Bachelor of Architecture
B. Arch Degree Program

Regulations, Manual, Curriculum (Program structure) and Syllabi
2019 – 20 Admission Onwards

MAHATMA GANDHI UNIVERSITY
2019

BOARD OF STUDIES FOR B.ARCH (UG AND PG) COMBINED
REGULATIONS, MANUAL, CURRICULUM (PROGRAM STRUCTURE and SCHEME) AND SYLLABI
BACHELOR OF ARCHITECTURE (B. Arch)
(U.O No: 3241/1/2019/ELECN dt. 28/09/2019)

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TABLE OF CONTENTS

Part A: REGULATIONS

1. ADMISSION TO BACHELOR OF ARCHITECTURE (B.ARCH.)

1.1. **Academic Eligibility for Admission.** No student shall be admitted to the Bachelor of Architecture (B.Arch.) course unless he/she has passed an examination at the end of the 10+2 scheme of examination with at least 50% aggregate marks in Physics, Chemistry and Mathematics and also at least 50% marks in aggregate of the 10+2 level examination or passed 10+3 Diploma Examination with Mathematics as compulsory subject with at least 50% marks in aggregate (vide notification dated 12th February 2019 by Council of Architecture, New Delhi, a statutory authority constituted under the Architects Act 1972 notified in the Gazette of India dated 13th February 2019, which has come in to force with effect from 13th February 2019). Any change as notified by the Council of Architecture from time to time, would be the criteria for the academic eligibility for admission.

1.2. Aptitude Test in Architecture

1.2.1. In addition to clause (1.1.) the candidate needs to qualify an Aptitude Test in Architecture conducted by the COA or by the competent authority of the Central Government or the respective State Government, complying with the Admission Norms prescribed by COA from time to time.

1.2.2. The institutions shall give weightage of 50% marks for aptitude test and 50% marks for the qualifying examination in the matter of admission or as approved by the State Government authority concerned.

1.2.3. No admission shall be made under the Minority Institution/Management/Non-Resident Indian/Person of Indian Origin or any another Quota unless a student has qualified the Aptitude Test in Architecture, as prescribed by the Council of Architecture from time to time.

1.3. Lateral admission

No lateral admission to any stage/semester of the 5-year course in Architecture shall be made.

2. MEDIUM OF INSTRUCTION

Medium of Instruction and Examinations (Written examination, Jury and Viva Voce), unless otherwise specified, shall be English.

3. DURATION OF THE COURSE

3.1. The Bachelor of Architecture (B.Arch.) course shall be of minimum a duration of FIVE academic years/TEN semesters of approximately 15 to 18 working weeks each, inclusive of

one semester of Practical Training as prescribed in the Program Structure and Scheme and as per the Manual.

3.2. The B.Arch. course shall be completed in a maximum period of 8 (eight) years. However, in special circumstances, a student maybe granted an extension of one year by the university/ institution to complete the course. This extension shall be given only once to the student.

4. ELIGIBILITY FOR THE DEGREE

4.1. Students for the award of Degree of Bachelor of Architecture shall be required to have undergone as a regular student in a Council of Architecture approved institution affiliated to the University. He/She shall successfully complete and pass the prescribed course of studies in not less than 10 semesters as per the Regulations, Program Structure and Scheme and Syllabi.

4.2. The students admitted to 1st year of a 5-year course without passing an Aptitude Test in Architecture and who have been granted B. Arch. Degree or other qualifications shall not be deemed to have attained recognized qualification listed in the schedule of qualifications appended to the Architects Act, 1972. Such students shall not be eligible for registration as an Architect with the Council of Architecture.

5. SUBJECTS OF STUDY

The subjects of study shall be in accordance with the prescribed Program Structure and Scheme and Syllabi, implemented with effect from 2019 – 20 admissions onwards.

6. COURSE PLAN/ TEACHING PLAN

The Teaching Institution shall publish Course Plans/Teaching Plans for all subjects as per the Program Structure and Scheme except for Professional Training. Such course plans, approved by the Head of the Institution, shall be duly published within two weeks of commencement of the semester. The course plan preparation shall suit the Academic Calendar published by the University every year.

7. SEMESTER EXCHANGE

The Program Structure and Scheme permits interested students for a full semester exchange with Council of Architecture enlisted Institutions/Universities at national or international level ONCE during the course period. The applicant should have passed the entire subjects up to and including fourth semester examination in full, at the time of submitting the application to the university through the Head of the Teaching Institution. The applicant should apply to the university in the prescribed form of the university through the Head of the Teaching Institution at the end of Fifth semester university examination. This full semester exchange program coupled with one semester professional

training shall be undergone during the seventh and eighth semesters. Such exchanges conducted, with the prior approval of the university, shall allow transfer of credits based on nearest course equivalence and their Grade cards shall be prepared by the university accordingly.

Teaching institutions shall finalize academic programs as mentioned above and enter into MoU with such Institutions/Universities. The selection of students for such exchange shall solely be the prerogative of the individual Teaching Institution and approved by the Mahatma Gandhi University. The MG University shall not incur any expenditure in this regard.

8. ONLINE COURSES

The Program Structure and Scheme permits students to enroll for any ONE online certified course during semester six with the prior approval of the Teaching Institution. Such courses shall be considered equivalent to one elective workshop course in semester six.

9. ACADEMIC EVALUATION: CONTINUOUS ASSESSMENT (CA)

Marks awarded for the Continuous Assessment shall be on the basis of day-to-day work, periodic tests and assignments/projects. The Continuous Assessment for the individual subjects for each semester shall be on the following basis:

9.1. All subjects of the B. Arch Degree Course as per the Program Structure and Scheme and Syllabi are grouped into four groups as stated below:

Group I (a): Subjects having evaluation through CA and having a Final Jury conducted by a team consisting of an Internal Juror and an External Juror. The External Juror shall be from among the core faculty of any other B.Arch. institution or a Practicing Architect, registered with the Council of Architecture.

Group I (b): Subjects having evaluation through CA and having a Final Jury conducted by a team consisting of an Internal Juror and an External Juror. The External Juror shall be from among the core faculty of any other B.Arch. institution under the University.

Group I (c): Subjects having evaluation through CA and having a Final Jury conducted by a team of Internal Jurors.

Group II: Subjects having evaluation through CA and University theory Examination

Group III: Architectural Design Thesis

9.2. CA marks shall be awarded as per the following norms for each group and as per the Manual:

Group I (a) and I (b)	Assignments	70%
	Time bound project of max 1-day duration/written exam	20%
	Attendance	10%
Group I (c)	Assignments	80%
	Attendance	20%
Group II	Assignments	30%
	Written Exam	50%
	Attendance	20%
Group III	As per the manual	

The CA marks allotted for attendance for any subject shall be awarded full only if a student has secured 90% attendance in the subject. Proportionate reduction will be made in the case of subject(s) in which he/she gets below 90% of the attendance for the subject(s).

10. ACADEMIC EVALUATION: FINAL JURY AND VIVA VOCE

10.1. The Final Jury and Viva Voce of Groups I (a), I (b), I(c) and Group III subjects shall be conducted as per the Manual. The Final Jury of all subjects in these groups (except Group III) shall be conducted by the institution as per the Course plans published. However, the date of the last jury in these subjects shall not be later than 10 days prior to the commencement of the University exams for Group II subjects of the particular semester. The schedules and conduct of the Group III subject shall be as per University notification and referred in the manual.

11. ACADEMIC EVALUATION: UNIVERSITY EXAMINATIONS

11.1. There shall be University Examinations for Group II subjects as prescribed in the Program Structure and Scheme and Syllabi for B. Arch Degree course.

11.2. The University examinations for Group II subjects under B. Arch degree course from 2019-20 admissions onwards shall be conducted as per the Question Bank system of the University.

11.3. **Attendance**: Total attendance of a student for a given semester shall be calculated on the basis of total number of working hours of all subjects that the student is present, put together in the respective semester. Subject wise attendance shall be calculated on the basis of total working hours of each subject that the student is present.

A student shall be permitted to appear for the University Examination only if he/she satisfies the following requirements:

11.3.1. He/She must secure not less than 75% attendance in the total number of working hours, of all subjects put together, in each semester.

11.3.2. He/She also shall be physically present for a minimum of 50% of the working hours of each subject.

11.4. **Condonation**: It shall be open to the University to grant condonation of shortage of attendance on the recommendation of the Head of Institution, supported with medical certificates and/or other relevant documents as per the following norms:

11.4.1. The total attendance shall not be less than 65% of the total working hours

11.4.2. He/She shall be physically present for a minimum of 40% of the total working hours of each subject.

11.4.3. The shortage of attendance shall not be condoned by the University more than twice during the entire course. However, Semester I and II shall be considered as a single chance for the purpose of condonation count.

11.4.4. The condonation shall be granted subject to the rules and procedures prescribed by the University from time to time.

11.4.5. A student who is not eligible for condonation of shortage of attendance shall repeat the semester in the next immediate chance offered.

11.5. University Examinations will be held twice in a year – May/June and November/ December as per the Program Structure and Scheme and Syllabi.

11.6. Chances for Supplementary Examinations for Group II subjects shall be offered by the University every semester.

12. LETTER GRADES

For each subject in a semester, based on the total marks obtained by the student in the University examination and Continuous assessment put together, a letter grade (S, A+, A, B+, B, C+, C, D, E and F) shall be awarded. All letter grades except 'F' shall be awarded if the marks for the University examination is 40 % or above and the total mark (CA marks + University Exam mark) is 50 % or above. No absolute mark will be indicated in the mark list. Letter grade corresponding to total marks (CA marks+ University Exam mark) and the corresponding grade point in a ten-point scale is described below.

% of Total marks (CA marks + University Exam mark)	Letter Grade	Grade Point (G.P)	Remarks
90% and above	S	10	Excellent
Above 85% and less than 90%	A+	9	
Above 80% and less than 85%	A	8.5	
Above 75% and less than 80%	B+	8	
Above 70% and less than 75%	B	7.5	
Above 65% and less than 70%	C+	7	
Above 60% and less than 65%	C	6.5	
Above 55% and less than 60%	D	6	
Above 50% and less than 55%	E	5.5	
Below 50% (CA + U.E) or below 40% for U.E only	F	0	Failed

12.1. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

Semester Grade point average is the semester wise average points obtained by each student in a 10-point scale. SGPA is calculated as per the calculation shown below.

$$SGPA = \frac{\sum (Subject\ Credit\ x\ GP\ obtained\ for\ the\ subject)}{Total\ Credits\ for\ the\ Semester}$$

Cumulative Grade Point Average (CGPA) is the average grade points obtained by the students till the end of the course. CGPA is calculated in a 10-point scale as shown below.

$$CGPA = \frac{\sum\ (Total\ credits\ for\ the\ Semester\ x\ SGPA)}{Total\ credits\ for\ the\ course}$$

SGPA and CGPA shall be rounded to two decimal points. The Grade card issued to the students shall contain subject number and subject name, credits for the subject, letter grades obtained, SGPA for the semester and CGPA up to the last semester.

13. MINIMUM CRITERIA FOR A PASS

13.1. A student shall be declared to have passed a semester examination in full in the first appearance if he/she secures not less than 5.5 GPA with a minimum of 'E' grade for the all individual subjects in that semester.

13.2. A student shall be declared to have passed in an individual subject of a semester examination if he/she secures grade 'E' or above.

13.3. A student who does not secure a full pass in a semester examination as per clause (13.1) above shall have to pass in all the subjects of the semester examination as per clause (13.2) above before he/she is declared to have passed in that semester examination in full.

14. IMPROVEMENT OF MARKS

14.1. Continuous Assessment (CA) Marks During Course Period

During the course period, a student shall be allowed to repeat the Subject(s) in one or more semesters in order to better the CA marks already obtained, subject to the following conditions:

14.1.1. The student shall not be allowed to improve on CA marks of Group I (a) Subjects.

14.1.2. He/She shall repeat the particular Subject in a particular semester only once and that too at the earliest opportunity available to him/her. He/She shall not combine this course work with his/her regular coursework.

14.1.3. He/She shall not be allowed to repeat the course work of any semester if he/she has already passed that semester examination in full.

14.1.4. The CA marks obtained by the repetition of course work alone will be considered for all purposes, and in cancellation of the previous CA. marks of that particular semester.

