIES & POLICIES IN CONSERVATION** - Establishment, goals & objectives of INTACH – UNESCO – ASI – ICOMOS -ICCRUM – Charters – Conservation Strategies – Central & State Government policies on heritage Conservation – Outline of Legislations and legal interventions in Conservation – Listing of World Heritage Monuments in India - Case studies. **ARCHITECTURAL CONSERVATION TECHNIQUES** - Culture of the people – time – place - Historic Building - Materials and construction techniques - Conservation strategies - Lime, Wood, Brick and Stone. Historic Precinct - Historic Madurai and Srirangam – Historic cities - City planning strategies in ancient times – Occupation based settlement – religious structures, road network. Concepts of Integrated Conservation – selected case studies of Srirangam & Madurai. Assessing and defining the values of historic cities.

Learning Resources

Text Book

- Sir Bernard Feilden, Guidelines for conservation in India– a technical manual – UNESCO, 1989

- Sir Bernard Feilden, An Introduction to Conservation, UNESCO, 1980.
- Sir John Marshall, Conservation manual, INTACH, 1990.

Reference Books

- W. Install, Donald & Associates; Chester – A Study in Conservation; Published By London Her Majesty's Stationery Office, Edition 1968.
- Menon, A.G.K. & Thapar, B.K.; Historic Towns And Heritage Zones; Published By Intach, Edition 2002.
- J. Larkham, Peter; Conservation And The City; Published By Routledge. London And New York, 1st Edition, 1996.
- Icomos, Isbn: 075061210x, Guide To Recording Historic Buildings, Butterworth, 1990.
- Urban Heritage in Indian Cities by Intach.
- Improving Heritage Management in India by Niti Aayog.
- Transferable Development Right by Niti Aayog.

Charters

- The Venice Charter: International Charter for the Conservation and Restoration of Monuments and Sites (1964)
- Charter for the Conservation of Historic Towns and Urban Areas (*Washington Charter*) - 1987
- Charter on the Built Vernacular Heritage - 1999
- ICOMOS Charter – Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage

Websites

- <https://www.icomos.org/en/resources/charters-and-texts>
- <https://www.iccom.org/publication/history-architectural-conservation>
- <https://indiaculture.gov.in/built-heritage>

Course Designers:

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21ARFD0	LATERAL THINKING	Category	L	T	P	Credit
		EFC	2	0	2	4

Preamble

Lateral thinking is closely related to creativity. But whereas creativity is too often only the description of a result lateral thinking is the description of a process. Lateral thinking is also concerned with the generation of new ideas and breaking out of the concept prison of old ideas. Hence the need for Lateral Thinking arises from the limitations of the behaviour of mind as a self-maximizing memory system that needs to be supplemented with the generative qualities of creative thinking.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognise the attributes of a thinker, Imagination, Creativity and Reasoning.	Understand 10%
CO2	Identify the difference between Vertical Thinking and Lateral Thinking	Understand 10%
CO3	Identify new patterns of thinking for problem solving	Understand 10%
CO4	Challenging the common assumptions and apply lateral thinking techniques consciously into his/her thinking when necessary- Exercises	Apply 15%
CO5	Apply tools like, choice of entry, polarization for problem solving- Exercises	Apply 15%
CO6	Analyse the new techniques of thinking exercises and case studies	Analyze 40%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Plates / Assignment / Model		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	60	20	-	-	30
Apply	20	40	25	25	30
Analyse	20	40	75	75	40

Syllabus

BASICS OF THINKING- Thinking – Attributes of a thinker, Imagination, Creativity and Reasoning, Types of thinking. Landscape of the mind – Way the mind works, Features of memory and Disadvantages of memory system. Vertical thinking and Lateral thinking. **LATERAL THINKING TECHNIQUES-** Generating Alternatives, Challenging Assumptions, Innovation and Design, Suspended Judgement, Dominant Idea and Crucial Factor, Fractionation, The Reversal Method, Brainstorming, Analogies, Choice of Entry, Random Stimulations, Concepts/Polarization, Blocked by Openness – Theory and Exercise

Learning Resources

Text Books

- Edward De Bono, Lateral Thinking, Creativity Step by Step, Penguin UK, 2010.
- Edward De Bono, Six Thinking Hats, Penguin UKI, 2010.

Reference Books

- Glatthorn A.A., & Baron J (1985), Developing Minds: A Resource Book for Teaching Thinking. Revised Edition, Volume 1. Costa, Arthur L., Ed.
- Serious Creativity: Using the power of Lateral Thinking to create new ideas by Edward De Bono.

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21ARFE0	PRODUCT DESIGN AND ERGONOMICS	Category	L	T	P	Credit
		EFC	2	0	2	4

Preamble

Human factors and user needs are one of the key considerations in design development. The course introduces students the field of Ergonomics, its fundamentals, its importance in design and the impact it creates on user upon interaction. It exposes students – the domain of product design engulfed in architecture program focusing especially on the furniture design and the importance of ergonomics in everyday usable furniture. The course will make the students propose ergonomically effective furniture design solutions occupying the residential, work/ learning spaces.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognize the importance of Ergonomics, Anthropometry, Human factors in product design.	Understand 10%
CO2	Get exposed to the domain of Industrial product design and infer knowledge on the various categories of Product design.	Understand 10%
CO3	Relate the evolution of furniture design and gain knowledge in the domain of furniture design	Apply 10%
CO4	Distinguish the various parameters involved in furniture design and illustrate the factors involved through case examples.	Analyze 20%
CO5	Appraise and assess the existing furniture based on the ergonomic assessment methods	Evaluate 20%
CO6	Propose adaptive design solutions to the furniture after ergonomic assessment and communicate through graphics & presentations.	Create 30%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Plates / Assignment / Model		Terminal Examination
	1	2	1	2	
Understand	20	10	-	-	20
Apply	40	20	20	20	10
Analyze	40	20	20	20	20
Evaluate	-	30	20	20	20
Create	-	20	40	40	30

Syllabus

Introduction to Ergonomics - Introduction to Ergonomics - Definition, Importance and Advantages - Types of Ergonomics: Physical, Cognitive and Organizational Ergonomics – Risk factors. Introduction to Anthropometry- Anthropometric Database – Common Work Place Postures and Motion. Difference between Ergonomics and Anthropometry – Definition of human factors – Ergonomic assessment – Process & methods, Introduction to Ergonomics Checklist – User survey methods - Discomfort Survey Checklist – Human Comfort and Good Practices, Importance of Ergonomics and Anthropometry in Architecture.

Introduction to Product Design - A brief introduction to Industrial Product Design - Definition - Various elements of product design– overview of Types of Product design: Furniture design, Household appliance design, Toy design, Transportation design, Fashion & Footwear design – Overview of Role of Digital technology in product design- Furniture Design - Purpose and importance of Furniture Design - Role of Furniture Designers – Classification of furniture: According to Purpose, Functionality, Form & Construction, Technology, Quality, Multi-utility Oriented approach - Characteristics of furniture: Case furniture, Skeletal furniture, Upholstered furniture- Examples. Overview on the History of furniture construction: Antique furniture to Modern furniture -Contemporary Furniture Design- -Examples. **Ergonomics of Furniture** - Anthropotechnics – an introduction, Human percentile & its importance in Furniture Design, Basic Requirements of Furniture design: Aesthetic requirements, Functional requirements, Construction & Technology requirements, Technical & Economic requirements. Dimensional requirements & Requirements concerning safety of use -Examples - Kitchen Furniture, Furniture for sitting & relaxing, Beds, Workplace/ Office Furniture, School furniture etc.

Studio Exercises (25)

1. Exercises:

- a. Develop ergonomics checklist for Ergonomic Assessment of existing furniture in Residential spaces & Workplace
- b. Ergonomic Assessment of a product/ furniture in the above mentioned Residential and learning/ workplaces and provide adaptive solutions respect to product design through sketches, drawings, presentations and models. **(or)**
- c. Design of an ergonomic furniture for Residential and learning/ workplaces.

Learning Resources

1. Debkumar Chakrabarti, Indian Anthropometric Design for Ergonomic Design Practice, National Institute of Design, Hardcover (Edition: 1997).
2. IS 4838 (1990): Anthropometric dimensions for school children age group 5-17 years.
3. Dul, J. and Weerdmeester, B. Ergonomics for Beginners: A Quick Reference, Second Edition. London: Taylor & Francis, 2003
4. Stephen Pheasant, Bodyspace Anthropometry, Ergonomics and the Design of Work, Second Edition. London: Taylor & Francis, 2003
5. Salvendy, Gavriel (ed.). Handbook of Human Factors and Ergonomics. New York: John Wiley & Sons, Inc., 1997.
6. Jerzy Smardzewski, Furniture Design, Springer International Publishing, Switzerland 2015.
7. Wiley Blackwell, Neufert Architects Data Fourth Edition, Kenrick Munnings
8. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGrawhill Co., USA, 1982.
9. Scott Openshaw & Erin Taylor, Allsteel, Ergonomics & Design – A reference Guide, Allsteel Inc., 2006

Course Designers:

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21ARFF0	COMPUTATIONAL DESIGN	Category	L	T	P	Credit
		EFC	1	0	3	4

Preamble

Computational Design Thinking introduces the students to contemporary methodologies of computational design concepts combining mathematical geometry logics with visual scripting. The module aligns with the notion of rule-based computer-generated geometries for sequence transformations and exploits the power of algorithms to generate parametric models. The module also deals with simulation in design which is not merely a predictive analytical tool but can also be used to model complex relationships and observe their interactions as means of experimenting with ideas and generating forms through visual scripting.

Prerequisite

21AR720 – Geometric Modeling (VII SEM)

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Relate conceptual knowledge and skills; for visual programming and computational design thinking.	Understand (10%)
CO2	Demonstrate parametric modeling skills on spatial, curve and surface geometries.	Apply (25%)
CO3	Demonstrate skills on information nesting and data landscapes.	Apply (15%)
CO4	Develop Fabrication Skills to Produce Rapid Prototypes of the Parametric Models.	Apply (10%)
CO5	Demonstrate skill in multifaceted parametric modeling.	Apply (20%)
CO6	Compute algorithms; for contemporary computational concepts and optimization objectives.	Apply (20%)

*** Weightage depends on Bloom's Level and number of contact hours.

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment				Terminal Examination
	1	2	1	2	3	4	
Remember	-	-	-	-	-	-	-
Understand	-	-	10	10	10	10	10
Apply	-	-	90	90	90	90	90
Analyze	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-

Syllabus

INTRODUCTION TO COMPUTATIONAL DESIGN THINKING - Introduction to Digital Architecture – Origins - Philosophical change - Proto-Parametric - Cybernetic revolution - Early Digital Exploration and Advancement in digital technologies -Computer Aided Design - Navigation - Viewports - Mouse Controls - Menu - Toolbars - Panels - Rhino Objects, Creating Geometry - Selecting Geometry - Modeling Aids - Snaps and Gumballs - Visual Programming - Interface - Components - Wire Conduits - Navigation - Component Palettes - Parameters and Data Primitives - Associative Modeling - Integer Ranges - Range Transformations - Symbolic Expressions - Procedural Geometry - Epicyclic Curves - Shape Replications - Cross Linking and Visual Attributes. **PARAMETRIC GEOMETRICS** - Spatial Geometry - Points and Vectors - Point Semantics - Vector Semantics - Relationships between Points and Vectors - Basic Vector Arithmetic - Scaling - Vector Inversion - Point Average - Points on Line - Points on Plane - Point Distance - Vector Length - Normalization - Spatial Operations - Dot Product - Trigonometry - Projection - Closest Point to Line - Directionality and Containment - Cross Product - Orthogonality - Parallelism - Orthonormalization - Closest Point to Plane and Mapping - Curve Geometry - Points on Curves - Curve Domains - Curve Divisions - Distance Division - Index Visualization - Range Indexing - Target along Curves - Normal along Curves and Frames along Curves - Surface Geometry - Point Evaluation - Tangent Plane - Surface Normal - Surface Frames - Surface Curvatures - Surface Divisions and Surface Closest Point - Parametric Modeling - Spline

Geometry - rotating about Spline - Rotating Frame Points - Centerline Geometry - Diagonal Bracing - Dress-up Geometry - Shaping - Measuring Design Performance and Design Space Exploration - Mesh Geometry – Mesh Construction – Single Triangle - Single Quad - Mixing Faces - Fused Cube - Index Patterns - Index Ordering - Conic Surfaces - Loft Surfaces - Meshing Surfaces - Curvature Mapping - Color Coding - Mesh Normals - Mesh Lighting - Mesh Displacement - Vertex Welding - Mesh Morphing - Mesh Subdivision - Tetrahedron Mesh - Mesh Disassembly - Mesh Assembly - Mid-Point Subdivision - Recursive Application and Molecule Transformation. **DATA STRUCTURE** - Information Nesting - Columns, Rows and Tables, Cartesian Products - Composition Rules - Shape Operations – Flattening, Partitioning - Transpose, Joining, Selecting Items, Geometric Tiles - Range Folding - Components with Multiple Results - Sequence Folding and Grid Indexing - Data Landscape – Grid Generation - Point Transformation - Surface Generation - Using Expression - Complex Patterns - Modular Arithmetic - Clipping Functions - Design Parameters - Parametric Variations - Desirability Mapping - Addictive Manufacturing – Dimensions – Thicken – Triangulate – Instantiate - Export and Slicing. **COMPUTATIONAL PROCESSES** - Computational algorithm - Shape Grammar - Sierpinski Triangle - Fractals - Koch Snowflake and Cellular Automata - Optimization algorithm– Genetic Algorithm - Generative Design and Topology Optimization.

Assignments

1. Using Addictive Manufacturing, 3D=print the developed parametric model after optimizing its surfaces through form finding, dimensioning and thickening the digital model.
2. Using visual scripting parametrically design a waffle chair and fabricate it using laser cutting.
3. Using visual scripting parametrically design a building façade that responds to the climate of that region.
4. Using visual scripting parametrically design a pedestrian bridge that connects two towers of an office building

Learning Resources

1. Computational Design; Neil Leach and Philip F. Yuan; Tongji University Press (21 February 2018).
2. Computational Design Thinking: Computation Design Thinking (AD Reader); Wiley; 1st edition (30 September 2011).
3. Digital Fabrication; Neil Leach and Philip F. Yuan; Tongji University Press (20 February 2018).
4. Computational Design: Technology, Cognition and Environments; Rongrong Yu, Ning Gu, Michael J. Ostwald; CRC Press.
5. AAD Algorithms-Aided Design; Arturo Tedeschi; Le Penseur; 14th edition (1 October 2014).
6. Post-parametric Automation in Design and Construction; Alfredo Andia, Thomas Spiegelhalter; Artech House; Illustrated edition (November 16, 2014).
7. Material Computation: Higher Integration in Morphogenetic Design: 216; Academy Press; 1st edition (2 March 2012).
8. Parametric architecture with Grasshopper; Arturo Tedeschi.

Course Designers

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21ARFG0	LANDSCAPE DESIGN	Category	L	T	P	Credit
		EFC	2	0	2	4

Preamble

This course introduces students to the field of Landscape architecture. It sensitizes students to the importance of ecology, natural and man-made components that shape the landscape, and the role of landscape architecture in the conscious curation of open spaces for the coexistence of man with nature. This course is designed to encourage the application of concepts through small-scale assignments and completion of this course would equip students with the integration of landscape design into their architectural design projects in the subsequent semesters.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Comprehend the role of Landscape in the architectural design process	Understand (10 %)
CO2	Relate the role of elements in landscape design	Understand (20 %)
CO3	Perceive the Landscape Design at broad level of various time period	Understand (10 %)
CO4	Integrate landscape services at schematic level	Apply (20 %)
CO5	Explore scale, form, function, articulation of landscape design of various typology	Apply (20 %)
CO6	Integrate built form and open space in design form	Apply (20 %)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	80	20	80	40	40
Apply	20	80	20	60	60
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

INTRODUCTION TO LANDSCAPE ARCHITECTURE: Definitions, Importance, Need and Scope - Introduction to landscape architecture - Roles and Responsibilities of Landscape Architects. Relation of Ecology and Landscape Architecture, Basic concepts of ecology and the impact of human activities on them. Current trends and climate change related to ecology and role of Biodiversity and its impacts to Landscape. Importance of Geology, Hydrology, Flora and Fauna with Landscape Design. Landscape Design Process - Introduction to Conceptual Landscape Design & Schematic Landscape Design - Case Studies – Landscape Graphics & Representation - Introduction to Landscape Presentation Drawings & Landscape Construction Drawings - Case Studies. **ELEMENTS OF LANDSCAPE DESIGN:** Factors to be considered in Landscape Design – Land Form – Influence of existing land form, soil, topography, contour levels, drainage, vegetation in Landscape Design. Landscape elements – Land, Water and Vegetation; Significance of Landscape elements. Land & Landform as Landscape element: Importance of Land & Landform – Grading – Use of Land and Land form as Landscape Element. Water as a Landscape element: various forms of functional and recreational water bodies such as Water Falls, Water Channels, Water Fountains, Water Cascades etc. Vegetation as Landscape element: Planting material - Structural and Visual characteristics of planting - Planting Database for Tropical Conditions – Selection of Planting material. **DESIGN EXERCISE:** A simple landscape design exercise exploring the employment of all the elements of landscape. **PARKS AND GARDEN DESIGN IN HISTORY:**

Landscape Architectural Features in Ancient India. Mughal Gardens in India - Tomb & Pleasure gardens. Landscape Design of Italian Gardens & Japanese Gardens. Introduction to Park Movement in America - Landscape Design in Parks in America – Central park , New York. Introduction to Types of Park in Urban Areas. Landscape Architectural Features in Ancient India - Sacred Trees & Sacred Gardens - Gardens in Temples (Nandavanam) in Tamilnadu and Sacred Groves in Tamilnadu & India. **ASSIGNMENT:** Study of landscape design of historic garden styles / parks from around the world, To understand the garden design principles and concept, landscape elements along with function and uses. **LANDSCAPE SERVICES:** Landscape Maintenance of Outdoor spaces - Landscape Irrigation - Strategies to reduce water consumption, recycled water, Storm Water Drainage, Rainwater Harvesting, Landscape Lighting - integration of renewable energy sources, Landscape Furniture. **LANDSCAPE DESIGN FOR FUNCTIONAL SPACES:** Planning and Design Consideration for Courtyards; Roof gardens; Vertical gardens; Balcony Planning and Design Consideration of Pools and Ponds – Lily & Lotus Pond – Pools – Swimming Pools, Dipping Pool, Infinity Pool Landscape Design Considerations for function, form, articulation of open spaces in Residential Projects, Commercial Projects, Institutional Projects, Industrial Projects Landscape Design for active and passive recreation areas in urban areas such as Parks, Play Grounds, Urban waterfront Landscape Design for scale, function, articulation Public open spaces such as Greenways, Roads and Streets, public squares & Plazas. **DESIGN EXERCISE:** Preparation of Conceptual Landscape Development Plan with the integration of planting, lighting and services for a chosen typology (Institute, Commercial, Residential, Public, etc). **THE CHANGING ROLES OF LANDSCAPE DESIGN:** The Changing Roles of Landscape Design in Nature-Based Solutions – Combating climate change with Landscape design – Emerging Paradigm for Landscape Architecture with case examples

Learning Resources

Text Books

1. John L. Motloch, Introduction to landscape architecture: A manual to site planning and design, McGraw-Hill, 1983.
2. Planting Design – Theodore D Walker, John Wiley and Sons, 1991.

Reference Books

1. John L. Motloch, Introduction to landscape design, John wiley and Sons, 2000.
2. Nick Robinson, Planting design Handbook, Ashgate Publishing, 1992.
3. Joseph dechiara Lee E Koppelman, Site planning Standards, McGraw-Hill, 1984.
4. Glift Tandy, Hand Book of Urban Landscape, The Architectural Press, London, 1971.

Course Designers:

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| 3. Prof Lekshmi Shunma M | mlsarch@tce.edu |

21ARFJ0	INTRODUCTION TO DIGITAL FABRICATION	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

By the end of the course, students are expected to have a basic knowledge in digital fabrication principles, techniques, and applications. This course aims to expose students to the knowledge and skills needed to thrive in the rapidly evolving field of digital fabrication.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage*** in %
CO1	Identify the current trends in digital fabrication including latest trends and advancements in digital fabrication, including new materials, technologies, and processes.	Understand (30%)
CO2	Comprehend the workflow of digital fabrication processes, from initial design to final fabrication.	Understand (10%)
CO3	Recognize the fundamentals of digital technology in fabrication and its role in the fabrication processes.	Understand (10%)
CO4	Identify the materials used in digital fabrication, including polymers, metals, ceramics, composites, and bio-materials.	Understand (5%)
CO5	Recognize the importance and the critical role of testing in the digital fabrication process.	Understand (5%)
CO6	Case Study Analysis and Presentation to analyze and present case studies related to digital fabrication.	Apply (40%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	60	60	-	-	60
Apply	40	40	100	100	40
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

CURRENT TRENDS - Addictive Manufacturing – Latest Advancements in 3D Printing Technology and its Application and Uses - CNC Machining – Multi-axis Machining - Tooling - Automation and its Application and Uses - Hybrid Fabrication Techniques – Combination of Addictive and Subtractive Manufacturing - Benefits - Challenges and its Application and Uses - Industry 4.0 – Integration of Big Data - Cloud Computing and Artificial Intelligence into Digital Fabrication -Interactive Technologies – Integration of Internet of Things Technologies and the Use of Augmented and Virtual Reality in Digital Fabrication – **WORKFLOW** - File Preparation and Optimization of Digital Files for Fabrication including File Formats - Resolution - Scaling and Orientation - Mesh Repair - Slicing and Toolpath Generation - Workflow Planning and Project Management including Project Planning - Scheduling and Resource Management -Documentation and Reporting Techniques including Fabrication Parameters - Documenting Design Iterations and Creating Reports -Safety and Ethics including Handling of Equipment -Materials - Waste - Intellectual Property - Copyright and Sustainability - **DIGITAL TECHNOLOGY** - Computer-Aided Design Software for Creating 2D and 3D Digital Models - Computer-Aided Manufacturing Software for Generating Toolpaths - Parametric Design and its Application in Digital Fabrication - Use of Simulation and Optimization for Simulating CNC toolpaths - Optimizing Material Usage - Predicting Fabrication Outcomes -Slicing to Convert 3D Models into Printable Layers - File Formats and Interoperability – **MATERIALS** - Material Properties of Metals - Plastics - Composites and Wood such as Mechanical - Thermal and Electrical for Specific Fabrication Techniques and Applications - Cost - Availability - Functionality and Aesthetics for Material Selection and the Process of

Sourcing Materials and Procurement -Material Innovation and Emerging Materials such as Smart Materials - Bio-Based Materials and Nanomaterials – **TESTING** - Testing Methods such as Dimensional Accuracy - Tolerance Testing - Strength Testing - Durability Testing and Functional Testing -Importance of Developing Proper Testing Plan including Test Objectives - Appropriate Testing Methods - Determining Sample Size and Testing Parameters to Execute Tests - Collect Data and Analyze Results -Failure Analysis - Understanding Root Causes and Developing Corrective Actions and Establishing Prevention Methods.

Learning Resources

1. Digital Fabrications: Architectural and Material Techniques; Lisa Iwamoto.
2. Fabricating Architecture: Selected Readings in Digital Design and Manufacturing; Ruairi Glynn.
3. Digital Fabrication in Architecture; Nick Dunn.
4. Robotic Fabrication in Architecture, Art, and Design; Sigrid Brell-Cokcan and Johannes Braumann.
5. Protoarchitecture: Analogue and Digital Hybrids; Bob Sheil.
6. Fabricate: Making Digital Architecture; Ruairi Glynn, Bob Sheil, and Marilena Skavara.
7. Digital Architecture Now: A Global Survey of Emerging Talent; Neil Spiller.s
8. Architecture in the Digital Age: Design and Manufacturing; Branko Kolarevic.