14.2. Continuous Assessment (CA) Marks After Course Period

14.2.1. A chance for re-doing the continuous assessment shall be provided for all the subjects except Architectural Design (I to VI), Basic Design and Architectural Thesis and Viva voce for those candidates who have completed five years of B.Arch. study but could not be declared pass by University due to low marks in their continuous assessment though they could obtain the minimum requirement of 45 percent marks in the respective University Theory Examinations/Viva voce/Lab as the case may be. All the candidates who have obtained at least 45 percent marks or above in the university theory examination under Group II subjects as well as the subjects under Group I namely Architectural Graphics and Visual Arts but failed in the subject due to the shortfall in the continuous assessment (CA) marks are alone eligible to appear for re-do of their continuous assessment marks in that subject. Further, for the subjects Interior Design, Landscape Architecture, Computer Applications in Architecture I and II (lab), Working Drawings and Details, Documentation of Traditional Building, Workshop Practice and Dissertation for which University Theory examinations are not there, if the student has not acquired a pass even after repeated attempts with the succeeding regular batches, but has acquired minimum 45 percent marks for external Viva voce/Lab, then the chance of re-doing is allowed so that the student gets the B.Arch. degree.

14.2.2. No candidates would be permitted to re-do the continuous assessment marks if either they are declared pass in that particular subject or have already obtained 70 percent marks in continuous assessment process. Candidates who have obtained 70 percent marks in the continuous assessments need to obtain the minimum requirement of 40 percent marks in

University theory examination to meet the passing criteria of 50 percentage in total for that subject.

14.2.3. The re-do exercise shall be conducted for the candidates whose regular period of study for B.Arch. degree course has been completed. Only one attempt would be given for the candidate for re-do of the Continuous Assessment (CA) of a particular theory/lab/viva voce subject. The entire re-do exercise is applicable to 2011 admission onwards for B.Arch. degree program.

14.2.4. A re-do of continuous assessment would require to satisfy the components mentioned above and would also call for an elaborate arrangement of accommodating them at various centers and for different subjects.

14.2.5. A re-do of continuous assessment shall be conducted by colleges/institutions under the direction of the Controller of Examinations, Mahatma Gandhi University. The examination centers shall be, allocated to all colleges where affiliated B. Arch programs of Mahatma Gandhi University are/were offered. These colleges shall conduct the continuous assessment for re-do of a few subjects of a particular semester or entire subjects of one complete semester as mentioned in clause 1 based on the feasibility of implementation as decided by Controller of Examination. The internal re-do of different semesters could be with different colleges.

14.2.6. Controller of Examinations shall communicate the overall structure of the program along with the information on semesters/subjects for which re-do is to be conducted through various colleges/institutions. The coordinator of examination at each institution shall be appointed by the university in consultation with the Principals of the colleges concerned.

14.2.7. The fee for the process shall be fixed by the syndicate and a guideline for the same is proposed as follows. Every candidate needs to pay a specified registration fee (Rs.3000/- per subject) to University and the entire expenditure for this exercise need to be met from this amount. Remuneration for examiner, coordinator and principal and institutional cost towards stationery, overheads and related expenditure in connection with the conduct of the exercise need to be included in the registration fee. Students need to register with University for the re-do under reference on payment of prescribed fee. The list of students along with the required university U.Os and documents shall be passed on to respective principals/coordinators of the colleges/institutions.

14.2.8. The coordinator shall identify suitable examiners from the existing faculty members in the department/institution for conducting the re-do. The re-do shall consist of two tests and two assignments for all theory subjects. The first test and assignment shall be from the first two modules and second test and assignment shall be from the remaining module(s). The scheme & pattern of the re-do is left to the examiner based on the learning requirement of that particular subject. Out of the total marks allocated for continuous assessment, 70 percent marks shall be for test and 30 percent for assignments for those subjects for which University Theory examinations are there. For the remaining subjects for which re-do is

permissible (as per clause 1) 70 percent shall be allotted for assignments/practical/research work and 30% for written test/viva voce/lab.

14.2.9. The candidates registered for re-do shaft complete the stipulated assessment exercises within a minimum of 45 days and maximum of 90 days from the date of registration for re-do at the allotted teaching institution. Any act of misconduct or malpractice, during the re-do examination shaft be dealt with relevant rules and regulations of the University.

14.2.10. Examiners shaft be given a consolidated remuneration based on the total number of examinations conducted for each paper. No TA/DA need to be paid to the examiners as this is conducted at their own institutions.

14.2.11. The final marks in the continuous assessment awarded to candidates for each subject shaft be communicated back to the Controller of Examinations, Mahatma Gandhi University by the coordinators.

14.2.12. University shaft reckon only the minimum marks required to meet the passing requirement of 50 percent marks out of total marks (CA and external put together) irrespective of the actual marks obtained by the candidate in the re-do exercise. Candidates who avail re-do chance to obtain B.Arch. degree shaft be placed in second class only.

14.2.13. Notification for the re-do examination shaft be invited along with specific odd/even semester examination notifications issued by the University. Also, the marks after conducting the examination shaft reach the university before the completion of the regular valuation camps. The results of the re-do process shaft be released only along with the regular release of B.Arch. Examination results of that particular semester.

14.3. University Examination Marks

A student who has secured pass marks for the Group II Subjects shall be allowed to re-appear for a maximum two Subjects of a semester examination for Group II Subjects, in order to improve the grades already obtained, subject to the following conditions:

14.3.1. The student shall be permitted to take the improvement examination only along with next available chance.

14.3.2. The student shall not be allowed to appear for an improvement examination of the subjects of the IX and X semester.

14.3.3. The grades obtained by the students for each subject in the improvement chance appeared for, when compared to the already existing grades- whichever is better will be reckoned as the grades secured.

14.3.4. A student shall be allowed to withdraw from the whole examination of a semester only in accordance with the rules for cancellation of examination of the University.

15. ELIGIBILITY FOR PROMOTION TO HIGHER SEMESTER

15.1. A student who has secured 75% attendance overall for all subjects put together in a particular semester and 50% marks in Architectural Design/Professional Training shall be eligible for promotion to the next higher semester.

15.2. Before being admitted to the VI semester classes, a student should have passed all the subjects in the combined I and II semester examinations in full.

15.3. Similarly, before being admitted to the IX semester classes, a student should have passed the entire subjects up to and including IV semester examinations in full.

16. CLASSIFICATION OF SUCCESSFUL STUDENTS

16.1. A student who qualifies for the degree passing all the subjects of the ten semesters within six academic years (twelve consecutive semesters after the commencement of his/her course of study) and secures not less than 8 CGPA up to and including tenth semester (overall CGPA) shall be declared to have passed the B. Arch degree examination in FIRST CLASS WITH DISTINCTION.

16.2. A student who qualifies for the degree passing all the subjects of the ten semesters within six academic years (twelve consecutive semesters after the commencement of his/her course of study) and secures less than 8 CGPA but not less than 6.5 CGPA up to and including tenth semester shall be declared to have passed the B. Arch degree examination in FIRSTCLASS.

16.3. All other successful students shall be declared to have passed the B. Arch Degree examination in SECONDCLASS.

16.4. Successful students who complete the examination in five academic years (Ten consecutive semesters) after the commencement of the course of study shall be ranked on the basis of the CGPA in all ten semesters put together. In the case of a tie in the CGPA the total marks of the students who have got same CGPA shall be considered for finalizing the rank. Students who pass the examination in supplementary examination are also covered under this clause.

17. REVISION OF REGULATIONS

The University may from time to time revise, amend or change the Regulations, Manual, Program Structure and Scheme as well as Syllabi. These changes unless specified otherwise will have effect from the beginning of the academic year following the notification by the University.

Part B: MANUAL

18. MANUAL

The set of Regulations stipulated above is appended by this Manual, the clauses of which are also mandatory.

19. GROUP I (a) SUBJECTS

19.1. Architectural Design I and II to VII and IX

19.1.1. The Evaluation of Architectural Design I and II to VII and IX shall be based on Continuous Assessment (CA) and Final Jury as specified in clause (9.1.). The Final Jury shall consist of the following three stages of evaluation:

1. Final Jury Test.
2. Final Jury portfolio and model evaluation.
3. Final Jury Viva voce.

A Make-up Jury chance shall be provided for students who have appeared for the Final Jury and have not passed the same as per the Manual.

19.1.2. The marks for the Continuous Assessment shall be awarded by the teaching staff in charge as per clause (9.2.).

19.1.3. The CA marks and the Attendance obtained by the students shall be officially published twice – mid-semester and at the end of all semesters. The final CA marks shall be published at least one day before the Final Jury Test.

19.1.4. For the conduct of the Final Jury/Make-up Jury, the head of the teaching Institution shall nominate, an External Juror as well as an Internal Juror (avoiding repetition), and release appointment letters to them under intimation to the University. One External Juror and one Internal Juror shall conduct the Final Jury/Make-up Jury, for a batch of 40 or less students.

19.1.5. The Internal Juror shall be a member from among the core faculty of the teaching institution other than the faculty member who evaluated the work for awarding the internal marks.

19.1.6. The External Juror shall be from among the core faculty of any other B.Arch. teaching institutions or an Architect registered with the Council of Architecture, incorporated under Architect's Act 1972 (in both cases with not less than 5-year experience after the date of COA registration).

19.1.7. The students shall submit their portfolio consisting of the assignments done for the subject during the particular semester with the approval of the Faculty-in-charge of the subject, TWO days before the commencement of the Final Jury Test (not later than 12 noon). The physical models shall be submitted by all students, at least ONE day before the commencement of the Final Jury Portfolio Evaluation and Viva Voce (not later than 12 noon).

19.1.8. The Faculty-in-charge of the subject shall submit a Pre-Jury Report consisting of the details pertaining to the assignments given and its objectives as well as weightage given to each work to the Head of the Teaching Institution, who shall forward the same to the identified Juror Team at least one week before the commencement of the Final Jury/Make-up Jury.

19.1.9. The Internal Juror, based on the Pre- Jury Report and in consultation with the External Juror, shall set a Time Bound Project of six hours duration as the Final Jury Test. This Final Jury Test is a manual exercise and shall be conducted on the previous working day of the Final Jury Portfolio Evaluation and Viva Voce. Opaque sheet(s) of appropriate size shall be supplied for the Final Jury Test by the teaching institution and the students shall work on the same under the supervision of the Internal Juror. The Internal Juror shall keep the submitted materials of the Final Jury Test under safe custody and present the same for evaluation during the Final Jury Portfolio Evaluation and Viva Voce. This stage, the Final Jury Test, is a pre-requisite for entry into the Final Jury portfolio evaluation and viva voce.

19.1.10. The Internal Juror shall maintain all the materials (including the physical models) to be presented for the Jury by the students and hand over the same to the student based on his/her turn. Each student after the Jury shall retain all the materials in the teaching institution itself.

19.1.11. The overall split up, with a suitable scheme of evaluation, of the Final Jury/Make-up Jury marks shall be as stated below:

- Architectural Design Portfolio – 80%
- Final Jury Test – 10 %
- Viva Voce – 10%

19.1.12. Students shall be physically present during the Final Jury/Make-up Jury and explain their work done.

19.1.13. The External and Internal Jurors shall have equal weightage in the joint evaluation process.

19.1.14. The Final Jury members shall submit the consolidated marks to the Head of the teaching institution on the last day of Jury.

19.1.15. The Final Jury marks shall be published not later than the next working day.

19.1.16. Any student(s) who appeared for the Final Jury and could not get 50 % aggregate mark (CA marks + Jury) shall be provided a chance to appear for a Make-up Jury. In the Make-up Jury such student(s) shall get an opportunity to present his/her improved portfolio and physical models along with the original ones already presented in the Final Jury and get them revaluated by another panel of Jurors comprising of a different External Juror and a different Internal Juror. The student(s) concerned shall submit all the materials to be evaluated in the Make-up Jury before 4 pm on the previous working day of the Make-up Jury date. However, the student(s) shall not get a chance to improve the Final Jury Test. The maximum mark a student can score during the Make-up Jury shall be just enough to make him/her get a pass for the subject i.e. not more than 50%. The portfolios of the highest and the lowest marks scorers in the Final Jury, except of those who are appearing

for the Make-up Jury, shall be referred by the Make-up Juror Team before the commencement of the Make-up Jury.

19.1.17. Make-up Jury shall be conducted not later than TEN days after the completion of the University Examinations (Written and Jury) in full of the particular semester.

19.1.18. Students who could not get minimum pass marks for the subject even after the Make-up Jury shall repeat the course work for that subject, along with the next batch of students.

19.1.19. The Make-up Jury members shall submit the consolidated marks to the Head of the teaching institution on the last day of Jury.

19.1.20. The Make-up Jury marks shall be published not later than the next working day.

20. GROUP I (b) SUBJECTS

20.1. Building Materials and Technology (I and II to V) and Advanced Building Technology (IX)

20.1.1. The evaluation of Group I (b) subjects shall be based on Continuous Assessment (CA) and Final Jury Evaluation as specified in clause (9.1.).