Course Designers:

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21ARFN0	HUMAN SETTLEMENT AND PLANNING	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

The course is to assist the students in developing cognitive skill in planning through exposure to the evolution of thoughts, theories and practices of planning of human settlement.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage*** in %
CO1	Recognize the components and evolution of settlement.	Understand (10%)
CO2	Acquire knowledge of the human settlement domain, its scale, scope and objectives.	Understand (10%)
CO3	Compare the urban theories and planning models of the earliest settlements developed independently in the various hearth areas.	Understand (10%)
CO4	Comprehend the planning as a process and its methodology through various stages of human history, reflecting the diverse social and geographical factors that influence their formation of settlement.	Analyze (40%)
CO5	Critically examine the theories and concepts proposed by Pioneers.	Apply (20%)
CO6	Comprehend the current and future practices to connect the nature and causes of the problems associated with over-urbanization in developing countries	Understand (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	40	40	40	40	40
Apply	20	20	20	20	20
Analyze	40	40	40	40	40
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

PLANNING PRINCIPLES, PROCESS AND THEORIES: Process of evolution of human settlement planning, Basic elements of the city, Types of settlement - Urban and rural settlement, Classification of areas within the urban settlements, Phases of evolution of settlement - Trade, Ideology and Impact of industrialization on settlement. Factors responsible for development of various settlement forms and effects of socio - cultural influence on physical form of settlements. Approaches in Planning - the Rational Comprehensive approach, the Incremental approach, the Transformative Incremental (TI) approach, the Transactive approach, the Communicative approach, the Advocacy approach, the Equity approach, the Radical approach, and the Humanist approach. Technical processes for land use - natural resources, transportation, & infrastructure planning. Spatial models of Urban Land use - Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory and other relevant theories. Concepts of Planning: Ebenezer Howard's Garden City Concept; Green Belt Concept, Patrick Geddes, Neighbourhood Unit, Rad-burn Concept, Radiant City and Linear industrial City - Lewis Mumford. Land use determinants - Location dynamics of urban Land use - land use, densities and land divisions. Economic principles in land use planning. **CITY PLANNING:** Introduction to master plan, structure plan, detailed development plans, city corporate plan and smart plan -Case examples Orthodoxies of planning; Goal formulation, objective, scope, limitations, Sustainability and rationality in planning – Case examples Zonal Plan And Development Control Rules - Concept, priority in the preparation - Plan making process (URDPFI) – Introduction, Zoning Development regulations, Land-Based Resource Mobilization for Implementation of Development Plans. Spatial organization of urban settlement - Social

and economic impacts of urban growth and expansion. Economic growth and development, quality of life; Human development index; – Case examples **CONCEPT OF REGIONAL PLANNING:** Concept - Defining a region- fluidity and purpose and need for regional planning and regional development. Special Regions: SEZ, Agro Regions, Ecological regions with case examples of cities in India. Input-output analysis - Shift and share analysis - Concentration and dispersal - Industrial location theory. Socio-cultural context of a project through case studies in India. Techniques of Regional Analysis - the study of a specific region or area, with the goal of understanding its characteristics and patterns of regional zone. **INFRASTRUCTURE AND SPATIAL PLANNING:** Planning of utilities and services, objectives of planning and its implications for public health and environmental protection. Familiarizing to CPHEEO (MoUD) manual and guidance in India. **IMPLICATIONS OF ACTS AND POLICIES:** Town and Country Planning Act of Tamil Nadu, Urban Development Act, Public Health Act, Slum Improvement Act, State Housing Board Act, National Rehabilitation and Resettlement Policy (2007) – Social Impact mitigation, National Environmental Policy (2006). Development management - Law relating to utilities and services - Implications of land ceiling, betterment levy and development charges - Concept of arbitration. Significance of land development controls – Zoning, subdivision regulations, building regulation and bye-laws. Professional role, responsibility and planning consultancy service - Role of inter disciplinary group, role in decision making processes and the process in relation to varied consultancy assignment of planning.

Learning Resources

Text Book:

1. Goel, S.L Urban Development and Management, Deep and Deep publications, New Delhi 2002
2. George Chadwick, A Systems view of planning, Pergamon press, Oxford 1978
3. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi, 2001
4. Edwin S.Mills and Charles M.Becker, Studies in Urban development, A World Bank publication, 1986

References:

1. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai
2. Goel S.L., Urban Development and Management, Deep and Deep Publications, New Delhi, 2002
3. Thooyavan, K.R., Human Settlements – A Planning Guide to Beginners, M.A Publications, Chennai, 2005
4. CMDA, Second Master Plan for Chennai, Chennai 2008

Course Designers:

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21ARFP0	SOCIOLOGY, CULTURE AND ARCHITECTURE	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

This course introduces students to the study of habitats and how each setting is influenced and responds to the social and cultural aspects of the society. This course sensitizes how architecture influences the physical environment in the relations of society and vice versa, the evolution of architecture as a result of socio-cultural influences and the importance of understanding.

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Comprehend the basic concepts of sociology and culture	(Understand) 10%
CO2	Understand the relationship between built environment, human behaviour and society.	(Understand) 10%
CO3	Enumerate the Socio cultural factors that influence habitations	(Understand) 20%
CO4	Explore how cultural diversity and social differences shape the individuals, families, communities and society.	(Apply) 20%
CO5	Discover how architectural forms influence and react to socio-cultural phenomena in domestic setting and clusters at Habitation level	(Apply) 20%
CO6	Examine the role of socio- cultural factors in guiding the form and setting of clusters at Settlement level	(Apply) 20%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	40	40	-	-	40
Apply	60	60	100	100	60

Syllabus

Introduction to Sociology - Definition of Sociology, Society. Relationship of sociology with political science, history, Anthropology, sociosemiotics; Socialization and the Institutional structure of Family - Origin, the initial form of the family, Types of family, Family & Society; Social Interaction and Social Processes, the Individual & Physical setting - factors influencing personal space norms and behaviour, the small group and its setting; Social Environmental concerns - Territoriality, Crowding, Privacy, Freedom of choice.

Introduction to Culture - Definition of Culture, Identity; The Characteristics of Culture; The Components of Culture - Values/Beliefs/Norms/Ideal versus Real culture; Importance of culture; Cultural diversity in terms of race, ethnicity, nationality, religion, gender identity; Relationship between culture and architecture: context, spatial organization and architectural forms; Role of culture in promoting Architectural identity; Symbolism in Art and Architecture as the manifestation of culture.

Architecture And Socio-Cultural Influences – Habitation level - Family types and cycle - households in their many forms, lifecycles of generations interaction, influencing the nature of accommodation; Culturally appropriate design - culture specific layout and use of spaces, example - kitchen, bedding, open spaces in a residence - Comparative study; Gender roles - domestic activities in the houses with respect to gender, Concept of home - the focus of the family life in space and time, kinship and residence - relationship of individual to the domestic group. Social life and interaction in household forms: Mongolian huts, Hayat in Black sea region houses, Japanese house planning, 21st Century Compact homes, Condos etc.

Socio-Cultural Influences In Settings – Settlement level - Cultural Landscapes - Overview; Clusters, Settlement: patterns and forms with reference to culture. Clusters and settlements as a result of society and culture; Socio-cultural factors contributing to the form and materiality; The Kassena tribe settlement, Beehive Houses of Harran, Turkey ; The Batamarriba of Africa; Cliff of Mandiagara, Mali; Djenne in Mali; Ab- anbar, Iran, Migrant settlements. Bhunga huts in Banni Bungha village of Kutch, Toda villages, Chettinad settlement, Araharams at Srirangam, Satellite towns, etc

Learning Resources

Rappaport, Amos. 2005. Culture, Architecture and Design. Foundations of Cultural Geography Series
 Rappaport, Amos. 1969. House, Form and Culture. Locke Science Publishing Inc.
 Paul Jones(2011), The Sociology of Architecture: Constructing Identities, Liverpool University Press
 Rapoport, Amos. "Vernacular architecture and the cultural determinants of the form". **Buildings and Society: Essays on the Social Development of the Built Environment** ed, Anthony D King. pages 158-167

Course Designers

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21ARFQ0	BUILT ENVIRONMENT AND THE HUMAN BEHAVIOUR	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

Environmental behaviour studies, encompasses understanding of relationships between human behaviour and the built environment, its application in the design process. Knowledge of human behaviour in relevance to personal, social and cultural context will help the students to enhance their design process including functional and visual aspects.

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Summarize the terminologies related to behavioural studies with respect to the built environment.	Understand 20%
CO2	Comprehend Environmental Psychology with respect to Human Perception in different environments and various behavioural theories.	Understand 20%
CO3	Recognize the socio-cultural factors and physical settings that influence human behaviour at various scales – Micro, Meso and Macro Spaces.	Understand 20%
CO4	Identify the tools and approaches involved in behavioural responsive design.	Understand 10%
CO5	Experiment Different environmental behavioural theories in interpreting the spaces – micro, meso or macro.	Apply 10%
CO6	Implement behavioural design concepts to enhance the quality of spaces in the process.	Apply 20%

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	70	70	70	70	70
Apply	30	30	30	30	30

Syllabus

INTRODUCTION TO ENVIRONMENTAL BEHAVIOR - Introduction to Environmental Behaviour studies and its relation with Architecture, Environmental Psychology – Role of Perception – Man/Environment Interchange, Patterns of Human Behaviour – Social influences and Physical Settings. Introduction to Environmental Theories – Gestalt's theory, Barker's Ecological psychology and Lewin's Field Theory etc., Other Theories of Human Behaviour – The Perception or Cognition Theory, The Stimulus load Theory.

ENVIRONMENTAL BEHAVIOUR IN DESIGNED SPACES – Micro space: Defining personal space, classifying personal space, variability of personal space. Meso and Macro space: Determinism and Design in built environment – Fit, Misfits and Social Effects. Proxemics - Intimate distance, Personal distance, social distance and public distance. Privacy, Territoriality- Nature of territoriality, Function of territoriality, Defensible spaces - Socio petal and Socio fugal theories – Examples. The Neighbourhood unit - Effects of Crowding and Density, Neighbourhood effects and Neighbourhood satisfaction. The Urban Environment – Imageability, Spatial Desirability, Sense of safety and comfort in public spaces. **APPLICATION OF BEHAVIORAL STUDIES IN ARCHITECTURE** - Understanding the application of various approaches to behavioural study – Understanding the application of various approaches to behavioural study – Observation, Survey Research – post occupancy questionnaire survey, Interviews, Field Study, Behavioural mapping etc., Understanding the application of Environmental Psychology in architectural design process through case examples – relevant architectural projects such as Learning environment, therapeutic environment, Defensible concepts in housing, Parks and Public Squares.

Learning Resources

1. William H. Ittelson, Introduction to Environment Psychology, Holt McDougal, 1974
2. J Douglas Porteous, Environment and behaviour – Planning & Everyday Urban life, Addison Wesley Publishing, 1977.
3. Bryan Lawson, The Language of Space–Architectural Press.