20.1.2. The marks for the Continuous Assessment will be awarded by the faculty-in-charge as specified in clause (9.2.).

20.1.3. For every batch of 40 or less students, the Head of the teaching institution shall nominate a two-member Jury panel consisting of an Internal Juror from the core faculty (other than the faculty member who evaluated the work for awarding the CA marks) of the teaching institution and an External Juror from the core faculty of any other B.Arch. teaching institution under the University from where Theory Examination Invigilators are appointed by the University for the current semester.

20.1.4. Students shall submit the portfolio consisting of the assignments done for the subject during the course period, with the approval of the faculty-in-charge of the subject on the previous working day of the commencement of the Jury (not later than 3pm).

20.1.5. The faculty-in-charge of the subject shall submit a report consisting of the details of assignments given and its objectives and weightage given to each work to the Head of the Teaching Institution, who in turn will forward it to the Jury Panel.

20.1.6. The Jurors will evaluate the portfolio and other relevant materials on the basis of the report.

20.1.7. The External and Internal Jurors shall have equal weightage in the joint evaluation process.

20.1.8. Students shall be physically present and explain their work to the Jury members at the time of evaluating their work.

20.1.9. The split up of the evaluation shall be as stated below:

- Portfolio – 80%
- Viva Voce – 20% (related to the various projects/work done during the particular semester).

20.1.10. Students who could not get minimum marks for the subject shall repeat the Jury along with the next batch(es) of students with an improved portfolio.

20.1.11. The Jury members shall submit the consolidated marks to the Head of the teaching institution on the last day of Final Jury Evaluation.

20.1.12. The Jury marks shall be published on the next working day.

21. GROUP I (c) SUBJECT

21.1. Professional Skill Enhancement

During semesters I to VII and during semester IX, the students are required to undergo Professional Skill Enhancement Courses (PSE) as prescribed in the Program Structure and Scheme and Syllabi.

21.1.1. The subject is divided into mandatory and optional modules. Students shall be trained through workshops and lab assisted learning in the mandatory modules. Self-initiatives and participation in specific student learning exposures, both within and outside the campuses are considered as optional modules.

21.1.2. The evaluation of Group I (c) subjects shall be based on Continuous Assessment (CA) and Final Jury Evaluation as specified in clause (9.1.).

21.1.3. The marks for the Continuous Assessment will be awarded by the faculty-in-charge as specified in clause (9.2.).

21.1.4. For every batch of 40 or less students, the Head of the teaching institution shall nominate a two-member Jury panel from the faculty (other than the faculty member who evaluated the work for awarding the CA marks) of the teaching institution.

21.1.5. Students shall submit the portfolio consisting of the assignments done for the subject during the course period, with the approval of the faculty-in-charge of the subject on the previous working day of the commencement of the Jury (not later than 3pm).

21.1.6. The faculty-in-charge of the subject shall submit a report consisting of the details of assignments given and its objectives and weightage given to each work to the Head of the Teaching Institution, who in turn will forward it to the Jury Panel.

21.1.7. The Jurors will evaluate the portfolio and other relevant materials on the basis of the report.

21.1.8. The Internal Jurors shall have equal weightage in the joint evaluation process.

21.1.9. Students shall be physically present and explain their work to the Jury members at the time of evaluating their work.

21.1.10. The split up of the evaluation shall be as stated below:

- Portfolio/Test – 80%
- Viva Voce – 20% (related to the various projects/work done during the particular semester).

21.1.11. Students who could not score a minimum of 50% for the subject shall repeat the Jury as a supplementary chance along with the next odd/even batch(es) of students with an improved portfolio.

21.1.12. The Jury members shall submit the consolidated marks to the Head of the teaching institution on the last day of Final Jury Evaluation.

21.1.13. The Jury marks shall be published on the next working day.

21.2. Site Planning and Landscape Design (IV), Interior Design and Detailing (V), Working Drawing (VI and VII), Research Methodology (IX), Elective Workshops (III, VI, VII and X)

21.2.1. The evaluation of Group I (c) subjects shall be based on Continuous Assessment (CA) and Final Jury Evaluation as specified in clause (9.1.).

21.2.2. The marks for the Continuous Assessment will be awarded by the faculty-in-charge as specified in clause (9.2.).

21.2.3. Those students who have received certificates for the NPTEL online courses during the sixth semester, under the supervision of the faculty in – charge, shall submit the course completion certificate, marks/grade card and attendance to the Teaching Institution on or before the date notified by the Teaching Institution. The marks/grades thus obtained shall be considered equivalent to that of the CA of one Elective Workshop subject in semester six. Final Jury evaluation as specified in clause (9.1) shall be conducted for those who have undergone the NPTEL online courses.

21.2.4. For every batch of 40 or less students, the Head of the teaching institution shall nominate a two-member Jury panel from the faculty (other than the faculty member who evaluated the work for awarding the CA marks) of the teaching institution.

21.2.5. Students shall submit the portfolio consisting of the assignments done for the subject during the course period, with the approval of the faculty-in-charge of the subject on the previous working day of the commencement of the Jury (not later than 3pm).

21.2.6. The faculty-in-charge of the subject shall submit a report consisting of the details of assignments given and its objectives and weightage given to each work to the Head of the Teaching Institution, who in turn will forward it to the Jury Panel.

21.2.7. The Jurors will evaluate the portfolio and other relevant materials on the basis of the report.

21.2.8. The Internal Jurors shall have equal weightage in the joint evaluation process.

21.2.9. Students shall be physically present and explain their work to the Jury members at the time of evaluating their work.

21.2.10. The split up of the evaluation shall be as stated below:

- Portfolio/Test – 80%
- Viva Voce – 20% (related to the various projects/work done during the particular semester).

21.2.11. Students who could not score a minimum of 50% for the subject shall repeat the Jury along with the next batch(es) of students with an improved portfolio.

21.2.12. The Jury members shall submit the consolidated marks to the Head of the teaching institution on the last day of Final Jury Evaluation.

21.2.13. The Jury marks shall be published on the next working day.

21.3. Professional Training

21.3.1. As per the B. Arch Program Structure and Scheme students shall undergo one-semester practical training immediately after the completion of the VII semester B.Arch. examinations and after the teaching institutional wise registration to VIII semester.

21.3.2. The training shall be under a registered architect and approved by the Head of the Teaching Institution. The student shall select a registered architect with good experience and reputation in the field of Architectural practice for practical training and the same should be approved by the head of the Teaching Institution in advance before the commencement of the VII semester university examination. The Architect should have valid registration with the council of Architecture and have a minimum of FIVE years' experience in the practicing field. He/She should not be an architect employed in the Public sector or a regular faculty member of the Teaching Institution or immediate relative of any regular faculty member of the Teaching Institution. The Architect shall not be a relative of the trainee also. Further the training firm shall in no way be associated with the Teaching Institution.

21.3.3. Students may also select internationally recognized Architects practicing outside India, with the approval of the teaching Institution.

21.3.4. Type of works to be carried out during training period**.** The students are expected to get exposure in the following aspects:

i. Involvement in the Design process
ii. Site visit and Site Supervision.
iii. Preparation of drawings for getting building permissions, working drawings, service drawings, etc.
iv. Preparation of estimates, specifications, contract documents, and tender documents.
v. Discussion with clients and other consultants.

21.3.5. Monthly work report: The students are required to send copies of the monthly report of the work done to the faculty-in-charge of Practical Training of the Teaching Institution at the end of each month. The report shall be duly signed by the Architect or an authorized officer supervising the work in the format prescribed by the teaching institution.

21.3.6. The evaluation of Group I (c) subjects shall be based on Continuous Assessment (CA) and Final Jury Evaluation as specified in clause (9.1).

21.3.7. The marks for the Continuous Assessment will be awarded by the faculty-in-charge as specified in clause (9.2.). The assignments shall include Work Dairy, Monthly Work Report, Critical Appraisal and Portfolio.

21.3.8. The Final Jury evaluation of the Professional Practice shall be conducted at the end of VIII semester.

21.3.9. At the end of the Practical training period, the students shall submit to the Teaching Institution a portfolio as specified by the institution. This shall consist of the complete

report of their work done during the entire training period illustrated with sketches, prints and other documents related to the projects on which he/she has involved both in office and at site, a work diary, original of monthly report, a certificate regarding their conduct and performance of work done during the training period and regarding the successful completion of training under the approved Architect /Firm. In the absence of the above documents students shall not be permitted to appear for the University Exam.

21.3.10. The split up of the evaluation shall be as stated below:

- Portfolio, Work Diary, Critical Appraisal – 80%
- Viva Voce – 20% (related to the various projects/work done during the particular semester).

21.3.11. For every batch of 40 or less students, the Head of the teaching institution shall nominate a two-member Jury panel from the faculty (other than the faculty member who evaluated the work for awarding the CA marks) of the teaching institution.

21.3.12. The Jurors will evaluate the portfolio and other relevant materials to check the qualitative achievement of the student during the practical training period.

21.3.13. The Internal Jurors shall have equal weightage in the joint evaluation process.

21.3.14. Students shall be physically present and explain their work to the Jury members at the time of evaluating their work.

21.3.15. Students who could not score a minimum of 50% for the subject shall repeat the Professional training and appear for the Jury along with the next batch(es) of students with an improved portfolio.

21.3.16. The Jury members shall submit the consolidated marks to the Head of the teaching institution on the last day of Final Jury Evaluation.

21.3.17. The Jury marks shall be published on the next working day.

22. GROUP II SUBJECTS

Subjects having evaluation through CA and University theory Examination

23. GROUP III SUBJECT

23.1. Architectural Design Thesis

Students of the B.Arch. Degree course are required to prepare an Architectural Design Thesis during the X semester of the B.Arch. Degree program.

23.1.1. The Head of the Teaching Institution shall allot a guide for each student considering the nature of the work and specialization of the faculty member at the beginning of IX semester. As far as possible student's preference may also be considered before allotting the guide.

23.1.2. Students admitted to the IX semester should submit their choices of their thesis project within a month after the commencement of the IX semester classes in consultation with the guide.

23.1.3. Students shall obtain approval for the project of Architectural Design Thesis from Teaching Institution.

23.1.4. The duration of the Architectural Design Thesis will be six months from the date of commencement of the X Semester B. Arch Degree Course.

23.1.5. The project selected may be either a live architectural project or hypothetical one so that the student gets training in tackling projects similar to what he/she is likely to face in his/her professional career. The project, of around 10000 sq. m built up area, and its Program shall be worked out by the student himself/herself under the guidance of the guide.

23.1.6. The work should include an intensive study of the topography, climate and problems concerned with design of spaces and structures. The solution of the problem must be with the integrated approach of the Architect, Engineer, Urban Designer, Planner and Landscape Architect and this shall be reflected in the preparation of drawings and the report.

23.1.7. Students are required to maintain a work diary of the thesis work.

23.1.8. All students are required to schedule their thesis work, get it approved by the guide, at the beginning of the X semester and submit a copy of the same to the thesis coordinator nominated by the Head of the Teaching Institution.

23.1.9. Special Topic: Any Architectural Design related special topic, approved by the Teaching Institution recommended by the respective guide, appropriate for the Thesis project shall be selected by the students.

23.1.10. Internal evaluation of each student will be done by a three-member Jury constituted by the Teaching Institution. One member of the Jury will be the guide. The other Jury members are to be constituted by the Head of the Teaching Institution from the faculty of Architecture of the Teaching Institution or any other Teaching Institution or from among the Architects, registered with the Council of Architecture and incorporated under the architect's act 1972, with not less than 10-year experience.

23.1.11. The progress shall be assessed by the Jury periodically through a minimum of three stages of reviews, the dates of which will be published by the Teaching Institution before the commencement of the X semester. Each review shall be graphical (including models) and oral presentation.

23.1.12. Students have to obtain a total of 40% marks combining all the stages of reviews to become eligible for the external Jury. Those who do not become eligible to appear for the External Jury shall have to repeat the subject fully with the next batch(es) of students.

23.1.13. Total 300 marks to be awarded for internal assessment will be allotted through the internal reviews, the suggestive split up of works to be done may be as given below:

23.1.13.1. Review 1 - Introduction of the Thesis Topic, Feasibility studies, Basic data, and Case studies/Primary surveys, Analysis, Arriving at Inferences. Design Program. Site analysis and Conceptual development.

23.1.13.2. Review 2 - Review of Previous stage, detailing of the conceptual stage leading to design decisions, the process to arrive at Sketch design. Layout, blocking etc. graphical presentations of Floor Plans, Sections, Views, Block Models etc. Conformity to Relevant Standards, Bye laws etc. and Achievement of Basic Objectives of Architectural Design. Introduction of the Special Topic.

23.1.13.3. Review 3 - Review of Previous stages, Finalization of the Design. Layout, Final Design for various buildings graphical presentation of Plans, Sections, Elevations, Views etc. Details of Building and Site Services, Site Planning and Landscape schemes. Preparation of relevant Detailed Drawings. Application of Special Topic in the design. Review of Report.

23.1.13.4. In case the Teaching Institution conducts more than three Reviews as stated above, proportionate changes shall be done in the contents of various Reviews and split up of marks. The same shall be published in the Course Plan as per clause (6).

23.1.14. The following Documents shall be submitted for the External evaluation Final Jury:

23.1.14.1. Two copies of the Data Collection in the preliminary design stage (up to the design and including the case studies) shall be compiled and presented along with the final submission in A3 size format.

23.1.14.2. Two copies of the Final Report A4 size format shall be submitted on the date and time announced by the Teaching Institution.

23.1.14.3. The total sheets submitted shall not exceed 30 (thirty) A1 size sheets. These shall be submitted as per the schedules published by the University.

23.1.14.4. Physical Models shall be submitted on the date of Viva Voce examination, at least by 8 am.

23.1.14.5. The format and other instructions regarding the schedule of reviews, preparation of the bound volumes of Data Collection, Final Report, Final Sheets, Model, etc. will be announced by the Teaching Institution.

23.1.15. For the conduct of External evaluation, the University shall appoint a Chairman from among the Heads/Senior most Professors in Architecture of the Teaching Institutions, on a rotation basis. The Chairman shall prepare a provisional list of External Jurors, having a minimum of 10 years practical/teaching experience after registration with COA, for the conduct of External Jury, and submit to the University for ratification and release of appointment letters. The External Jury consisting Chairman, two External Jurors and one Internal Juror appointed by the University shall conduct the Thesis and Viva Voce Examination, as per the University declared Schedule. The Chairman shall visit the venues of External evaluation in all the centers and carry out a random verification of the evaluation being carried out by the other Jury members.

23.1.16. The Jury members (excluding the chairman) shall submit the consolidated marks to the Chairman on the last day of Viva Voce and the Chairman should submit the mark sheet directly to the University.

23.1.17. Students shall secure 40% of marks in the external Jury and 50% aggregate (Internal + External) for successfully completing the thesis and Viva voce. Supplementary chances will be given to the students who failed in the final Jury.

Part C: CURRICULUM (Program Structure and Scheme)

24. SUBJECT CODE

- Every subject code has 9 characters: PP**AR**QQRSS
- Each code starts with the last 2 digits (PP) of the year of syllabus formulation.
- The fifth and sixth characters (QQ) denote the semester number (12 for semesters 1 and 2 and for all the other semesters it varies from 03 to 10)
- The seventh character (R) denotes the number of times the subject content has gone through minor revisions (a scope of 9 revisions is assumed before the entire syllabus get revised again).
- Last two characters (SS) denote the subject number.

Program Structure (Semester Wise)

25. DEFINITION OF CREDIT

1 Hr. Teaching (T) per week	1 Credit
1 Hr. Studio (S) per week	1 Credit
1 Hr. Workshop/Lab (W/L) per week	0.5 Credits

26. FIRST AND SECOND SEMESTER COURSES

Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								University Exam		
			T	S	W/L		CA	Jury	Written	Total
I (a)	19AR12001	Architectural Design 1 & 2		10		10	250	250		500
I (b)	19AR12002	Building Materials and Technology 1 & 2	1	3		4	100	100		200
I (c)	19AR12003	Professional Skill Enhancement 1 & 2			4	2	50	50		100
II	19AR12004	History of Architecture 1 & 2	2			2	50		100	150
II	19AR12005	Theory of Structures 1 & 2	2			2	50		100	150
II	19AR12006	Theory of Design	2			2	50		100	150
II	19AR12007	Architectural Graphics		3		3	100		100	200
II	19AR12008	Mathematics for Design	2			2	50		100	150
Total Hours		**29**	**9**	**16**	**4**	**27**	**700**	**400**	**500**	**1600**

27. THIRD SEMESTER COURSES

Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								University Exam		
			T	S	W/L		CA	Jury	Written	Total
I (a)	19AR03001	Architectural Design 3		10		**10**	250	250		500
I (b)	19AR03002	Building Materials and Technology 3	1	3		**4**	100	100		200
I (c)	19AR03003	Professional Skill Enhancement 3			4	**2**	50	50		100
II	19AR03004	History of Architecture 3	2			**2**	50		100	150
II	19AR03005	Theory of Structures 3	2			**2**	50		100	150
II	19AR03006	Climatology	2			**2**	50		100	150
II	19AR03007	Humanities	2			**2**	50		100	150
I (c)	19AR03008	Elective Workshop I	1		2	**2**	50	50		100
Total Hours		**29**	**10**	**13**	**6**	**26**	**650**	**450**	**400**	**1500**

28. FOURTH SEMESTER COURSES

Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								University Exam		
			T	S	W/L		CA	Jury	Written	Total
I (a)	19AR04001	Architectural Design 4		10		**10**	250	250		500
I (b)	19AR04002	Building Materials and Technology 4	1	3		**4**	100	100		200
I (c)	19AR04003	Professional Skill Enhancement 4			4	**2**	50	50		100
II	19AR04004	History of Architecture 4	2			**2**	50		100	150
II	19AR04005	Theory of Structures 4	2			**2**	50		100	150
II	19AR04006	Building Services 1	2			**2**	50		100	150
I (c)	19AR04007	Site Planning & Landscape Design	1	2		**3**	75	75		150
II	19AR04008	Elective Theory I	2			**2**	50		100	150
Total Hours		**29**	**10**	**15**	**4**	**27**	**675**	**475**	**400**	**1550**

29. FIFTH SEMESTER COURSES

Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								University Exam		
			T	S	W/L		CA	Jury	Written	Total
I (a)	19AR05001	Architectural Design 5		10		**10**	250	250		500
I (b)	19AR05002	Building Materials and Technology 5	1	3		**4**	100	100		200
I (c)	19AR05003	Professional Skill Enhancement 5			4	**2**	50	50		100
II	19AR05004	Human Settlement Planning	2			**2**	50		100	150
II	19AR05005	Theory of Structures 5	2			**2**	50		100	150
II	19AR05006	Building Services 2	2			**2**	50		100	150
I (c)	19AR05007	Interior Design & Detailing	1	2		**3**	75	75		150
II	19AR05008	Elective Theory 2	2			**2**	50		100	150
Total Hours		**29**	**10**	**15**	**4**	**27**	**675**	**475**	**400**	**1550**

30. SIXTH SEMESTER COURSES

Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								University Exam		
			T	S	W/L		CA	Jury	Written	Total
I (a)	19AR06001	Architectural Design 6		10		**10**	250	250		500
I (c)	19AR06002	Working Drawings 1		4		**4**	100	100		200
I (c)	19AR06003	Professional Skill Enhancement 6			4	**2**	50	50		100
II	19AR06004	Housing	2			**2**	50		100	150
II	19AR06005	Specification and Cost Estimation	2			**2**	50		100	150
II	19AR06006	Building Services 3	2			**2**	50		100	150
I (c)	19AR06007	Elective Workshop 2	1		2	**2**	50	50		100
II	19AR06008	Elective Theory 3	2			**2**	50		100	150
Total Hours		**29**	**9**	**14**	**6**	**26**	**650**	**450**	**400**	**1500**

31. SEVENTH SEMESTER COURSES

Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								University Exam		
			T	S	W/L		CA	Jury	Written	Total
I (a)	19AR07001	Architectural Design 7		10		**10**	250	250		500
I (c)	19AR07002	Working Drawings 2		4		**4**	100	100		200
I (c)	19AR07003	Professional Skill Enhancement 7			4	**2**	50	50		100
II	19AR07004	Urban Design	2			**2**	50		100	150
II	19AR07005	Project Management	2			**2**	50		100	150
II	19AR07006	Environmental Science for Architecture	2			**2**	50		100	150
II	19AR07007	Professional Ethics & Practice	2			**2**	50		100	150
I (c)	19AR07008	Elective Workshop 3	1		2	**2**	50	50		100
Total Hours		**29**	**9**	**14**	**6**	**26**	**650**	**450**	**400**	**1500**

32. EIGHTH SEMESTER COURSES

Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								University Exam		
			T	S	W/L		CA	Jury	Written	Total
I (c)	19AR08001	Professional Training			30	**15**	250	500		750
Total Hours		**30**			**30**	**15**	**250**	**500**	**0**	**750**

33. NINTH SEMESTER COURSES

Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								Final Evaluation		
			T	S	W/L		CA	Jury	Written	Total
I (a)	19AR09001	Architectural Design 8		10		**10**	250	250		500
I (b)	19AR09002	Advanced Building Technology	2	3		**5**	125	125		250
I (c)	19AR09003	Professional Skill Enhancement 8			4	**2**	50	50		100
II	19AR09004	Green Built Environment	2			**2**	50		100	150
II	19AR09005	Disaster Management & Mitigation	2			**2**	50		100	150
I (c)	19AR09006	Research Methodology	2			**2**	50	50		100
II	19AR09007	Elective Theory 4	2			**2**	50		100	150
II	19AR09008	Elective Theory 5	2			**2**	50		100	150
Total Hours		**29**	**12**	**13**	**4**	**27**	**675**	**475**	**400**	**1550**

34. TENTH SEMESTER COURSES

Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								Final Evaluation		
			T	S	W/L		CA	Jury	Written	Total
III	19AR10001	Architectural Design Thesis		26		**26**	650	650		1300
I (c)	19AR10002	Elective Workshop 4	1		2	**2**	50	50		100
Total Hours		**29**	**1**	**26**	**2**	**28**	**700**	**700**	**0**	**1400**

Total Credits: 229

Part D: SYLLABI

35. FIRST AND SECOND SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Viva	Written	Total
I & II	I (a)	19AR12001	Architectural Design 1 & 2		10		10	250	250		500

Course Overview:

The course aims to deliver the fundamentals of Architecture and provide a brief introduction to the design process.

- To Introduce architectural and design vocabulary to familiarize students with the grammar of design
- To introduce the elements and principles of basic design
- To enable design thinking and basic principles of 2D and 3D composition
- To develop an understanding of the methods of architectural drawing
- To develop the ability to translate abstract principles into design solutions
- To familiarize students with design development methodology and the process involved

Course Outcomes:

Upon completion of the course, the student should have an:

- Understanding of definition of architecture
- Understanding of elements of space making, various design principles and its application
- Understanding of architectural drawings and various techniques for visual representation
- Understanding of design as a multidimensional creative art
- Understanding nature as a contextual setting
- Understanding of design development methodology and its process.

Module 1: Orientation Course

Module Contents:

- Introduction to the fundamentals of architectural education
- Introduction to how Architecture is connected to other realms of knowledge
- Introduction to the multi-faceted role of an architect
- Exposure to the works of master architects and their philosophies
- Introduction to tools and mediums of visual representation

Suggested exercises: Mind mapping, Story boards

Module 2: Fundamentals of Design and Drawing

Module Contents:

- Exploring Elements and Principles of Design by creating 2 dimensional and 3 dimensional compositions
- Introduction to Principles of two-dimensional compositions- Balance, Movement, Scale, Proportion, Rhythm etc.

- Introduction to principles of three-dimensional composition - Form, Mass, Volume, Scale etc.
- Introduction to Color Theory
- Introduction to fundamentals of architectural drawing. Measured drawing exercise of familiar objects & spaces
- Introduction to dimensioning systems and standard unit conversions

Suggested exercises: Poster Design, Product design, use of patterns to synthesize 2D and 3D models, Form making exercise, Application of colors in built form and objects, Measured drawing exercise etc.

Module 3:Art in Design &Space Articulation

Module Contents:

- Introduction to the evolution of Art and Design
- Factors influencing the process of Art, Design and Architecture.
- Relationship of art and design with space and environment
- Introduction to Perceptual bases for Architectural Design
- Introduction to theories of scale and proportion in Space articulation
- Introduction to anthropometry
- Observation and study on People-Space interaction

Suggested exercises: Creative visual expressions representing culture and context, Simple activity mapping and space correlation, Space illustrations related exercises and models, Exercises to illustrate basic proportions and spatial concepts

Module 4: Introduction to Design Process

Module Content:

- Introduction to Concepts in Design
- Introduction to Design in Nature and Context
- Introduction to methods of design in architecture through Generation of Circulation diagram, Bubble Diagram and Activity Proximity Matrix to establish a functional relationship among various spaces.
- Introduction to basic concepts of structures in design
- Architectural study tour of spaces or buildings which has to be concluded with a report incorporating studies based on the aspects discussed in the syllabus

Major project: Design of a simple structure (Not more than 50 sqm) illustrating the fundamentals of architecture discussed in the syllabus. The context may be hypothetical.