Course Designers:

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21ARFR0	URBAN ANALYSIS AND MAPPING	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

Urban design is a multidisciplinary field that encompasses various aspects of city planning, architecture, and landscape design. At the heart of this field lies the understanding of the city as a complex and dynamic spatial entity that is shaped by social, economic, and cultural forces. Therefore, the ability to comprehend the city as a space is crucial for any urban designer. This course aims to equip students with the knowledge and skills to Analyze and interpret the city as a spatial entity, taking into account its physical, social, and cultural dimensions. This understanding will enable students to develop effective urban design solutions that respond to the needs and aspirations of diverse urban communities.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course students will be able to

CO's	Course Outcome Statement	Weightage*** in %
CO1	Outline the idea of city space, territories and the experience of a metropolitan region	Understand (10%)
CO2	Make use of different urban tools such as sketch walks and urban transect to understand the community pattern and form	Apply (20%)
CO3	Illustrate different mapping techniques with multiple attributes as a part of data visualization	Apply (20%)
CO4	Associate different terminologies such as Inequality, space manifestation etc. to the social justice of a city.	Understand (20%)
CO5	Discuss the current Urban design practices with case studies and future trends where the practice is headed to	Understand (10%)
CO6	Analysing an urban precinct with different overlay of maps to get a holistic view of area	Analyze (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	40	40	10	-	40
Apply	40	40	90	50	40
Analyze	20	20	-	50	20
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

City Space: The idea of urban, urbanization and urbanism - Notions of a city, urban society and culture - Social access and Territories –everyday space in the city, Suburban, Metropolitan experiences. **Cognitive Diagramming and Base Maps:** Basics of mapping -Type of maps, Understanding area development maps, Master plans, Understanding urban tools such as Urban transect and sketch walks. **Overview of methods of Mapping and techniques of data visualisatio of tangible layers:** colour schemes, land-use, Density, districts and boundaries, physical morpholog and growth, heritage fabric, movement, activity, nodes, thresholds-networks, pedestrian pathways, transit density, population demographics, ecology and environmental factors, physical and social infrastructure. **Overview of methods of mapping and techniques of data visualisation of intangible layers-** visual and non-visual clues, social memory, community narratives and place realms, soundscape. *Assignment:* Site selection - identification of attributes – finalizing the methodology for mapping. **Social justice in the city-** Spatial inequalities and urban form - The Flâneur, gaze, gender gaze, Tourist gaze, with respect to urban public spaces - Understanding the concept of power and its space manifestation in cities. Case studies from New Delhi, Istanbul, Los Angeles. **Urban Design Practice** –Urban development policies and process –Urban Renewal, Rehabilitation - Types of Urban design (Jon Lang) - Globalization and local culture. Future Trends in Urban Design: Examining emerging trends in Urban Design, Modern

technologies. Assignment: Exploring and analysing selected urban sites with mapping overlays of urban theories (as filters) on base maps.

Learning Resources

1. TschumiBernand. Notations: Diagrams and Sequences. London Artifice Press, 2014
2. Allen, Stan. Points and Lines: Diagrams and Projects for the City. Oxford: The Architectural Press, 1999.
3. Watson, Donald et.al. Time Saver Standards for Urban Design. New York: McGraw-Hill Education, 2003
4. Rapoport, Amos. House, Form and Culture. London: Pearson Education, 1969
5. Srivastava A.R.N. Essentials of Cultural Anthropology. New Delhi: Prentice Hall India Private Ltd, 2005
6. J. Mitchell, William. City of Bits: Space, Place and the infobahn. Cambridge: MIT PRESS, 1996.
7. Kitchin, R., & Dodge, M. (2011). Mapping the Unmappable: The Production of Spatial Data Infrastructures. In Martin Dodge, Rob Kitchin (ed.), Mapping Controversies in Architecture (pp. 29-50). Routledge.
8. Batty, M. (2013). The new science of cities. MIT Press.

Course Designers:

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2. Prof. Vaishali G gviarch@tce.edu

21ARFS0	ALTERNATE BUILDING CONSTRUCTION PRACTICES	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

The course is designed to expose the students to the concept of alternate building construction & its process, the properties of alternate building materials and its cost effectiveness. Furthermore, it intends to familiarize students about the organizations and Architecture firms practicing alternate technology and their contributions through case studies. This course also intends to expose the students to alternate building materials available at the market and the alternate construction practices on building sites to showcase students on its practical implications.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Comprehend the need of alternative construction practices in the current scenario, their guiding principles and limitations.	Understand (10%)
CO2	Illustrate the difference between prevalent and alternate construction practices and its end user benefits.	Understand (10%)
CO3	Get familiar with the fundamental information on various alternate building materials and its properties.	Understand (20%)
CO4	Recognize the various organizations and practicing firms that promote alternative construction practices.	Apply (20%)
CO5	Explore alternate building materials and technology and its construction process- Wall and Roofing systems, Precast construction etc.	Apply (20%)
CO6	Interpret the knowledge to evolve appropriate alternate construction technologies/Material palette for a design through construction details and working drawings.	Apply (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	40	40	40	40	40
Apply	60	60	60	60	60
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

INTRODUCTION - Introduction-Difference between prevalent and alternate construction practices - Need for alternate building practices in construction and their end user benefits, Guiding principles and Limitations of alternate construction practices. **ALTERNATE BUILDING MATERIALS**-Fundamental information on different alternate building materials, their properties, advantages and limitations through comparison matrix: **Building materials from Agro and industrial wastes** - Fly ash Products; Masonry blocks using industrial wastes. **Sustainable alternatives** - Natural Fibres; Stabilised Adobe; Fal-G stabilized mud blocks; Compressed earth bricks & blocks; Bamboo products in construction. **Cost effective** – Reinforced brick panels and joists; Precast concrete blocks, Precast hollow concrete blocks, precast aerated/cellular concrete walling blocks and roofing slabs, Expanded Polystyrene concrete (EPS) blocks. **Polymers** - Fibre reinforced polymers (FRP); Red mud polymer doors and panels; ETFE structures; Coir polymer composite boards – Wall and roof panels; Wood plastic composite panels (WPC) – Wall and ceiling panels, doors and windows. **ALTERNATE BUILDING CONSTRUCTION SYSTEMS – Walling systems** - Composite masonry; Cavity walls; Rammed Earth; EKRA walling (bamboo); Glass Fibre Reinforced Gypsum (GFRG)/Rapid wall Building System; EPS sandwich panels; EPS cornice panels; Cast in Situ wall construction (Mivan), Panel building system (using steel mesh, polystyrene core, chipping concrete). **Roofing/Flooring systems** - Filler slabs, Composite beam panel

roofs, Masonry vaults and domes.; extruded structural clay unit floor/roof (hourdi); Ferrocement channel shell; Funicular shells over edge beams; Jack arch roof/floor; Life-Extended Thatched roofing (Developed by CBRI); Corrugated bamboo roofing sheet; Cement bonded fibre roofing sheets; Micro Concrete Roofing tiles (MCR). **Precast** - precast brick panels; precast brick arch panel system; RCC plank and joist roofing system, precast waffle units(roofing); precast channel units(roofing); precast cored units(roofing); precast stairs. **PRACTICING FIRMS / ORGANIZATIONS AND THEIR CONTRIBUTIONS** Organizations – Innovative construction practices carried out in India: Auroville, COSTFORD, Habitat Technology Group, BMPTC, Application of Science and Technology to Rural Areas (ASTRA) Cell at IISc, Bangalore and organizations in other countries like Africa, Malaysia etc., **Practicing Firms** - Biome, Kamath Design Studio, Made in Earth, Bangalore – Case studies on alternate construction practices and its drive towards growth and development.

Learning Resources

1. BMTPC, “Standards and Specifications for Cost Effective Innovative Building Materials and Technology including Rate Analysis”, 2nd Edition, BMTPC.
2. SHEE, “Environmentally Friendly Indian Building Materials and Technology for Cost Effective Housing”, Society for excellence in Habitat development, Environmental protection and Employment generation.
3. William spencer, Construction Materials, Methods, and Techniques: Building for a Sustainable Future, Delmar Cengage Learning, 2021.
4. Sebastian El khouli, Sustainable Construction Techniques: From structural design to interior fit-out: Assessing and improving the environmental impact of buildings, Edition Detail, 2015.
5. DK Ching, Green Building Illustrated 1st Edition, John Wiley, 2014.
6. John E Fernandez, Material Architecture: emergent materials for innovative buildings and ecological construction, Architectural press, 2005.

Course Designers:

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21ARFT0	ENERGY EFFICIENT BUILDINGS	Category	L	T	P	Credit
		EFC	3	0	0	3

Preamble

The course introduces the students to principles, technologies, and strategies for designing, constructing and operating buildings that use energy in a more efficient and sustainable way. The course will cover a broad range of topics, including the fundamentals of building science, energy efficient site planning and energy efficient building envelopes, active & passive cooling and heating strategies. The student gains knowledge about principles and practices of energy efficient building design and construction.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage*** in %
CO1	Recognize the importance of energy efficiency in buildings and various techniques implied in achieving energy efficiency	Understand (10%)
CO2	Analyze the site, climate, resources and techniques for energy saving.	Analyze (20%)
CO3	Interpret the impact of building envelope design on the heat and cooling loads of the building	Understand (10%)
CO4	Analyze the climate responsive design considerations for different climatic zones of India.	Analyze (20%)
CO5	Apply passive and active cooling design strategies to reduce energy consumption in buildings	Apply (20%)
CO6	Apply passive and active heating design strategies to reduce energy consumption in buildings	Apply (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	20	20	20	20	20
Apply	40	40	40	40	40
Analyze	40	40	40	40	40
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

INTRODUCTION TO ENERGY EFFICIENT BUILDINGS – Need for energy efficiency in buildings. Sources of energy-renewable and non-renewable. Renewable Energy Systems-Solar energy -Wind energy- Geothermal energy -Biomass energy, generate clean energy on-site. Definitions-embodied energy, energy conservation, energy efficiency, zero energy buildings, net zero buildings, green buildings, sustainable buildings. Green building rating systems – GRIHA, IGBC and LEED, overview of the criteria as per these rating systems. Codes related to green buildings : NBC, ECBC, ASHRAE, UPC etc. **ENERGY EFFICIENT SITE PLANNING** – Micro climate - Influence of land form, built form, open space, Topography, orientation, vegetation, water bodies. Planning for solar access - maximizing day lighting. Examples- orientation, landscape, ventilation principles. Design considerations depending on climate zones of India. **BUILT FORM AND BUILT ENVELOPE** - Building envelope, massing - façade articulation Finishes - appropriate use of building materials in historic building. Plan form & Elements - Roof form Fenestration pattern & Configuration Heating & cooling loads Energy estimates. Exercises on heating and cooling load calculations and analysis for a live case study (office room etc.) to determine the energy efficiency. Role of thermal imaging systems. Introduction to energy simulation programs-Getting to know energy audit software. Getting to know energy simulation programs related to energy in buildings. **PASSIVE AND ACTIVE COOLING** - Passive and active cooling - Theories and Principles Evaporative cooling, Nocturnal radiation cooling, Passive Desiccant cooling, induced

ventilation. Earth sheltering, Berming, Wind Towers, earth - Air tunnels, Curved Roofs & Air Vents, Insulation, Vary Thermal wall etc. Case studies on buildings designed with passive cooling techniques. Case studies on buildings using active and passive cooling techniques. **PASSIVE AND ACTIVE HEATING** - Passive and active heating - Theories and principles. Direct gain systems - Glazed walls, Bay Windows, Attached sun spaces etc. Indirect gain systems - Trombe wall, Water wall, Solar Chimney, Trans wall, Roof Pond, Roof radiation trap, Solarium, Solar Water heating etc - Isolated gain systems - Natural convective loop etc. Case studies on buildings using active and passive heating techniques. Advancements in active systems technology for energy efficiency.