Time bound project: Design of a functional space to demonstrate the process of design development and fundamentals of architectural design representation

Reference:

- Broadbent, G. (1973). *Design in Architecture - Architecture and Human Science*. New York: John Wiley and Sons.
- Ching, F. (2014). *Architecture: Form, Space, and Order, 4th Edition*. John Wiley & Sons.
- Ching, F. (2015). *Architectural Graphics*. Wiley & Sons Canada, Limited, John.
- Ching, F., Jarzombek, M. and Prakash, V. (2010). *A global history of architecture*. 2nd ed. John Wiley & Sons.
- Conway, H. and Roenisch, R. (2003). *Understanding architecture: an introduction to architecture and architectural history*. London: Routledge.
- Kleiner, F. (2009). *Art through the ages a Global History*. 3rd ed. Clark Baxter.
- Pramar, V. (1973). *Design fundamentals in architecture*. Bombay: Somaiya Publications.
- Roth, L. (n.d.). *Understanding architecture: Its Experience History and Meaning*.
- Snyder, J. and Catanese, A. (1979). *Introduction to architecture*. New York: MacGraw-Hill.
- Unwin, S. (2009). *Analysing architecture*. London: Routledge.

Notes:

- Students may be encouraged to read and discuss books/ journals related to the topics discussed in the semester
- Discussions of the topics given above may include relevant contents from the other subjects in the semester as well.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Viva	Written	
I & II	I (b)	19AR12002	Building Materials and Technology 1 & 2	1	3		4	100	100		200

Course Overview:

The subject primarily aims at developing understanding in the use of appropriate construction technique and material in building design based on feasibility of technology, physical properties (like density & specific gravity, strength, thermal properties), aesthetic value, socio-cultural impacts and relevance, socio-economic factors, Ecological footprint etc.

The course introduces the technological aspects of a building design from the perspective of functional building component where use of natural and artificial materials is discussed based on their application. Each material would be taught in a manner such that its application would be discussed in a sequential manner, starting from foundation level, followed by plinth & others (sill, lintel, sunshades, window/door openings, walling material, as a floor & flooring) and culminating at roof and parapet wall. Construction technology and appropriate materials for structural systems, roofing, enveloping and interior finishes shall be considered under this subject from simple examples to complex.

Course Outcomes:

Upon completion of the course, the student should:

- The student should develop necessary decision-making skills in using appropriate construction technologies and materials while designing buildings, based on understanding of their potentials and properties.
- The student should develop the skill to represent various construction techniques as well as materials through drawings supporting their building design.
- Three drawing sheets shall be drafted based on the contents of each module.

Module 1: Introduction to Fundamental Components of a Building

Learning Strategies:

- Lecture on various building components and various techniques as well as materials used.
- Demonstration at building construction sites, workshops etc. on various building components and various techniques used.
- Market study on materials.
- Drawing studios on representation of different building components and materials.

Module Contents:

- Foundation: Function, Types based on structure, Techniques & materials used in construction.
- Building envelope: Function, Desirable properties, Types based on materials.
- Floor: Function, Types based on material and construction used, Techniques used in construction.
- Fenestrations: Function, Types based on application, Techniques & materials used in construction.

- Roof: Function, Types by shape and structure, Techniques & materials used in construction.
- Overview of load bearing and framed structures – related components – columns, beams, trusses etc.

Module 2: Soils and Foundations

Learning Strategies:

- Lecture on various soil types, various techniques of soil tests for different properties of soil and types of foundations for each situation.
- Demonstration at building construction sites, workshops etc. on various building foundations used for different types of buildings.
- Site visits to soil testing facilities.
- Drawing studios on representation of different foundation types.

Module Contents:

- Soils – Their classification, physical properties and behaviour – Bearing capacity, safe bearing capacity, Determination of SBC, Standard Penetration test – Sand – fineness, bulking qualities - Methods of improving bearing capacity.
- Shallow Foundations – Types- Pad, Strip, Raft-Method of construction.
- Deep Foundations-Types- Piles, Piers, Caissons-Materials and method of construction.
- Execution problems in loose and clayey soil, Shoring, Timbering.
- Vernacular construction methods of foundation – stone, rammed earth, bamboo, coconut etc.

Module 3: Construction Using Wood

Learning Strategies:

- Lecture on various building components using wood as construction material.
- Demonstration at timber yards, saw mills, carpentry workshops etc.
- Market study on various wood and wood-based materials.
- Drawing studios on representation of different wood construction techniques.

Module Contents:

- Timber/ wood as construction material: Properties, Types of timber, defects, seasoning and preservation of timber, ecological impact due to use of wood, joinery details & systems, BIS Specifications etc.
- Wooden doors & windows - Wooden joinery & details.
- Structural members: application of wood as a structural member – framed structure, roof structure - King post truss, Queen post truss.
- Timber Floors – Single, double and framed floors with joints between joists with wall plate, joist with beam and sub beam with main beam, strutting of joists.
- Roof & Ceiling: wooden ceiling systems – members of the system, detailing, wooden roof systems – members, detailing.

Module 4: Masonry

Learning Strategies:

- Lecture on various building components in elementary load bearing construction using concrete.
- Demonstration at construction sites on various stages.
- Market study on cement, bricks, steel etc. used in elementary concrete load bearing constructions.
- Drawing studios on representation of different building components.
- Hands on workshop on masonry types.

Module Content:

- Material Study- Burnt bricks and alternative building blocks: Mud Bricks, Stones, concrete blocks, mud blocks, rammed earth, their BIS specifications.
- Wall: Masonry techniques & tools, Types of masonry bonds – Stretcher, Header, English, Flemish, Stack, Dutch, Facing and rat trap bonds.
- Properties of cement concrete, preparation, cement, aggregates and other components of concrete, techniques and tools.
- Vernacular materials like mud, bamboo, lime, surkhi, clay products – applications, environmental aspects.

List of drawings for viva (Minimum 7 sheets)

- Typical Wall section
- Strip foundation
- Column footing
- Pile & Pile cap
- Wooden joinery
- Timber floors
- King post truss
- Queen post truss
- English bond – different thickness and T joint
- Flemish bond – different thickness and T joint

Reference:

- Barry, R. (1999). The Construction of Buildings Vol. 2. 5th Ed. New Delhi: East-West Press.
- McKay, W. B. (2005). Building Construction Metric Vol, I – IV. 4th Ed. Mumbai: Orient Longman.
- Chudley, R. (2008). Building Construction Handbook. 7th Ed. London: Butterworth-Heinemann.
- Foster, J. and Mitchell, S. (1963). Building Construction: Elementary and Advanced, 17th Ed. London: B.T. Batsford Ltd.
- H Leslie Simmons, 'Construction – Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
- Sushil-Kumar, T. B. (2003). Building Construction. 19th Ed. Delhi: Standard Publishers.
- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt. Ltd, New Delhi, 2005

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Viva	Written	Total
I & II	I (c)	19AR12003	Professional Skill Enhancement 1 & 2			4	2	50	50		100

Course Overview:

This course intends to provide/ enhance the soft skills in order that students perform well in their academics and beyond. These skills are intended to support the student to perform better in her/his core subjects and also build up robust performance through hands-on workshops and laboratory training. This course is subdivided into two categories – Mandatory and Optional. Mandatory courses help in preparations for respective semester subjects. The optional category helps students to take personal initiatives to develop in specific areas that can widen their horizon of their understanding of architecture and also initiate action at the society level. There are also options to work on competitive exercises alongside other similar institutions.

- The aim of this subject is to familiarise students with different types of materials and manufacturing techniques for creating art forms/ models.
- Students will be able to use different kinds of tools and machinery for production of design models.
- The subject will be taught in congruence with subjects like Design and Graphics. Assignments for the subject will be linked to design exercises to achieve higher level of learning and understanding the practical application of the same.
- Considering the significance of English language as a tool for global communication, the course aims to develop and enhance the linguistic and communicative competence of the students. The focus is on honing the skills of reading, writing, listening, and speaking. By providing suitable examples, the students will be exposed to various forms of personal and professional communication. The self-learning tasks designed will facilitate to enhance effective communication skills in a modern, globalised context.

Course Outcomes:

Upon completion of the course, the student should:

- be given an exposure of varied skills that can bring in confidence in handling their core subjects such as workshops, communication skills, computer applications etc.
- be able to develop team spirit and interpersonal skills to manage complex situations.
- be able to cope with stress and develop multi-tasking capabilities.

Module 1: Architecture Model Making Workshop

Learning Strategies:

- Practical hands on sessions
- Model making lab and equipment
- Suggestive Materials: Paper, thermocol, clay, ceramic, plastic sheet, sheet metal, wood etc.

Module Contents:

- Training in translating ideas into three dimensional forms.
- Training sessions using different materials and techniques pertaining to Architectural model making.
- Training in safe handling of equipment for production of design models.

Module 2: Communication Skills

Learning Strategies:

- Language lab
- Group discussions and Interactive sessions

Module Contents:

- Scope and Importance of effective communication.
- The Process of Communication: Levels of communication; Flow of communication; Use of language in communication; Communication networks; Significance of technical communication.
- Barriers to Communication: Types of barriers; Miscommunication; Noise; Overcoming measures.
- Listening Skills: Listening as an active skill; Types of Listeners; Listening for general content; Listening to fill up information; Intensive Listening; Listening for specific information; Developing effective listening skills; Barriers to effective listening skills.
- Reading Skills: Previewing techniques; Skimming; Scanning; Understanding the gist of an argument; Identifying the topic sentence; Inferring lexical and contextual meaning; recognizing coherence and sequencing of sentences; Improving comprehension skills.

Module 3: Co-curricular Activities

Learning Strategies:

- Technical and hands on workshops
- Group discussions and Interactive sessions
- Self- initiatives

Module Contents:

- Optional content to be developed by each institution in order to help students to take part in activities that involve larger groups and facilitate peer learning.
- The activities could be skill oriented like Photography or Crafts training or student initiated societal activities or participation in NASA or similar student led group initiatives which have an academic content as well.

Reference:

- Dunn, N. (2014). *Architectural modelmaking*. Laurence King Publishing.
- Kaplan Test Prep. (2018). *IELTS prep plus 2019-2020*. Kaplan Pub.
- Knoll, W. (2014). *Architectural models: Construction Techniques*. 1st ed. Cengage Publications.
- Lougheed, L. (2010). *Barron's IELTS*. 2nd ed. Barrons Educational Series.
- Werner, M. (2011). *Model making*. Princeton Architectural Press.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Viva	Written	Total
I & II	II	19AR12004	History of Architecture 1 & 2	2			2	50		100	150

Course Overview:

The subject principally aims at sensitizing the students towards understanding architecture as a product of historic evolution process of human kind along the timeline through socio cultural and political changes as well as technological advancements at different geographies around the planet earth. The subject intends to inculcate in the students a sense of curiosity to understand the origins and meanings of the various forms of architectural details, expressions as well as functional design elements or space standards used extensively in the practice.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to relate and identify built forms through socio cultural, climatic, political, economic influences on them in respective geography and timeline.
- Possess the skill to formally (visually and theoretically) analyse and appreciate architectural works.

Introduction to History of Architecture and its relevance in design (not part of evaluation)

Learning Strategies

- Lecture on chronological evolution of architecture in various geographical contexts.
- Drawing exercises on various significant architectural works in various eras/ geographies.
- Lecture/ discussion on observation of changes in built form design across timeline.
- Lecture on architectural history its relevance in modern day architecture design.
- Lecture/ discussions on human experience of architectural built forms and their appreciation based on the physical and metaphysical influences on architecture.
- Drawing exercises on applications of architectural history in design.
- Lecture/discussion on Physical and metaphysical influences by architecture: Brief introduction to use of various principles of design such as Unity, Focal Point, Scale and Proportion, Rhythm and Balance using examples like Pyramid complex at Giza, Acropolis, Parthenon, Pantheon, etc. (cross-study with Theory of Design).
- Lecture/discussion on applications of architectural history: Analyzing buildings through historical perspectives, use of details, construction techniques, materials etc. in sensitive design projects with modern day examples.

Contents

Study of architectural history and its relevance in modern day architecture design

Brief Early History: A very brief introduction to landmark architectural works during different periods in different geographical regions- Early cultures (before 12,000 BCE) up to 1200 CE- Changes occurring to the built form design across timeline as well as geographies based on socio cultural, climatic, geographic, economic factors as well advancements in construction techniques (ref. Ching, Introduction to Architecture, Ch. 2)

Brief History from Renaissance to Contemporary: A very brief introduction to landmark architectural works during different periods in different geographical regions c. 1200 CE to 1950s- Changes occurring to the built form design across timeline as well as geographies based on socio cultural, climatic, geographic, economic factors as well advancements in construction techniques (ref. Ching, Introduction to Architecture, Ch. 3)

Module 1: Architecture in Pre-Historic and Ancient Times – 1

Learning Strategies:

- Unit wise lectures on how the built form in the region is a manifestation of its socio cultural, climatic, political, economic context.
- Drawing exercises on various significant architectural works in various eras/ geographies.
- Lectures/ assignments on construction techniques.
- Lecture/ discussion on observation of periodical changes and cross influences between various geographies.
- Each lecture will have pre- requisite readings and each module will have to specify self-learning component in the lecture plans.

Module Contents:

- **Early cultures:** Paleolithic-Society, Culture & Settlements, Dolni Vestonice, Megdalenian tents, Ice age - Relevance of ice age, dwellings, Neolithic Age - Society, Culture & Settlements, Jomon Culture.
- **Indus Valley:** Introduction to Bronze Age and its impact in the region, Geography, society and culture, Dholavira, Architecture and urban infrastructure of Mohenjodaro - Citadel, Dwelling units.
- **Mesopotamia:** Sumerians- culture and social structure, City of Ur, Ziggurat at Ur.
- **Egypt:** Culture and social structure, Pre-dynastic Egypt- royal tombs at Abydos, Old Kingdom- Mortuary complex of Zosur, Pyramid complex at Giza, New Kingdom - Temple complex at Karnak, Temple of Amun.

Module 2: Architecture in Ancient Times – 2

Learning Strategies:

- Lecture on how built form is a manifestation of its socio cultural, climatic, political, economic context.
- Drawing exercises on various significant architectural works in various eras/ geographies.
- Lectures/ assignments on construction techniques.
- Lecture/ discussion on observation of periodical changes and cross influences between various geographies.
- Each lecture will have pre- requisite readings and each module will have to specify self-learning component in the lecture plans.

Module Contents:

- **China**: Early Chinese cultures- Yangshao- Banpo (brief) | Shang Dynasty- rites and rituals, tombs | Zhou Dynasty- Mandate of Heaven, Ritual complex at Feng Chu (brief), Wangcheng, an ideal city (brief) | Qin Dynasty- Tomb of first emperors (brief) | Han Dynasty - Mingtang-Biyong ritual complex (brief) | Great Wall of China (detail)
- **Greece 1**: Mycenaean civilisation- Palace complex at Pylos | Geometric period- emergence of Greek temple form, Temple of Poseidon (brief) | Archaic period- architectural characteristics, Temple of Apollo at Delphi (brief)
- **Greece 2**: Classic - Athens' Acropolis(detail) | Hellenistic age- Temple of Apollo at Didyma (brief) | Greek Orders
- **Rome 1**: Founding and expansion of Rome (brief) | Engineering and construction technology | Forums- Forum of Augustus, Imperial Forums (brief)
- **Rome 2**: Roman Urban Villa (brief) | Roman Baths (brief) | Colosseum and Pantheon (detail)
- **Vedic period and Buddhist architecture 1**: Aryan invasion, Vedic village, Aryan house | Origin and spread of Buddhism | Mauryan School of Art- Asoka pillar (brief), Sanchi Stupa (brief) | Sunga school of Art- Growth of Sanchi Stupa (detail), Viharas and Chaitya halls
- **Buddhist Architecture 2**: Satvahana School of Art- Amaravati Stupa (brief), Chaitya hall at Karle (details) | Kushana School of Art- Mahayana Buddhism and monastery at Takht-i-Bahi (brief) Gupta period- Ajantha caves (detail)

Module 3: Architecture in Kerala

Learning Strategies:

- Lecture/ Individual history of Kerala Architecture during the medieval era.
- Lecture/ discussion on observation of changes and influences on Kerala architecture during the era.
- Lecture/ Individual student assignments on significant buildings.
- Drawing exercises on various significant architectural works.
- Model making exercises on significant architecture works in Kerala during the era.
- Lecture on theories such as planning principles, use of Vasthu Purusha Mandala, etc. can be added to understand its impact on the built form.

Module Contents:

- **Pre-historic built structures of Kerala:** Megalithic structures- Dolmens, Umbrella stones, Burial caves, Cave temples.
- **Influencing factors of indigenous architecture in Kerala:** Geography, Climate, Building materials, Social, Political, Religious and Traditional planning principles.
- **Indigenous residential architecture of Kerala-1:** Characteristics of sala typology of houses – Development of four types of sala house configuration, Evolution and expansion of ekasala, catusala and other complex courtyard based residential typology, example of ekasala (Thampuran, 2001 p. 143), example of catusala: (Thampuran, 2001 p. 154), example of complex sala: Pathinarukettu (Thampuran, 2001 p. 201), One example of Muslim and Christian Tharavadu.
- **Indigenous religious architecture of Kerala:** Characteristics of Kerala temple architecture- Types of Kerala 'Sreekovils'(Moola-prasada) Five types- with/without Antharala and

with/without Mukhamandapa.

- Schematic layout of a full-fledged Kerala temple with names of important structures. Sectional elevation of a typical Kerala Sreekovil (Moola-prasada).
- Architectural characteristics of Kerala type mosques and churches (Study of relevant examples).

Reference:

- Achuthan, A. and Prabhu, B. (1998). *Manushyalaychandrikabhasyam - An engineering commentary on manusyalayachandrika of Tirumangalat Nilakanthan Musat*. Calicut: Vastuvidyapratisthanam.
- Chandrashekara, U & Joseph, S.P. & Ashtamoorthy, Sreejith. (2002). Ecological and socio-cultural dimensions of sacred groves of Northern Kerala. Man in India. 82. 323-340.
- Ching, F. (2013). *Introduction to architecture*. Hoboken, N.J: Wiley Publishers.
- Ching, F., Jarzombek, M. and Prakash, V. (2010). *A global history of architecture*. Hoboken, NJ: Wiley.
- Fletcher, B. (1999). *A History of Architecture*. CBS Publication (Indian Edition).
- Jarzombek, M. (2013). *Architecture of first societies: A Global Perspective*. Hoboken, N.J.: Wiley Publishers.
- Jayashankar, S. (1997). *Temples of Kerala*. Census of India.
- Koduveliparambil, J. (1997). *Construction practices in traditional dwellings of Kerala*. India: McGill University, Montreal.
- Kostof, S. (1985). *A history of architecture: Setting and Rituals*. London: Oxford University Press.
- Nuttgens, P. (1983). *The Story of Architecture from Antiquity to the Present*. London: H. F. Ullmann Publishers.
- Prabhu, B. and Achuthan, A. (1996). *A text book of Vasthuvidya, Vasthuvidya Prathishtanam*. Calicut.
- Sarkar, H. (1978). *An Architectural survey of Temples of Kerala*. Archeological Survey of India.
- Scully, V. (1991). *Architecture - The Natural and the Manmade*. New York: Harper Collins Publisher.
- Thampuran, A. (2001). *Traditional architectural forms of Malabar Coast*. Vastuvidyapratishthanam Academic Centre.
- Vatsyayan, K. (1997). *The square and the circle of the Indian arts*. New Delhi: Abhinav Publications.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Viva	Written	Total
I & II	II	19AR12005	Theory of Structures 1 & 2	2			2	50		100	150

Course Overview:

The course primarily aims at understanding importance of structures in Architecture. It focuses on making the students aware of the role of structural design as an integral part of Architecture design. It provides the fundamental understanding of various possibilities in exploring Architectural design with the help of different structural forms. It also acts as the orientation to basic structural design terms and fundamental governing principles. It also emphasizes on making students aware of different external loads and forces acting on the structural elements and giving a conceptual idea of the behavior of these elements.

Course Outcomes:

Upon completion of the course, the student should:

- be able to develop a habit of inclusive structural aspects in their Architectural design.
- be able to visualize the flow of forces in their Architectural design elements to develop a stable and practical structure.
- be able to develop basic skill to choose appropriate structural form from various possibilities.
- be able to develop an intuitive understanding of how structures behave and thereby enhancing their skills in conceptual Architectural design.

Module 1: Structural Design and its relevance in Architecture. Introduction to basic structural design and various structural forms and elements in Architecture.

Learning Strategies:

- Lectures on the below contents by presentation and discussion on Architectural projects and structural behavior diagrams to make students understand structures in the context of Architecture
- Lectures by using analogies and examples to explain structural concepts.

Module Contents:

- Introduction – Definition of Structure, Role of Structures in Architecture
- Historical evolution of structures - Walls, Post and beams, Arches, Vaults, Domes, Suspended structures, Truss, Sky scraper
- Force types – Definition of force, Moment of a force, Bending & Buckling Force concepts - principle of transmissibility, principle of super position.
- Resultant of co planar concurrent forces, parallelogram law of forces and numerical problems.
- Resolution and composition of forces, numerical problems.
- Moment of force concept, Varignon's theorem, Couple and moment of a couple concept. Numerical problems on coplanar non- concurrent force system.

Module 2: Principles of structural design.

Fundamental governing principle in behavior of the external loads (Statics) acting upon different structural elements.

Learning Strategies:

- Lectures on the below contents by presentation and discussion with relatively accessible mathematical equations and calculations.
- Lectures by using analogies and examples to explain structural concepts.

Module Contents:

- Equilibrium concept and free body diagram. Condition of static equilibrium for different force system. Lami's Theorem. Numerical problems on equilibrium of coplanar concurrent force system.
- Types of supports and loads in statically determinate beams, equilibrium of coplanar non concurrent force system, to find the support reaction for statically determinate beams.
- Loads on structure as a whole - Dead Load - Live Load - Seismic Load - Wind Load
- Tributary Load & load path. Basic concepts of Strength - Stiffness - Stability –
- Load tracing – Understanding load flow by tributary load and load path, Load paths – Pitched Roof systems, Wall systems, Roof and floor systems, and Foundation systems.

Module 3: Principles of resistance of structural members to the various external forces acting upon them.

Importance of cross section in resisting the external loads. Truss analysis

Learning Strategies:

- Lectures on the below contents by presentation and discussion with relatively accessible mathematical equations and calculations.
- Lectures by using analogies and examples to explain structural concepts.

Module Contents:

- Resistance of Structural Members – Material strength and cross-sectional properties.
- Centre of gravity and centroids, Locating the centroid of plane and compound figures.
- Moment of Inertia - of an area, Theorem of parallel and perpendicular axis- Principle axis and Principle moment of inertia;
- Moment of inertia of composite areas. Radius of Gyration.
- Truss analysis: - Method of joints- cantilever and simply supported trusses

Reference:

- Ambrose, J. and Tripeny, P. (2013). *Building structures*. Hoboken, N.J.: Wiley.
- Babu, J. (n.d.). *Engineering Mechanics*. Pearson Prentice Hall.
- Bansal, R. and Bansal, S. (n.d.). *Engineering mechanics*.
- Becker, H. (2015). *Structural competency for architects*. New York, N.Y: Routledge.
- Bedi, A. and Dabby, R. (2013). *Structure for architects*. Hoboken, N.J.: Wiley.
- Beer, F. and Johnston, E. (1984). *Vector mechanics for engineers*. New York: McGraw-Hill.
- Benjamin, J. (n.d.). *Engineering Mechanics*. Pentex Book Publishers and Distributors.
- Bhavikatti, S. (2010). *Mechanics of Solids*. New Age International Limited.
- Bjorn, N., Arne, P. and Mark, R. (n.d.). *The Structural Basis of Architecture*.
- Garrison, P. (n.d.). *Basic structures*.
- Garrison, P. (2005). *Basic structures for engineers and architects*. Oxford: Blackwell Publishing ltd.
- Ji, T., Bell, A. and Ellis, B. (n.d.). *Understanding and using structural concepts*.
- Macdonald, A. (1997). *Structural design for architecture*. Oxford: Architectural Press.
- Ochshorn, J. (n.d.). *Structural elements for architects and builders*.
- Onouye, B. and Kane, K. (2015). *Statics and Strength of Materials for Architecture and Building Construction*. Boston, MA: Pearson.
- Prasad I.B (n.d.). *Applied mechanics -Dynamics & Statics*. Khanna Publishers.
- Punmia, B. and Jain (n.d.). *Strength of Materials and Theory of Structures - Vol 1*.
- Rajasekaran, S. and Sankarasubramanian, G. (n.d.). *Engineering Mechanics*. Vikas Publishing House Private Limited.
- Ramamrutham, S. (n.d.). *Strength of Materials*. Dhanpat Rai Publishing Company Pvt Limited.
- Salvadori, M. (1975). *Structure in architecture; the building of buildings*. Englewood Cliffs: Prentice-Hall.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Viva	Written	Total
I & II	II	19AR12006	Theory of Design	2			2	50		100	150

Course Overview:

The course shall introduce the students to the basic theories of design as a cross disciplinary phenomenon. The course shall engage the students with various important design philosophies, their evolution and their major design directions. The course aims to supplement the broader understanding of design at the foundation level.