Learning Resources

1. Climatically responsive Energy Efficient architecture, PLEA/SPA, New Delhi - 1995
2. Ms.Sudha, NK.Bansal and M.A.S Malik – Solar Passive Building - Pergamon
3. J.K Nayak & Others, Energy Systems Energy Group, Is a Annual Of Passive Solar Architecture.
4. Arvind Krishnan & Others, Climate Responsive Architecture, Tata Mcgraw Hill New Delhi 2001.
5. Energy performance of buildings, George Baird, CRC Press
6. Thermal Control of Passive Solar Buildings, S.C.Kaushik, G.N.Tiwari, J.K. Nayak, IBT Publishers & Geo Environment Academy
7. Solar Energy Applications and Buildings, Laura C.Zeiber, Whitney Library of Design

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PROGRAM ELECTIVES

21ARPBO	ART APPRECIATION	Category	L	T	P	Credit
		PE	2	0	0	2

Preamble

Providing a keen knowledge on art to understand, to analyze, to evaluate and to create

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Recall the need and meaning of art	20
CO2	Identify the value of art and its aesthetics	20
CO3	Categorize the techniques, art forms and styles	15
CO4	Assess the western art and the works of Western Artists	15
CO5	Assess the Indian Art and the works of Indian Artists Evaluate	15
CO6	Distinguish the value of art in architecture	15

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	40	40	-	-	40
Apply	-	-	-	-	-
Analyze	60	60	100	100	60

Assessment Pattern: Psychomotor

Psychomotor Skill	Mini project /Assignment/Practical Component
Set	-
Guided Response	40
Mechanism	-
Complex Overt Responses	60

Syllabus

AN INTRODUCTION TO ART - Defining art, its need & meaning, Theories of art, classes & utility of art, Characteristics of art – symbols, skills, values, communicating emotions. **TECHNIQUES OF ART** – Classification of art like, drawing, painting, sculpturing, photography, print making (block and lithographic prints), Techniques in art forms- abstract, portray, use of mediums such as clay, glass, metal, wood, digital imaging. **ART IN WESTERN WORLD** – Stone Age Art, Cave Art, Classical art, Medieval art, Renaissance art and Artists –Michelangelo, Leonardo Da Vinci. **MODERN ART HISTORY** - Birth of modern art, cubism, impressionism, expressionism, constructivism and its artists, Introduction to futurism –pop art, abstract art, minimalism and its artists. Movements of art –surrealism, Pointillism, and its techniques. **ART IN INDIA** - Pre historic India - Cave art, Indus valley civilization, Medieval Indian art – Mughals- Islamic art and paintings, South Indian art – Dravidian temple art and sculptures, Post independent art, Works of Ravivarman, Recent developments in Indian Art and Architecture.

Learning Resources

- Roy C. Craven, Indian Art,
- Nikos Stangos (Ed), Concept of Modern Art, (From Fauvism to Post Modernism) Thames and Hudson.
- Ian, Chillvers, (Ed) Dictionary of Art And Artists
- Livingstone, Pop art a continuing history,
- Gardner's Art Through the Ages
- Edith Tumory, A History Of Fine Arts In India And The West
- Manihara, Utsav, Creativity In Art And Architecture
- Anthony F Janson, History of Art.

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21ARPC0	ARCHITECTURAL JOURNALISM AND CRITICISM	Category	L	T	P	Credit
		PE	3	0	0	3

Preamble

This course aims to introduce writing on architecture as a method to study and interpret the built environment through analysis, criticism and review. The course shall equip the students with the fundamentals, relevant skills and techniques of various genres of architectural journalism and criticism.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage** * in %
CO1	Comprehend the Knowledge on Architectural Journalism and the Role of architect in Contemporary Architectural Journalism.	Understand (15%)
CO2	Appreciate the Knowledge on Regional, National, and international discussion forums.	Understand (15%)
CO3	Illustrate the techniques and technologies in Architectural journalism through case examples	Apply (20%)
CO4	Infer the evolution and principles of Architectural criticism.	Understand (15%)
CO5	Identify the methods and tools of architectural criticism.	Understand (15%)
CO6	Illustrate the methods and tools of architectural criticism with the case examples.	Apply (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	60	60	-	-	60
Apply	40	40	100	100	40
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

ARCHITECTURAL JOURNALISM Introduction to architectural journalism, Role of an architect as a writer and journalist in scripting the narrative of architecture. Roles of an architectural journalist as a reporter, reviewer, cartoonist, interviewer, feature writer and specialist writer. Contemporary Architectural Writing and Journalism, Readings on current journalism in Indian context. Issues and Potential: Scope and constraints of print, audio and visual architectural journalism in the context of newspapers, radio, film, and television. **TECHNIQUES AND TECHNOLOGIES IN ARCHITECTURAL JOURNALISM** Topics relevant and needed in architectural journals and current issues; Mass Media and Public Opinion – critique of architecture. Argument and debate as a technique in the investigation of social problems; Public Opinion – critique of architecture through new age journalism and technology; Book reviewing Regional, National and International context. Text preparations, Mode of presentation, Standards and Guidelines for documentation, Basic knowledge on Press laws, Press Council of India, Navigating Information Networks for Mass Media with relevance to searches on Architectural topics, User generated contents for analysis of various issues on Architecture, creating Knowledge on Regional, National, and international discussion forum and platform for exchange of ideas and information, code of ethics, copyright, royalty, publishing rights and policies; Citation and plagiarism, training in argumentative speaking Introduction to architectural software needed in journalism and photography, Video coverage, walk through of buildings, production of contemporary architectural journalism. **UNDERSTANDING ARCHITECTURAL CRITICISM** Evolution of criticism, its interpretation and judgmental process – exposition, analysis, comparison, justification, evaluation and

guidance. Need of criticism as a tool for generation better work. Principles of architectural criticism. **METHODS AND TOOLS OF CRITICISM**_Method of criticism – Normative – *Doctrinal* , *systematic*, *Typal and Measures*. Interpretive- Advocative, evocative and impressionistic and Descriptive – depictive, biographical and contextual. Analyzing critics works – Ada Louise Huxtable, Paul Goldberger, Kenneth Frantom. (case examples). Modern tools of critique – newspapers, blogs, juries. Components, benefits and limitation of academic critics.

Learning Resources

1. Edward Jay Friedlander and John Lee, "Feature Writing for Newspapers and Magazines", 4th edition, Longman, 2000.
2. Fuller, David & Waugh, Patricia eds., "The Arts and Sciences of Criticism", Oxford: Oxford University Press, 1999
3. Foust, James, Online Journalism,"Principles and Practices of News for the Web", Holcomb Hathaway Publishers, Scottsdale, AZ, 2005
4. M. Harris, "Professional Architectural Photography", Focal Press, 2001.
5. M. Harris, "Professional Interior Photography", Focal Press, 2002 68
6. Huckerby, Martin., The Net for Journalists: A Practical Guide to the Internet for Journalists in Developing Countries. UNESCO/Thomson Foundation/ Common wealth Broadcasting Association, 2005.
7. Ward, S. J. A. "Philosophical Foundations of Global Journalism Ethics." Journal of Mass Media Ethics., Vol. 20, No. 1, 3-21, 2005
8. M .Heinrich, "Basics Architectural photography", BirkhauserVerlag AG, 2008.
9. Gerry Kopelow, "Architectural Photography: the professional way", 2007

Course Designers:

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21ARPE0	BIOMIMICRY IN ARCHITECTURE	Category	L	T	P	Credit
		PE	3	0	0	3

Preamble

The course aims to provide a comprehensive understanding of Bio mimicry concepts and approaches, that use to emulate Bio mimic design strategies and interpret efficient strategies through form, structure and material.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage** * in %
CO1	Infer the basic concepts of Biomimicry concepts and various approaches.	Understand (20%)
CO2	Interpret the principles and applications of Biomimicry in Architecture.	Understand (20%)
CO3	Integrating Bio mimic strategies for form through interlocking-spans, pneumatic and deployable case examples.	Apply (10%)
CO4	Interpret the Bio mimic materials through hierarchy of components, organic digital fabrication and recyclable properties.	Understand (20%)
CO5	Implementation of various Bio mimics techniques and methods of energy production and management.	Apply (10%)
CO6	Outline the principles of Bio mimicry to create sustainable and resilient ecosystem.	Understand (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	80	80	80	80	80
Apply	20	20	20	20	20
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

INTRODUCTION TO BIOMIMICRY AND ITS APPROCHES- Introduction to bio-mimetic design principles and adaptations. Approach to create products and processes that are optimized for efficiency, durability, and resilience & its relevance in design. Steps and process of bio-mimic design – identify, Interpret, discover, abstract, emulate and evaluate. Application of bio mimicry at various levels – Application of bio mimicry at various levels – Organism level Eg: 30, St.Mary's Axe, London; Behaviour level Eg: Eastgate center, Harare and ecosystem level Eg. California Academy of science, San Francisco. **BIOMIMIC STRATEGIES IN FORM AND STRUCTURE-** Bio-mimic components influencing form for large span efficiency such as - hollow tubes, shells & domes. Case examples: Joris Larman-bridge design, Rafael Guastavino Vaulting. Bio-mimic components influencing interlocking for longer span and efficient load transfer structural aspects – skeletons, exoskeletons, webs & tension structure. Case examples: Canopy structures by Architect Andrew Harris, Landesgartenschau Expo hall @ University of Stuttgart, West German pavilion by Frei otto. Bio-mimic Strategies for achieving efficiency through dynamic characteristics such as pneumatic and deployable structures. Case Examples: Dougloous River Bridge, Thomas Heatherwicks rolling bridge. **BIOMIMIC STRATEGIES IN BUILDING MATERIALS-** Material efficiency through hierarchy and interlocking of components (micro structure of wood and bone tissues).Case example - Eiffel tower- levels of trusses, Evolution of organic materials (natural polymers) for 3d printing and digital fabrication process – methods at MIT media Lab-Neri Oxman, Bio mimic materials for self-repairing, non-toxic and recyclable properties. Case examples: Dr.Carolyn Dry-bio concrete, adhesives derived from –geckos-(Geckel) & sandcastle worm. **BIO-INSPIRED STRATEGIES FOR ENERGY AND RESOURSE MANAGEMENT-** Strategies for harnessing energy – Bio - Wave Energy Convertors inspired from centipods - wind turbines inspired through whale

tubercles. Bio-mimic techniques for Water harvest and management, Case example: Mathew parkes's Hydrological center inspired from Namibian Desert beetle, Strategies for ventilations systems regulating temperature and air exchange. Case examples: Nikken Sekkei's bioskin (delivering evaporative cooling). Bio mimic strategies for ecosystem – land restoration and resource management- Lavasa project, Qatar pilot plant – sahara project.

Learning Resources

1. Michael Pawlyn, "Biomimicry in Architecture", 2016, RIBA Publishing 2nd edition
2. Dora Lee, "Biomimicry Inventions Inspired by Nature", 2011, Kids can press, Toronto, Canada.
3. Benjamin Krueger, "Biomimicry: Nature as Designer", 2016, Createspace Independent.
4. Jannie M.Benyus, "Biomimicry: Innovation Inspired by Nature" 2002, Paperback.
5. Jay Harman, "Biomimicry and How Nature is Inspiring Innovation" 2013, the shark's Paint brush.

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21ARPF0	SUSTAINABLE CITIES AND COMMUNITIES	Category	L	T	P	Credit
		PE	3	0	0	3

Preamble

The main purpose is to increase students' knowledge of the special environmental and socio-economic problems that cities around the globe, face and to develop solution strategies. Critical thinking is important for an objective assessment of past, present and future developments. Students will learn that only an urban society that is based on communitarian principles is successful is successful in becoming "green" and sustainable. To achieve this, individuals have to take on a responsible citizenship that aims to improve urban life for all.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage*** in %
CO1	Interpret the key principles and concepts of sustainable urban planning and design.	Understand (20%)
CO2	Infer the practices of sustainable building design that includes the use of renewable energy sources and green building materials.	Understand (20%)
CO3	Determine the economic and social impact of sustainable energy production and use, including job creation and community development.	Apply (10%)
CO4	Summarize the effectiveness of different waste management strategies including waste reduction, reuse, recycling, and composting and energy recovery.	Understand (20%)
CO5	Interpret the principles and practices of sustainable urban mobility including the importance of reducing car dependence and promoting active and public transportation options.	Understand (20%)
CO6	Execute various principles and approaches to implement sustainable water management strategies and technologies, such as rainwater harvesting, waste water treatment and water reuse.	Apply (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	80	80	80	80	80
Apply	20	20	20	20	20
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