Course Outcomes:

Upon completion of the course, the student should:

- develop the vocabulary skills to effectively communicate design and its process.
- be able to critically review design and analyse them.
- be able to develop and understanding of the various design philosophies and their evolution.

Module 1: Elements of Design

Learning Strategies:

- Lecture
- Group Discussion
- Assignments

Module Contents:

- **Dot:** Illusion of roundness;
- **Line:** Types, Direction, Gesture, Contour, Quality & Value.
- **Planes:** Depth, Thickness, Boundary, Levels.
- **Shape/Volume/Mass:** Positive & Negative, Naturalism, Idealism, Abstraction, Distortion & Illusion.
- **Operations:** Detached, Within, Overlapping, Intersecting.
- **Texture:** Tactile, Visual, Actual & Implied, Pattern, Homogeneity.
- **Colour:** Colour theory, Psychology, Characteristics, Schemes., Properties of Colour, Symbolism and Psychology.
- **Value:** Light & Dark, Variations: Movement, Pause, Control, Focus.
- **Motion:** Anticipated, Suggestive, Actual and Illusion.
- **Perception of spaces:** Elements of spatial definition, Depth, Density, Opening, Juxtaposition and interpenetration, Spatial Characteristics of elemental shapes, Perspectives and projections.

Module 2: Principles of Design

Learning Strategies:

- Lecture
- Group Discussion
- Assignments

Module Contents:

- Unity: Gestalt Laws, Harmony, Variety, Factors of Coherence, Order in disorder, Gradation.
- Emphasis and Focal point: Axis, Datum, Hierarchy, Contrast, Complexity, Contradiction, Presence and Absence, Regularity and irregularity.
- Scale and proportion: The notion of scale, Ergonomics
- Anthropology and proxemics: Proxemics and Space bubbles, Commensurate and Incommensurate proportions, Vitruvian man, The modulor,Golden ratio and the Fibonacci series.
- Rhythm and Balance: Symmetry, Asymmetry, Interaction of design elements, Radial and crystallographic balance.
- Rhythm: Movement and Sensation, Shapes and Repetition, Pattern and Sequence, Progressive Rhythm and Gradation.

Module 3: Evolution of Design Discipline

Learning Strategies:

- Lecture
- Group Discussion
- Assignments

Module Contents:

- **Built Environment, human condition and Social Relevance of Design Solutions:** Abraham Maslow and built environment - needs vs wants and deficiency vs growth; Irvin Altman and behavioural concepts: Privacy, Territoriality, Crowding and Personal Space, understanding of different contexts to ascertain perception of meanings.
- **Evolution of design discipline:** Definition of design- physical, conceptual, Design since 1700s
- **Design Process:** Different maps of design process: Analysis, Synthesis and Evaluation.
- **Design Thinking:** Different Types and styles of thinking, Design strategies, Tactics and Guiding principles, Design as a communication.

Module 4: Nature as Primary Reference

Learning Strategies:

- Lecture
- Group Discussion
- Assignments

Module Contents:

- **Evolution of natural forms and Natural growth patterns:** Golden spiral, Fractals.
- **Emergent Designs:** Self -similarity, Self-organisation, Indeterminacy
- **Nature-inspired design:** Biomimicry, Janine Benyus and ideas from Biology, Contributions of Michael Pawlyn.
- **Bio-inspired Design:** Material ecology, Explorations of Neri oxman.
- **Works of Ross Lovegrove, Concept of Maximum with minimum:** Works of Buckminster fuller and Frei Otto.

Reference:

- Altman, I. and Chemers, M. (1980). *Culture and environment*. Brooks.
- Antonelli, P. and Lovegrove, R. (2004). *Supernatural - The Work of Ross Lovegrove*. Phaidon.
- Benyus, J. (2004). *Biomimicry - Innovation Inspired by Nature*. William Morrow.
- Ching, F. (2007). *Form, space & order*. New York: Van Nostrand Reinhold.
- Cross, N. (2011). *Design Thinking: Understanding how designers think and work*. Berg Oxford.
- Darcy, W. (1992). *On Growth and Form*. John Tyler Bonner (editor): Dover Publication.
- Hall, E. (1966). *The hidden dimension*. Anchor Books.
- Hannah, G. (2002). *Elements of design*. [United States]: Princeton Architectural Press.
- Lauer, D. (1999). *Design Basics*. Wadsworth Pub Co.
- LAWSON, B. (2014). *HOW DESIGNERS THINK - The Design Process Demystified*. ROUTLEDGE.
- Maslow, A. (2013). *A Theory of Human Motivation*. Martino Publishing.
- PAPANEK, V. (2019). *DESIGN FOR THE REAL WORLD*. THAMES & HUDSON.
- Pearce, J. (1990). *Structures in nature as a strategy for design*. MIT Press.
- Raizman, D. (2004). *History of modern design*. London: Prentice Hall.
- Steiner, R. (2001). *The fourth dimension - Sacred geometry, Alchemy and Mathematics*. Anchor Books.
- Von Meiss, P. (1990). *Elements of architecture*. Routledge.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Viva	Written	Total
I & II	II	19AR12007	Architectural Graphics			4	3	100		100	200

Course Overview:

This course is designed to generate comprehensive understanding of technical drawing techniques and architectural presentation. To introduce students to the fundamental concepts and techniques of graphical drawings, and multi-angle representations of built elements and built forms with applicable renderings.

Course Outcomes:

Upon completion of the course, the student should:

- develop visual communication through technical drawings.
- enhance 3Dvisualisation capability connecting to real world.
- develop 2-D & 3-D perception through observation, interpretation and logical understanding.
- stimulate and expand the skill of observing, interpreting and representing spaces and objects.

Module 1: Introduction of the Architectural Design Language – technical drafting and presentation.

Learning Strategies:

- Lectures
- Studio

Module Contents:

- Introduction to visual communication through technical drawings, tools & techniques for visual communication.
- Graphical Annotations and Symbols – Line types, line weights, labelling, titling etc.(T&S)
- Lettering -Introduction to Typography(T) – Free hand lettering – Block lettering (S)
- Dimensioning – Types of Dimensions with applications. (T&S)
- Scales- Plain Scale – Introduction to Graphical Scale – Diagonal Scale - Use and Applications. (T&S)

Module 2: Visual Representation

Learning Strategies:

- Lectures
- Studio
- Study Models

Module Contents:

- Orthographic projection – Introduction, Theory of projection, Systems of projection, projection of points, lines and planes - (With particular emphasis of first angle projection) (T)
- Orthographic Projection - Solids - Simple solid in simple position - top & front views, Auxiliary Projection-Axis inclined to one plane & parallel to other, Axis inclined to both planes –Altering the position method and Auxiliary plane method (T&S)
- Intersection of Solids - Method of drawing intersection between prism & prism, cylinder & cylinder, cone &cylinder. (Cases with mutually perpendicular axes only) - Applications (T&S)
- Section of Solids - (T&S) - True shape of section - Sectional views from the true shape of section
- Development of simple surfaces – Parallel Line Method- Triangulation Method – Radial Method – Approximate Method. (T&S)
- Conic Sections - Eccentricity, Types -Ellipse, parabola and hyperbola - Construction methods. Application of conics(T&S)

Module 3: Advanced Visual Representation

Learning Strategies:

- Lectures
- Studio
- Study Models
- Heliodon or related light & shadow casting equipment

Module Contents:

- Isometric and Axonometric Views (T&S)- types, construction methods, applications and advantages.
- Perspective View (T&S)– Visual Ray Method – Vanishing Point Method. Nomenclature of perspectives - Objects, study of picture plane, station point, vanishing point, eye level, ground level etc., its variation & effects.
- Application of Perspective in Architectural Drawings (T&S)– Interior and Exterior Views, Sectional perspectives.
- Sciography of Solids (T&S)- Principles of shade & shadow, shadows of architectural elements, application of sciography on pictorial views.
- Rendering Techniques (T&S)- using pen & ink, color, values, tones, and general approach to rendering.

Reference:

- Alexander, W. (2002). *The Elements of Graphic Design*. 1st ed. Allworth Press.
- Ching, F. (2015). *Architectural Graphics*. Wiley & Sons Canada, Limited, John.
- Couper, D. (1992). *Drawing and Perceiving*. Van Nostrand Reinhold.
- Evans, P. and Thomas, M. (2007). *Exploring Elements of Design*. 2nd ed. Thomson/Delmar Learning.
- Janson, H. (2002). *History of art, Prentice Hall*. Higher Education Division: Pearson Education.
- Meggs, P. (1998). *A History of Graphic Design*. 3rd ed.
- Morris, I. (1941). *Geometrical drawing for art students*. London a.o: Longmans, Green.
- Perard, V. (2012). *Anatomy and Drawing*. Dover Publications.
- S H, M. (n.d.). *Perspective*.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Viva	Written	Total
I & II	II	19AR12008	Mathematics for Design	2			2	50		100	150

Course Overview:

- To equip the students with necessary mathematical background to comprehend the aspects of design elements and structural stability.
- To recap students about the mathematical concepts of geometry, trigonometry, statistics and calculus; and make them understand the application of these concepts to architecture.
- Each of these core concepts will help students learn the skills associated with various subjects studied in B.Arch. course.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to understand mathematical concepts applied in architectural drawing.
- Acquire mathematical skills for analyzing and effective understanding of architectural works.

Module 1: Geometry

Learning Strategies:

- Widen knowledge 3D and 2D shapes

Module Contents:

- Basic two-dimensional shapes- curves, straight lines, triangles, quadrilaterals, rectangle, parallelogram, circles, ovals, squares, and spirals (Simple numerical problems on area, perimeter etc. and theory only)
- Basic Three-dimensional Shapes- Cube, Cylinder, Pyramid, Sphere (Simple numerical problems on Volume, Surface Area and theory only)
- Standard equation and problems based on properties of Conics
- Standard equation and problems based on properties of Parabola
- Standard equation and problems based on properties of Ellipse
- Standard equation and problems based on properties of Hyperbola
- Standard equation and problems based on properties of Rectangular Hyperbola
  (Note: Problems involving foci, eccentricity, directrix, latus rectum, tangent, chord, normal- Chap: 7,8,9,10 of Coordinate Geometry)

Module 2: Trigonometry

Learning Strategies:

- To include angles and corners in architectural design.
- Enables to draw properly load-bearing walls in the right places in the building

Module Contents:

- Trigonometrical ratios for angles less than the right angle
- Heights and Distances
- Trigonometric ratios of sum, difference and multiplication of two angles
- Identities and Trigonometrical equations
- Pythagoras Theorem and simple problems using the theorem
- Length of tangent to a circle – Simple problems
  (Note: Problems involving Length of tangent to a circle from Chap: 2,3,7,8 of Plane Trigonometry)

Module 3: Calculus

Learning Strategies:

- To better define curves of a structure, in order to produce the right reverberations within the building
- Enables to evaluate the physical forces a building must tolerate during and after construction

Module Contents:

- Differentiation; Maxima and Minima
- Successive differentiation – nth derivative using Leibnitz rule
- Radius of curvature (cartesian and parametric form)
- Evolute
- Area bounded by plane curve
- Arc Length of plane curves
- Volume of a solid of revolution

Module 4: Sequences & Statistics

Learning Strategies:

- To define and understand sequence
- To learn about important statistical measures essential for data analysis.

Module Contents:

- Arithmetic, Geometric Progression
- Golden Ratio- Its application in Design
- Statistics - Measures of Central Tendency- Mean-median-mode
- Measures of Dispersion- Mean deviation-standard deviation-variance.
- Covariance, Correlation – Karl Pearson coefficient
- Rank Correlation – Spearmen's coefficient for repeated and non-repeated ranks
- Regression coefficient–Lines of Regression-Fitting of straight line by method of least square

Reference:

- Bali, N. (n.d.). *Co-ordinate Geometry*.
- Bali, N., Goyal, M. and Watkins, C. (n.d.). *Advanced Engineering Mathematics*.
- Greenberg, M. (n.d.). *Advanced Engineering Mathematics*.
- Grewal, B. (n.d.). *Elementary Engineering Mathematics*.
- Grewal, B. (n.d.). *Higher Engineering Mathematics*.
- Gupta, S. and Kapoor, V. (2017). *Fundamentals of mathematical statistics*. Mumbai: Himalaya Publishing House.
- Kandasamy, P., Thilagavathy, K. and Gunavathy, K. (n.d.). *Engineering Mathematics - Vol 1 & 2*.
- Lauretta, J. (n.d.). *Geometric Shapes in Architecture*.
- Loney, S. (n.d.). *Plane Trigonometry*.
- Margaret, L., Barbara, B., Arnold, S. and Murphy, J. (n.d.). *Basic Geometry for College Students*.
- Merle, A. (n.d.). *The Pythagorean Theorem*.
- Miller, I., Freund, J. and Johnson, R. (2000). *Miller and Freund's Probability and statistics for engineers*. Upper Saddle River, NJ: Prentice Hall.
- Ramana, B. (n.d.). *Higher Engineering Mathematics*.
- Venkataraman, M. (n.d.). *Higher Mathematics for Engineering and Science*.