SUSTAINABLE URBAN PLANNING AND DESIGN Impact of urbanization on the environment - Definition of sustainability, introduction to Sustainable Development Goals – Evolution of SD perspectives, from 1987 Brundtland Commission and outcome; later UN summits (Rio summit, Johannesburg summit etc.) and outcome - Circles of sustainability - Sustainable Urban Resilience for the next Generation (SURGE) -Guiding principles contributing to building sustainable, inclusive and resilient urban systems. **SUSTAINABLE BUILDING AND HOUSING SERVICES** Advancing Energy efficiency - low-carbon materials and processes, circularity (including reuse of existing buildings), Eco-friendly captive power generation for Case studies- CII Godrej Green business centre. Eco friendly Heating and Cooling – District Cooling – Case studies, Indoor air quality - using low-emission materials and providing proper ventilation, exhaust systems, low VOC paints, materials & adhesives. Land-use policies, and adaptation/resilience measures to deliver solutions at scale for more sustainable, low-carbon or zero-carbon ready, resilient, healthy, and affordable housing, shelter, workplaces, communities, and settlements. **SUSTAINABLE ENERGY PRODUCTION AND USE** Renewable energy and energy efficiency in cities to provide energy access and tackle energy poverty while reducing municipal energy costs- creating local jobs and building urban energy system resilience. - Case examples **SUSTAINABLE WASTE MANAGEMENT** Enhancing municipal solid waste management systems that enable 'zero waste cities' and circular economies - 1.5- degree lifestyle that supports

social equity, food security, resilience, sustainable economic development, a culture of sustainability, and job creation. Waste reduction & management - Source reduction- waste segregation - less packaging, reusing, recycling -reduce landfills, composting, waste-energy, Social capital credits, Extended Producer Responsibility (case examples) **SUSTAINABLE URBAN MOBILITY** Supporting the uptake of public transport and active mobility use in cities- Reduce car use-Universalize early planning and coordination to achieve compact urban forms that enable public transport and active travel to thrive and trade to flourish. Promoting active travel/transportation - transportation through physical activity-walking, cycling, scootering, improves public health and social interaction. Encouraging public transportation -buses - light rail-subways-reduces road traffic-provides employment. Supporting electric and low emission vehicles-electric cars, hybrids, hydrogen fuel cell vehicles- incentives- tax and carbon credits- charging infrastructure- bike lanes, sidewalks, crosswalks – accessible public transportation stations, disabled-friendly, carpooling, telecommuting.case studies in developing countries such as the bus rapid transit system of Curitiba, Brazil and the Cable Car of Medellin, Colombia. **SUSTAINABLE WATER MANAGEMENT** Equitable access to year-round potable water - access and management of water for households and public buildings, and grey and wastewater management, - Manage water demand and water pipe leaks to preserve the resource.Water conservation - Low-flow fixtures, greywater reuse systems. Water efficient plumbing systems, water metering, waste water treatment, recycle and reuse systems, Rainwater harvesting methods, reducing landscape water demand by proper irrigation systems.

Learning Resources

1. "Happy city: Transforming our lives through Urban Design"(Charles Montgomery, Penguin Books limited,2013)
2. "Cities for people" (Jan Gehl,2nd Edition, Island press,2010)
3. "The Resilient city: How Modern Cities Recover from Disaster"(Lawrence J.Vale and Thomas J.Campanella,Oxford university press,2005)
4. https://www.undp.org/sustainable-development-goals/life-on-land?gclid=Cj0KCQjw6cKiBhD5ARIsAKXUdyZYj157Jd4Hbr6QKOhwzar_ACVga9QupkoljZxrnPyAKkg7wwBWLusaApMUEALw_wcB

Course Designers:

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21ARPG0	DISASTER MANAGEMENT	Category	L	T	P	Credit
		PE	3	0	0	3

Preamble

The course sensitizes students to the different types of disasters and their impacts. The students can gain a deep understanding of the principles and best practices for reducing the impact of natural and man-made disasters on communities and individuals. The students will learn about the various activities involved in disaster management, including preparedness, response, recovery, and mitigation, and how different stakeholders collaborate and coordinate to address the challenges.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage*** in %
CO1	Identify common types of disasters, their causes, and potential impacts on individuals, communities, and organizations.	Understand (10%)
CO2	Recall the phases of the disaster management cycle and describe the key activities and objectives of each phase	Understand (20%)
CO3	Discuss the role of agencies involved in disaster management	Understand (10%)
CO4	Demonstrate an understanding of the principles and phases of disaster management, including risk assessment, preparedness, response, and recovery at urban level	Apply (20%)
CO5	Illustrate the process of mitigating disasters at the building level.	Apply (30%)
CO6	Relate lessons learned from past disasters to inform effective disaster management strategies in future scenarios	Apply (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	70	40	40	40	40
Apply	30	60	60	60	60
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

Introduction to Disaster Management: Introduction to Disaster - Types of Disaster, Natural Disaster – Flood, Cyclone, Tsunami, Avalanches and landslides, Earthquake, Drought, Heatwave, etc., Man-made disaster – Fire, Industrial pollution, structural failure, toxic waste disposal, Industrial pollution, and nuclear disaster. Causes, effects, and practical examples for all Disasters, Disaster profile of India – The disaster management cycle – NDMA & SDMA **Hazard, Risk, Vulnerability, and Capacity Analysis – Concepts & Relationship** Types of vulnerability – Relationship between hazard vulnerability and disaster – Hazard Assessment – Tools for analysis – Vulnerability and Capacity Assessment – Tools – Socio-economic factors of vulnerability – Risk Assessment & Tools for analysis **Disaster Preparedness and Response:** Strategies for mitigating the impact of disasters at the building level, including retrofitting existing buildings and designing new buildings to withstand disasters such as earthquakes, floods, hurricanes - Strategies for mitigating the impact of disasters at the urban level, including urban planning and design - Preparedness: Concept – Nature – Preparedness plan - Prediction, Early Warnings, and Safety Measures of Disaster. Role of Government, International, IT, and NGO Bodies. Response: Introduction – Response plan - Communication, Participation, and Activation of Emergency Preparedness Plan - Search, Rescue, Evacuation and Logistic Management - Role of Government, International and NGO Bodies - Relief and Recovery **Rehabilitation, Reconstruction and Recovery** Reconstruction and Rehabilitation as a Means of Development - Damage Assessment - Post Disaster effects and Remedial Measures - Sanitation and Hygiene -

21ARPH0	ART HISTORY	Category	L	T	P	Credit
		PE	3	0	0	3

Preamble

Providing a keen knowledge on art to understand, to analyze, to evaluate and to create

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Recall the need and meaning of art	Understand (20%)
CO2	Identify the value of art and its aesthetics	Understand (20%)
CO3	Categorize the techniques, art forms and styles	Analyze (15%)
CO4	Assess the western art and the works of Western Artists	Analyze (15%)
CO5	Assess the Indian Art and the works of Indian Artists Evaluate	Analyze (15%)
CO6	Distinguish the value of art in architecture	Analyze (15%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	40	40	-	-	40
Apply	-	-	-	-	-
Analyze	60	60	100	100	60

Syllabus

AN INTRODUCTION TO ART - Defining art, its need & meaning, Theories of art, classes & utility of art, Characteristics of art – symbols, skills, values, communicating emotions. **TECHNIQUES OF ART** – Classification of art like, drawing, painting, sculpturing, photography, print making (block and lithographic prints), Techniques in art forms- abstract, portray, use of mediums such as clay, glass, metal, wood, digital imaging. **ART IN WESTERN WORLD** – Stone Age Art, Cave Art, Classical art, Medieval art, Renaissance art and Artists –Michelangelo, Leonardo Da Vinci. **MODERN ART HISTORY** - Birth of modern art, cubism, impressionism, expressionism, constructivism and its artists, Introduction to futurism –pop art, abstract art, minimalism and its artists. Movements of art – surrealism, Pointillism, and its techniques. **ART IN INDIA** - Pre historic India - Cave art, Indus valley civilization, Medieval Indian art – Mughals- Islamic art and paintings, South Indian art – Dravidian temple art and sculptures, Post independent art, Works of Ravivarma, Recent developments in Indian Art and Architecture.

Learning Resources

1. Roy C. Craven, Indian Art,
2. Nikos Stangos (Ed), Concept of Modern Art, (From Fauvism to Post Modernism) Thames and Hudson.
3. Ian, Chillvers, (Ed) Dictionary of Art And Artists
4. Livingstone, Pop art a continuing history,
5. Gardner's Art Through the Ages
6. Edith Tumory, A History Of Fine Arts In India And The West
7. Manihara, Utsav, Creativity In Art And Architecture
8. Anthony F Janson, History of Art.

Course Designers:

1. Prof.Dr. S.A.V.Elanchezian
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21ARPJ0	SPECIFICATION, COST ESTIMATION AND BUDGETING	Category	L	T	P	Credit
		PE	3	0	0	3

Preamble

This course applies estimation and costing of construction projects in its various stages. Elements of preliminary estimating, cost planning and detailed estimating will be integrated and applied to enable rational cost related decisions. The course will also make the students capable of calculating area, volume and other dimensions of the projects.

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage* ** in %
CO1	Comprehend the importance of estimation and prepare preliminary Estimation for buildings.	Understand (10%)
CO2	Get familiarized with different types of specification and to write detailed specifications for the purpose of tender issues.	Understand (10%)
CO3	Workout the rate per unit of various items of work using the prevailing schedule of rates.	Apply (30%)
CO4	Estimate the qualities of items of work for residential buildings of load bearing type.	Apply (20%)
CO5	Estimate the quantities of items of work for buildings of framed type and with slope roofs.	Apply (20%)
CO6	Interpret the components of budgeting, valuation and depreciation.	Understand (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	30	30	20	20	30
Apply	70	70	80	80	70

Syllabus

INTRODUCTION TO ESTIMATION: Type and purpose -Approximate Estimate and detailed Estimate of buildings. Measurement of basic materials like brick, stone masonry, P.C.C, R.C.C., wood work according to Bureau of Indian Standards - **SPECIFICATION FOR VARIOUS ITEMS OF WORK:** Various items of work for different types of buildings - Types of specification - writing specifications for the purpose of calling tenders - Specification for foundation, earth work, Brick work - Concrete work - RCC work- Plastering - Flooring - Wood work - partition walls - Finishes. Specifications for various items of works in interiors. Case examples through - Design of furniture for different purposes – bedrooms, dining hall, kitchen, library, office, workshop, Classroom etc.**DETAILED ESTIMATE:** Quantity Estimate for all items of work involved in simple buildings - Preparation of Detailed Estimate using computer tools / software. **BUDGETING:** Financing of projects economic feasibility report - Valuation - depreciation and its implications.

Learning Resources

1. Estimating and costing by G.S Birdie.
2. Estimating and costing in civil engineering - Theory and practices by Prof.B.N.Dutta
3. M.Chakroborti, Estimating, Costing, Specification and Valuation. Calcutta.

Course Designers:

1. Prof. Dr. R. Sanjaykumar - sanjaykumar@tce.edu
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3. Prof. S.Nandhini - sniarch@tce.edu

21ARPK0	LIGHTING DESIGN FOR WORK ENVIRONMENT	Category	L	T	P	Credit
		PE	3	0	0	3

Preamble

This course is intended to expose the students about lighting design in work environment. It is imperative for the students to learn & understand lighting and its relationship with Environment by getting exposed to the current trends of Energy saving techniques.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Recognize the Concepts and specification in Lighting design	Understand (10%)
CO2	Understand the relationship between Lighting and the Environment.	Understand (10%)
CO3	Exposure to the history of lighting and issues related to Lighting.	Understand (10%)
CO4	Choose appropriate design strategies of day-lighting and the use of control devices to achieve optimum standards of comfort within a built environment.	Apply (30%)
CO5	To have a working knowledge on electrical lighting systems and Control Systems in the work environment taking both cost and quality considerations into account in retrospect to energy optimization and savings.	Apply (20%)
CO6	To Comprehend the use of Integrated lighting concepts and layouts (electric light and daylight) with the help of energy review, Cost-benefit analysis.	Analyze (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	50	10	-	-	30
Apply	50	50	40	40	50
Analyze	-	40	60	60	20

Syllabus

BASICS OF LIGHT AND LIGHTING - Fundamentals of light – spectrum of sunlight, spectral energy distribution, laws of illumination- Eye and vision – visibility, visual activity, contrast sensitivity. Factors governing illumination – glare, diffusion, direction, composition, visual performance, and lighting quality. Light and Environment -Vision and human factors, Effect of lighting on health Visual performance and its assessment, Design-colour vision, Illumination Levels, Importance of Illumination at work. Light measuring equipment's-Illuminance Meter, Luminance Meter, Chroma Meter, Colour Analyzer. **DAYLIGHTING**- Components of Daylight - Direct, diffuse and reflected components- Sky component, internally reflected and externally reflected light. Design Parameters: Glare, critical indoor and outdoor luminance, daylight factor and its calculation and distribution, Useful Daylight illumination, Types of Lighting – Top and Side Lighting, Rules of Thumb for side Lighting. Psychological Impact of daylight in a space in concern Techniques of incorporating daylight in buildings- courtyards, atria, light-pipe and shafts, lateral pass-through components (Facades, windows, translucent wall, curtain wall), zenithal pass-through components (north lights, clerestories, translucent roofs, skylights, domes), global pass-through components (membrane envelope), optical day lighting, membrane envelopes. Control Devices- overhangs, light shelves, louvers, photo chromatic and film controls, Integrated Devices,

Daylight sensors- Types- Closed and open loop, Dual Loop. **ELECTRIC LIGHTING SYSTEMS AND EQUIPMENTS-** Evolution of Lighting for work Environment - History of lighting- Works of Architects and lighting designers: Richard Kelly, Louis Kahn, Mies van der Rohe, Philip Johnson, Eero Saarinen, Jonathan Speirs and Mark Major, Claude R. Engle. Lighting systems – Introduction to light fixture materials and construction, and components. Electric Lamps-Incandescent lamps, Discharge lamps, fluorescent lamps, LED, HID. Conventional and electronic ballasts. Lamp and ballast as a system and electrical characteristics. Power factor correction and harmonic compensation. Lighting a surface- -Direct, indirect, diffused, Ambient, Accent, lighting, Spotlights, Bollards, outdoor lighting, etc. Types of Mounting- Horizontal/Vertical Lighting-Up/Down Lighters. Light a Surface for a Task - Design Calculations- Approaches and techniques- Illuminance due to point, line, and area sources. Lumen method-Calculation of utilization factors. Point-by-point and flux transfer methods. Benefits-Energy Savings- Clean disposal options-Discount-Rational Economic Factor- Pay Back Formula. Cost of Light- Energy Cost –Usage hours- Replacement Cost. Trade –off among alternative technology-Daily Lighting Load Curves- Annual Cost of White LED's-Better investment. **LIGHTING CONCEPTS AND CHOICE OF LIGHTING SYSTEM-** Lighting Concepts - learning to develop a lighting concept, approach, and strategy- Reflected ceiling layouts by integrating of electric light and daylight- overview of lighting specification. Review of cost and Energy savings– Availability of Software tools for analysis - overview of Software.

References

1. Lighting design basics, Mark Karlen, James Benya , John Wiley and Sons
2. Architectural lighting design By Gary R. Steffy, John Wiley and Sons, 2002
3. Ergonomics and Health Aspects of Work with Computers: International Conference, EHAWC 2009, Held as Part of HCI International 2009, San Diego, CA, USA, July 19-24, 2009, Proceedings
4. Building technology:mechanical and electrical systems, Benjamin Stein, McGuinness, William J. John Wiley and Sons, 1997

Course Designers:

- | | |
|--------------------------|------------------------|
| 1. Prof. R.Meenakumari | - rmk@tce.edu |
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21ARPL0	DIGITAL DESIGN COMMUNICATION THROUGH UX AND UI	Category	L	T	P	Credit
		PE	1	0	2	3

Preamble

The course introduces the students to the basics of Digital Experience which includes User Experience and User Interface. The students are up-skilled to compose their final works in an effective and understandable digital way by analyzing User experience research, Information mapping and sorting and Design process write-ups. The student also gains knowledge about publishing it in different platforms, which is achieved through certain digital tools

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage*** in %
CO1	Infer the holistic approach of digital experience through user research	Understand (10%)
CO2	Examine the user experience by applying the design process and the methodologies	Analyze (10%)
CO3	Utilize and illustrate the various tools and elements for creating an effective user interface.	Apply (20%)
CO4	Illustrate the digital experience by understanding the importance of UX & UI through tools to derive the best possible outcome	Apply (20%)
CO5	Interpreting the portfolio layout using visual representation techniques from the acquired knowledge of User Experience and User Interface principles	Apply (20%)
CO6	Illustrating the process of content curation and publishing by exploring different modes of presentation	Apply (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	-	-	10	10	10
Apply	-	-	80	80	80
Analyze	-	-	10	10	10
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

INTRODUCTION TO DIGITAL EXPERIENCE– Introduction to User experience design process - Elements of User Experience Design – Defining the design statement and the role of research in UX design - User research and report finding - Good and poor design– User Experience methodologies: Synthesis and organization of data; Empathy mapping; Hierarchies and Relationship in Information modelling – Applying User Experience methodologies – Emerging Technologies in User Experience

DESIGN DEVELOPMENT – Introduction to User Interface principles & process– Gestalt theory of human perception - Wire framing - Basics of colour theories – Working with components - Layout using grids – Styling and design systems: Elements; components; patterns; pages and assets – Interaction and Micro-interaction– Introduction to UX & UI prototyping software(tools) – Basics to convert wireframe ideas in to Hi-Fidelity mock-ups – Ideation, Prototyping and Testing – Hi-Fidelity prototype walkthrough – Relationship between User experience & User Interface principles. Assignment 1: Re-visualizing and Re-framing existing website/app through User experience (Research and analysis) and User Interface (Visual representation).

VISUAL REPRESENTATIONS -Applying design principles to your portfolio layout and content -- Embedding fonts, icons and graphics - Interactive prototypes - Style guide/Pattern library – Understanding various sections of screen- Visual wireframe mock-ups - Sorting visual elements - Inserting Placeholders.

CURATING AND PUBLISHING - Converting contents and visual representation into presentation - reating low fidelity flowcharts using data - Creating a consistent visual design language - Creating complete presentation in various formats for offline and online (webhost) usage. Assignment 2: Designing an Architectural portfolio – creating, composing elements

and layouts using User experience and User Interface methodologies. And publishing it both online and offline formats.

Learning Resources

1. A Project Guide to UX Design: For user experience designers in the field or in the making (2nd. ed.). Russ Unger and Carolyn Chandler. New Riders Publishing, USA, 2012.
2. The Elements of User Experience: User-Centered Design for the Web and Beyond, Second Edition Jesse James Garrett, Pearson Education. 2011.
3. The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques, Third Edition Wilbert O. Galitz , Wiley Publishing, 2007.
4. The UX Book Process and Guidelines for Ensuring a Quality User Experience, Rex Hartson and Pardha S. Pyla, Elsevier, 2012.
5. "The Design of Everyday things", Don Norman, 1988.
6. Krug, Steve. (2017). Don't Make Me Think, Revisited, Instructor's Manual: A Common Sense Approach to Web Usability. New Riders. 3rd edition
7. Johnson, J. (2020). Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines. Elsevier (3rd Edition).
8. Bryan Lawson – How Designer's Think, Architectural Press Ltd, London 1980.
9. Bryan Lawson – What Designer's Know, Elsevier Architectural Press, Oxford 2004.

Course Designers:

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21ARPM0	BIM FOR MECHANICAL, ELECTRICAL AND PLUMBING	Category	L	T	P	Credit
		PE	1	0	3	4

Preamble

Building Information Modeling (BIM) has revolutionized the construction industry, providing architects, engineers, and contractors with an innovative approach to designing, constructing, and managing buildings. BIM goes beyond traditional 2D drawings by integrating digital representations of Mechanical, Electrical, and Plumbing (MEP) systems into a comprehensive 3D model, allowing for more efficient collaboration, improved accuracy, and enhanced decision-making throughout the entire building lifecycle.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

COs	Course Outcome Statement	Weightage*** in %
CO1	Comprehend the basic components and terminologies used in mechanical, electrical, and plumbing systems	Understand (10%)
CO2	Create basic 3D models of MEP systems using BIM tools, including modeling ducts, pipes, conduits, and other MEP components.	Apply (40%)
CO3	Coordinate MEP systems with architectural and structural models within a BIM project to ensure proper integration and coordination.	Apply (20%)
CO4	Generate comprehensive MEP documentation and reports using BIM software, including system schedules, equipment lists, and construction documents.	Apply (10%)
CO5	Apply knowledge and skills in real-world BIM MEP projects involving designing, coordinating, and documenting MEP systems addressing real-world challenges and issues.	Apply (10%)
CO6	Develop effective communication and presentation skills for MEP designs using BIM tools.	Apply (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	-	-	10	10	10
Apply	-	-	90	90	90
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Syllabus

INTRODUCTION MEP - Interface – System Families and In-Place Families – Viewing the Models in both 3D and 2D– Basic Editing Tools – Selecting Elements – Using Filters – Moving – Copying – Rotate – Mirror – Array – Align – Offset and Groups – Starting a New Project – Levels and Grids – MEP Fixtures – Saving Project – Linking CAD Files – Views – Controlling Visibility – Sections – Elevations – Callouts – Templates – Match lines and Scope Box– Spaces and Zones – Rooms – Tags – Creating Spaces – Creating Zones – Area and Volume Calculations and Energy Settings. **HVAC– HYDRONIC PIPING SYSTEMS AND PLUMBING** - Ducts – Air Terminals – Duct Placeholders – Ducts – Duct Insulation and Lining – Modifying Ducts – Adding and Modifying Fittings and Automatic Duct Layouts – Pipes – Plumbing and Piping System – Placeholder Pipes – Adding Pipes – Modifying Pipes – Adding Accessories – Pipe System and Automatic Pipe Layouts – Adding Plumbing Fixtures – Modifying Plumbing Fixtures – Plumbing Systems and Generating Pipe Layouts. **FIRE AND ELECTRICAL SYSTEMS** - Sprinklers – Sprinkler Systems and Sprinkler Pipe Layouts – Electrical Settings – Electrical Components – Lighting Fixtures – Electrical Equipment and Electrical Devices – Creating Lighting Circuits – Creating Switch Systems – Creating Power Circuits – Cable Tray and Conduit – Creating Panel Schedules and Modifying. **DOCUMENTATION– DETAILING AND SCHEDULING** - MEP

Schedules – Lighting Schedules – System Family Schedules and Material Takeoff Schedules – Creating Details – Adding Details – Annotating Details – Saving Drafting Views – Detailing in 3D – Importing Details and Legends – Sheets and Placeholders – Guide Grids – Sheet and Title Block Properties – Placing Views in Sheets – Editing Views in Sheets – Working Inside Views – Adding Revisions – Adding Dimensions – Tags – Texts and Printing. **COLLABORATION AND PRESENTATION** - Worksharing – User Setup – Worksharing Ownership – Worksharing Detach and Worksharing History Restore – Materials – Exporting Images and Walkthroughs.

Learning Resources

1. The BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers; Chuck Eastman; Paul Teicholz; Rafael Sacks; and Kathleen Liston.
2. BIM for MEP Engineering; Don Bokmiller; Simon Whitbread and Daniel Doriscar.
3. Mastering Autodesk Revit MEP 2015: Autodesk Official Press; Simon Whitbread; Daniel Doriscar and Eddy Krygiel.
4. Building Information Modeling (BIM) in Current and Future Practice; Karen M. Kensek and Douglas E. Noble.

Course Designers:

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AUDIT COURSES

21ARAA0	SANGA TAMIL LITERATURE APPRECIATION
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Category	L	T	P	Credit
AC	2	0	0	0

Preamble

The main learning objective of this course is to make the students an appreciation for 'Agathinai', 'Purathinai', 'Attrupadai', 'Puranaanuru' and 'Pathitru paththu' in Sangam Tamil Literature

Course Outcomes

On the successful completion of the course students will be able to

1. Appreciate and apply the messages in Sanga Tamil Literature in their life.
2. Differentiate 'Agathinai' and 'Purathinai' in their personal and societal life.
3. Appreciate and apply the messages in 'Attrupadai' in their personal and societal life.
4. Appreciate and apply the messages in 'Puranaanuru' in their personal and societal life.
5. Appreciate and apply the messages in 'Pathitru paththu' in their personal and societal life.

Syllabus

SANGAM TAMIL LITERATURE AN INTRODUCTION - Introduction to Tamil Sangam–History of Tamil Three Sangams–Introduction to Tamil Sangam Literature–Special Branches in Tamil Sangam Literature–Tamil Sangam Literature's Grammar- Tamil Sangam Literature's parables.

'AGATHINAI' AND 'PURATHINAI' - Tholkappiyar's Meaningful Verses–Three literature materials–Agathinai's message- History of Culture from Agathinai–Purathinai–Classification–Message to Society from Purathinai.

'ATTRUPPADAI' - Attrupadai Literature–Attrupadai in 'Puranaanuru'-Attrupadai in 'Pathitru paththu'-Attrupadai in 'Paththu aattu'.

'PURANAANURU' - Puranaanuru on Good Administration, Ruler and Subjects–Emotion & its Effect in Puranaanuru.

'PATHITRU PATHTHU' - Pathitru paththu in 'Ettuthogai'–Pathitru paththu's Parables–Tamil dynasty: Valor, Administration, Charity in Pathitru paththu- Message to Society from Pathitru paththu.

Learning Resources

1. Sivaraja Pillai, The Chronology of the Early Tamils, Sagwan Press, 2018.
2. Hank Heifetz and George L. Hart, The Purananuru, Penguin Books, 2002.
3. Kamil Zvelebil, The Smile of Murugan: On Tamil Literature of South India, Brill Academic Pub, 1997.
4. George L. Hart, Poets of the Tamil Anthologies: Ancient Poems of Love and War, Princeton University Press, 2015.
5. Xavier S. Thani Nayagam, Land scape and poetry: a study of nature in classical Tamil poetry, sia Pub. House, 1967.

21ARAB0	ESSENCE OF INDIAN KNOWLEDGE TRADITION
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Category	L	T	P	Credit
AC	2	0	0	0

Preamble

The course will introduce the students to get knowledge about Indian Culture. The course introduces Indian Languages and Literature religion and philosophy and the fine arts in India. Explore the Science and Scientists of Ancient, Medieval and Modern India and Understand education systems in India

Course Outcomes

On the successful completion of the course students will be able to

1. Understand philosophy of Indian culture.
2. Distinguish the Indian languages and literature.
3. Learn the philosophy of ancient, medieval and modern India.
4. Acquire the information about the fine arts in India.
5. Know the contribution of scientists of different eras.
6. Understand education systems in India

Syllabus

INTRODUCTION TO CULTURE - Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India. **INDIAN LANGUAGES AND LITERATURE** - Indian Languages and Literature – I: Languages and Literature of South India, – Indian Languages and Literature – II: Northern Indian Languages & Literature

RELIGION AND PHILOSOPHY - Major religions practiced in India and Understanding their Philosophy – religious movements in Modern India (Selected movements only)

FINE ARTS IN INDIA (ART, TECHNOLOGY& ENGINEERING) - Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India

EDUCATION SYSTEM IN INDIA - Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

Learning Resources

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN 13: 978-8187276333, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN 81-7450 494-X, 200
4. Narain, "Examinations in ancient India", Arya Book Depot, 1993
5. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989
6. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, ISBN 13: 978-8120810990, 2014

21ARAC0	STRESS MANAGEMENT BY YOGA
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Category	L	T	P	Credit
AC	2	0	0	0

Preamble

The main learning objective of this course is to develop healthy mind in a healthy body thus improving social health also improve efficiency. It helps to Invent Do's and Don't's in life through Yam, Categorize Do's and Don't's in life through Niyam, Invent breathing techniques through Pranayam and Develop a healthy mind and body through Yog Asans

Course Outcomes

On the successful completion of the course students will be able to

1. Develop healthy mind in a healthy body thus improving social health also improve efficiency
2. Learn Do's and Don't's in life through Yam
3. Learn Do's and Don't's in life through Niyam
4. Develop a healthy mind and body through Yogasans
5. Learn breathing techniques through Pranayam

Syllabus

INTRODUCTION TO YOGA - Definitions of Eight parts of yog.(Ashtanga)

YAM - Do's and Don't's in life. Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

NIYAM - Do's and Don't's in life. Ahinsa, satya, astheya, bramhacharya and aparigraha

ASAN - Various yog poses and their benefits for mind & body

PRANAYAM - Regularization of breathing techniques and its effects-Types of pranayam

Learning Resources

1. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata
2. 'Yogic Asanas for Group Tarning-Part-I' : Janardan Swami Yogabhyasi Mandal, Nagpur

21ARAD0	VALUE EDUCATION
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Category	L	T	P	Credit
AC	2	0	0	0

Preamble

On the successful completion of the course, the students will be able to:

1. Experience self-development
2. Explain the importance of Human values
3. Develop the overall personality
4. Overcome the self-destructive habits with value education
5. Interpret social empowerment with value education

Syllabus

INTRODUCTION TO VALUE EDUCATION - Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles, Value judgements

IMPORTANCE OF VALUES - Importance of cultivation of values, Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline

INFLUENCE OF VALUE EDUCATION - Personality and Behavior Development, Soul and Scientific attitude, Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship, Happiness Vs suffering, love for truth.

REINCARNATION THROUGH VALUE EDUCATION - Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature Character and Competence –Holy books vs Blind faith, Self-management and Good health, Science of reincarnation

VALUE EDUCATION IN SOCIAL EMPOWERMENT - Equality, Non-violence , Humility, Role of Women, All religions and same message, Mind your Mind, Self-control, Honesty, Studying effectively

Learning Resources

1. Chakroborty , S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press ,New Delhi

21ARAE0	CONSTITUTION OF INDIA
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Category	L	T	P	Credit
AC	2	0	0	0

Course Outcomes

On the successful completion of the course, the students will be able to:
 Teach history and philosophy of Indian Constitution.
 Describe the premises informing the twin themes of liberty and freedom from a civil rights perspective.
 Summarize powers and functions of Indian government.
 Explain emergency rule.
 Explain structure and functions of local administration.

Syllabus

INTRODUCTION - History of Making of the Indian Constitution-Drafting Committee- (Composition & Working) - Philosophy of the Indian Constitution-Preamble-Salient Features

CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES - Fundamental Rights-Right to Equality-Right to Freedom-Right against Exploitation Right to Freedom of Religion-Cultural and Educational Rights-Right to Constitutional Remedies Directive Principles of State Policy-Fundamental Duties

ORGANS OF GOVERNANCE - Parliament-Composition-Qualifications and Disqualifications-Powers and Functions-Executive President-Governor-Council of Ministers-Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions

EMERGENCY PROVISIONS - Emergency Provisions - National Emergency, President Rule, Financial Emergency

LOCAL ADMINISTRATION - District's Administration head- Role and Importance-Municipalities-Introduction- Mayor and role of Elected Representative-CEO of Municipal Corporation-Pachayati raj-Introduction- PRI- Zila 86 Pachayat-Elected officials and their roles- CEO ZilaPachayat- Position and role-Block level- Organizational Hierarchy (Different departments)-Village level- Role of Elected and Appointed officials-Importance of grass root democracy

Learning Resources

1. Basu D D, Introduction to the Constitution of India, Lexis Nexis, 2015.
2. Busi S N, Ambedkar B R framing of Indian Constitution, 1st Edition, 2015.
3. Jain M P, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. The Constitution of India (Bare Act), Government Publication, 1950

ONE CREDIT COURSES

21AR1B0	ROAD SAFETY AND CIVIC SENSE				
	Category	L	T	P	Credit
	PE	1	-	-	1

Preamble

To introduce the concepts, principles, tools and aids of road safety and civic sense to the students of B.Arch. To acquaint them with the design and safety standards for roads. Also inculcate the practice of safe and road behaviour and civic sense among them

Prerequisite

V SEM and above

Syllabus

Introduction to road safety - Road as an active space, Types of Users, User Behaviour, Sensory factors like vision and hearing in user behaviour. Types of vehicles: Heavy vehicles, Light motor vehicles, Two wheelers, Auto rickshaw, Bicycles and Cycle Rickshaw, Non-Motorized Vehicles. Vehicle Characteristics : Dimensions, Weights, Turning radii, Braking distance Light system, Tires, etc Types of hazards : Conflicts and accidents **Typology of roads : Components and Design** - Road classification : National Highways, State Highways, District roads(MDR and ODR), Village roads urban Road Classification : Expressways, Arterial, Sub-Arterial, Collector, Local service road, One-way, Two-Way etc, Mountainous Roads, Speed limits of the road types. Design of roads : Cross sectional Elements-Right of way, Carriage way, Median, Shoulders ,Sidewalk, Lanes, Cycling track, Green strip, Curbs, ,Camber etc Special standards for the cross-section Design, Relationship between road design and road safety. **Intersections** - Types of road intersection, Basic forms of at-grade junction (T, Y, staggered, Skewed, Cross, Scissors, rotary, etc Grade separated junctions (With or without Interchange): Three- lag, Four-leg, Multi-leg, etc. Design of Intersections: Design and special standards for Traffic islands, Turns, Turning radii, Directional lanes, Pedestrian crossings, Median openings, Traffic calming components like speed breakers and table top crossing, etc. Design considerations for Diverging, Merging and weaving traffic. Location and Design for Traffic signals. **Pedestrian Circulation and Barrier Free Design** - Requirements of Pedestrian Infrastructure: Sidewalks and Footpaths, Recommended Sidewalk widths, pedestrian crossings, Pedestrian bridges, Subways, Cycle tracks etc. Barrier free Design: Location and design standards for Ramps for wheelchair access, Other Provisions like Tactile for visually challenged etc. Safety Provisions: Pedestrian Railing, Anti-skid flooring, Pedestrian signal, Walk button, etc. **Traffic signs and Road markings** - Type for Traffic signs : Principles and types of Traffic signs, Danger sign, Prohibitory signs, Mandatory signs, Informatory signs, Indication signs Direction signs, Place identification signs, Route marker signs etc . Reflective sign, LED signs, Static and Dynamic signs. Standards of Traffic sign: Location, Height and Maintenance of traffic signs. Types of Road markings: Center lines, Traffic Lane lines, Pavement edge lines, No overtaking zone markings, Speed markings, Hazard markings, Stop lines, Pedestrian crossings , Cyclist crossings, Route material, colour and typography of the markings. **Traffic signals, Traffic control aids, Street lighting** - Traffic signals: Introduction, Advantages, and Disadvantages Signal indication: Vehicular, Pedestrian and location of the signals. Signal Face, Illustration of the signals, Red, Amber, Green signals, and its significance, Flashing signals, Warrant of signals, Co-ordinated control of signals. Traffic control aids: Roadway Delineators (Curved and Straight sections). Hazard markers, Object markers, Speed breakers, Table Top Crossings, Rumble strips, Guard Rails, Crash barriers etc Street Lighting : Need for Street lighting, Type of street lighting, Illumination standard, Location and intermediate distance. **Road accidents** - Nature and type of road accidents (Grievously injured, slightly injured, minor injury, Non-Injury etc). The situation of road accidents in India (Yearly) Fatality Rates, etc. Factors (and Violations) that cause accidents, Prevention and First Aid to Victims Collision Diagrams and condition diagrams exercises Traffic management measures and their influence in Accident prevention. **Road safety and Civic sense** - Need for road safety: Category of road users and road safety suggestions. Precaution for driving in difficult condition (Night, Rain, Fog, Skidding conditions, Non-functional Traffic light etc.) Types of Breakdowns and Mechanical Failures. Accident Sign (Warning Light, Warning triangle, etc) Introduction to concept of civic sense and its relationship to Road safety: Importance of civic sense, Road Etiquettes and road user behaviour, Rules of road, right of the way, providing assistance to Accident victim. Sensitization against road rage. **Traffic Regulations, Laws and Legislations** - Indian motor vehicles Act (Chapter VIII: Control of Traffic to be discussed in detail) Regulations Concerning Traffic : Cycles, Motor cycles and scooters, Rules for pedestrian Traffic, Keep to the left rule, Overtaking rule, Turning rules, Priority rules, Hand signals etc. Speed and Hazard management , Penal provisions. National road safety policy, Central motor Vehicle Rules, State Motor vehicle rules. Introduction to Good practices.