36. THIRD SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
III	I (a)	19AR03001	Architectural Design 3		10		10	250	250		500

Course Overview:

Familiarizing the process of design, Space articulation and Development of form

- To equip students to conceptualize form and space emphasizing the importance of the process of design
- To enable students to conduct Data collection, Case study and Analysis and to formulate their concepts and program
- To familiarize students with Development of Project Brief, Process of site analysis, Development of circulation diagram, form, function and their correlations
- To introduce students to basic structural systems and their applications
- To enhance the student's representation skills through 2D techniques and 3D modeling

Sustainable design objectives: Climatological influence on the design approach, natural materials, natural lighting and ventilation and passive technology.

Course Outcomes:

Upon completion of the course, the student should have:

- An exposure to architectural experience through the understanding of Elementary principles of Architectural Design on the basis of structure, function, context and aesthetics.
- An understanding of multi-space architectural unit and its expansion
- An understanding of the process and methodology of design
- An understanding of materials, its properties and design application

Major Project

Conceptualization of space and form through process of design development and space planning, responsive to the given context. Suggested projects may be design of architectural spaces (Not exceeding 200 SQM) such as residence, weekend cottage, coffee shop etc.

Critical analysis of a suggested space for functionality, structural stability, aesthetics, contextual relationship etc.

Emphasis may be given on:

- Space perception and the underlying concept
- Functional aspect of the space, user needs, circulation, efficient programming
- Architectural Composition and built form, massing and volume of space
- Application of building materials – color, texture and composition
- Climate responsive design, Passive Architectural techniques
- Space Planning and layout of Interior spaces

Minor Project

Documentation (Maximum of 3 days duration) of traditional Buildings and Portfolio preparation. This project may be carried out in association with settlement study of 19AR05001.

Time Bound Project

Short duration of (one day or less) Projects emphasizing on functionality of space to enhance student's imagination/innovation and decision-making skills.

Reference:

- Anderson, J. (2011). *Architectural design*. Lausanne: AVA Academia.
- Arvind, K., Nick, B. and Steve, S. (2001). *Climate responsive architecture*. New Delhi: Tata McGraw-Hill Pub. Co.
- Bakshi, S. (2008). *Architecture in Indian sub-continent*. Delhi: Vista International Publishing.
- Bawa, G. and Robson, D. (2002). *The complete works*. London: Thames & Hudson.
- Campos, C. (2008). *Living in small spaces*. Barcelona: LOFT Publications.
- De Chiara, J. and Crosbie, M. (2001). *Time-saver standards for building types*. New York: McGraw-Hill.
- De Chiara, J., Panero, J., Zelnik, M. and Michael, J. (2001). *Time-saver standards for interior design and space planning*. New York: McGraw-Hill.
- Panero, J. and Zelnik, M. (n.d.). *Human dimension & interior space*.
- Powell, R. (2001). *The tropical Asian house*. Singapore: Select.
- Ramsey, E. (2007). *Architectural graphic standards*. Hoboken, N.J.: John Wiley & Sons.
- Rapoport, A. (1969). *House form and culture*. Englewood Cliffs (N.J.): Prentice-Hall.
- Yatin, P. (n.d.). *Elements of Space Making*.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
III	I (b)	19AR03002	Building Materials and Technology 3	1	3		4	100	100		200

Course Overview:

- Understanding of building materials like Steel &Aluminum products and paints.
- Understanding different type of doors and windows.
- Understanding about the modern construction materials like glass and glass products, plastics, products and its application in construction industry
- The student should develop the skill to represent various construction techniques as well as materials through drawings supporting their building design.

Course Outcomes:

Upon completion of the course, the student should:

- Develop necessary decision-making skills in using appropriate construction technologies and materials while designing buildings, based on understanding of their potentials and properties.

Module 1: Steel, Doors, Windows

Learning Strategies:

- Lecture on steel, types of door and window fittings and surface finishes.
- Market study on types of fittings used for different purposes

Module Contents:

- Types-pig iron, cast iron, wrought iron
- Steel –mild steel, medium carbon steel, high carbon steel, manufacturing, composition, properties
- Anti-corrosive measures, Market forms of steel with particular emphasis on angles, sections and channels.
- Aluminum and its properties, UPVC
- Doors –Functional requirements, Types of doors – based on movement, materials and function
- Doors and design considerations: effective clear width of door openings, minimum width of passage way for certain door sizes etc.
- Windows –functional requirements, Types of windows- fixed light and opening light
- Air changes, Quality of day light
- Strength stability and air tightness, Resistance to passage of heat, Window U values

Market survey and presentation for Jury

- Door and window hinges like butt hinges, pin hinges, parliament hinges, garnet hinges, counter flap hinges, strap hinges, piano hinges, auto-closing hinges - Door and window bolts like sliding door bolt, tower bolt, flush bolt – door handles- door locks-other fastenings to door and windows like hook and eyes, window stays, door stoppers, door closers, caster wheels, floor springs, pivots, magnetic catchers for wooden cupboard.

Module 2: Plastics

Learning Strategies:

- Lecture on plastics, type of glasses & finishes
- Market survey for understanding about the topic.

Module Contents:

- Thermoplastics and thermosets: Thermosetting and thermoplastics, resins, fabrication of plastics, polymerization and condensation - Application of plastic in building construction.
- Properties and architectural uses of plastics: structural plastics – reinforced plastics and decorative laminates - plastic coatings, fabrications of plastics – FRP, plumbing applications – PVC, PPR, CPVC etc.
- Composition, types of glass: wired glass, laminated glass, double glazing, glass building blocks, their properties (including thermal and acoustics) and uses in buildings –
- Application of glass in construction – Structural glazing, curtain wall glazing-toughening, Insulation, applications in the building Industry with emphasis on energy efficiency. Natural and manufactured flooring materials, properties, uses. Applications

Module 3: Surface Finishes

Learning Strategies:

- Lecture on architectural finishes & their selection criteria
- Market study on different types of practices
- Site visits of various finishes at different stages till the final finishes.

Module Contents:

- Construction of ground floor and upper floor flooring
- Criteria for selection of flooring materials: -Appearance, resistance to abrasion &slipness, smoothness, durability, damp resistance, thermal insulation, fire resistance etc.
- Different types of floor finishes – natural & artificial - Natural stone, wood, ceramic, vitrified, oxides, vinyl, epoxy, terracotta etc.
- Inherent finish and applied finish
- Paints, distempers & varnishes – types –composition – properties – environmental, climatological and durability spects - application– Uses –BIS specifications- Covering capacity, method of distempering wall surfaces, and painting of timber and iron. Externalfinishes, Different types of finishes.
- Pre cast concrete cladding panels, GRC cladding panel, Sheet metal cladding
- Rain screens, Suspended glazing systems etc.

List of drawings for Jury (Minimum 7 sheets)

- Types of windows
- wooden windows-
- Steel windows
- Aluminum windows
- Types of doors: hinged, sliding, sliding and folding doors
- Timber doors
- UPVC doors & windows
- Structural glazing

Materials collected from the market survey shall be presented for the jury

Reference:

- Don, W. (1972). *Construction Materials and Process*. McGraw Hill Co.
- Emmitt, S., Gorse, C. and Meaden, A. (n.d.). *Barry's introduction to construction of buildings*.
- Jack, L. (1986). *Construction Materials and Methods*. Careers, South Holland, Illinois: Wilcox Co. Ltd.
- Rangwala S. C. (1997). *Engineering materials*. Charotar Publishing House, India.
- Shetty, M. (2007). *Concrete technology*. Ram Nagar, New Delhi: S. Chand.
- Varghese, P. (2005). *Building materials*. Prentice-Hall of India.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
III	I (c)	19AR13003	Professional Skill Enhancement 3			4	2	50	50		100

Course Overview:

This course intends to provide/ enhance the soft skills in order that students perform well in their academics and beyond. These skills are intended to support the student to perform better in her/his core subjects and also build up robust performance through hands-on workshops and laboratory training. This course is subdivided into two categories – Mandatory and Optional. Mandatory courses help in preparations for respective semester subjects. The optional category helps students to take personal initiatives to develop in specific areas that can widen their horizon of their understanding of architecture and also initiate action at the society level. There are also options to work on competitive exercises alongside other similar institutions.

Course Outcomes:

Upon completion of the course, the student should:

- be given an exposure of varied skills that can bring in confidence in handling their core subjects such as workshops, communication skills, computer applications etc.
- be able to develop team spirit and interpersonal skills to manage complex situations.
- be able to cope with stress and develop multi-tasking capabilities.

Module 1: Communication Skills 2

Learning Strategies:

- Language lab
- Group discussions and Interactive sessions

Module Contents:

- Training in oral and written communication skills to effectively communicate ideas.
- Interpersonal Communication.
- Verbal & Non-verbal communication, Body language, Persuasion.
- Individual Presentations (Audience Awareness, Delivery and Content of Presentation)
    - Writing Skills: Sentence formation; Use of appropriate diction; Paragraph and Essay Writing; Coherence and Cohesion.
    - Letter Writing: Formal, informal and demi-official letters; business letters.
    - Technical Writing: Differences between technical and literary style, Elements of style; Common Errors.
    - Report Writing: Basics of Report Writing; Structure of a report; Types of reports.
    - Presentation Skills: Oral presentation and public speaking skills; business presentations.
    - Group Discussion: Differences between group discussion and debate; Ensuring success in group discussions.
    - Non-verbal Communication and Body Language: Forms of non-verbal communication; Interpreting body language cues; Kinesics; Proxemics; Chronemics; Effective use of body language.

- Technology-based Communication: Netiquettes: effective e-mail messages; power-point presentation; enhancing editing skills using computer software.

Module 2: Computer Application 1

Learning Strategies:

- Computer lab sessions guided by experts
- Group discussions and Interactive sessions
- Develop theoretical understanding of AutoCAD and its relevance in Architecture. Students would develop skills of 2D drafting using various tools and techniques.

Module Contents:

- Introduction to computer aided drafting
- To develop and understand tools and basic set up for computer aided drafting
- Theoretical understanding of CAD
- Develops and draws various architectural plans, elevations and sections through 2 D Cad
- Manipulate and alter through various tools and techniques existing architectural drawings in 2D Cad

Module 3: Theatre/Music/any other co-curricular activities

Learning Strategies:

- Technical and hands on workshops
- Group discussions and Interactive sessions
- Self- initiatives

Module Contents:

- Optional content to be developed by each institution in order to help students to take part in activities that involve larger groups and facilitate peer learning.
- The activities could be skill oriented like Theatre/ Music training or student initiated societal activities or participation in NASA or similar student led group initiatives which has an academic content as well.

Reference:

- Cadfolks (2018). *AutoCAD 2019 for Beginners*. 1st ed. Kishore.
- Omura, G. and Benton, B. (2018). *Mastering AutoCAD 2019 and AutoCAD LT 2019*. 1st ed. Sybex.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam Jury	University Exam Written	Total
III	II	19AR03004	History of Architecture 3	2			2	50		100	150

Course Overview:

The subject aims at imparting knowledge about the development of architecture during medieval era in Europe, India and Kerala as a response to socio-cultural, geographical and political changes as well as technological advancements. The course also intends to expose the students to detailed studies on national as well as regional architectural history to prepare them well for contextual design applications.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to relate and identify built forms through socio cultural, climatic, political, economic influences on them in respective geography and timeline
- Be able to identify and compare elements of architecture, styles and intricate details across different regions
- Be able to use a theoretical base developed from architectural history in their design process

Module 1: European Architecture in medieval times

Learning Strategies:

- Unit wise lectures on how the built form in the region is a manifestation of its socio, cultural, climatic, political, economic context
- Drawing exercises on various significant architectural works in various eras/ geographies
- Lectures/ assignments on construction techniques
- Lecture/ discussion on observation of periodical changes and cross influences between various geographies
- Each lecture will have Pre- requisite readings and each module will have to specify self-learning component in the lecture plans

Module Contents:

- **Early Christian and Byzantine Empire 1**: Emergence and spread of Christianity | Old St. Peter's, Rome the evolution of early Christian Church form from the Roman basilica- St. Clemente
- **Byzantine Empire 2**: Centralized plan concept- St. San Vitale, Ravenna (brief) | The creation of eastern and western roman empire | Byzantine architectural character with study of Hagia Sophia (detail)
- **Romanesque Architecture**: Romanesque period: Monastic orders & development of Craft and merchant guilds, Influences & architectural character of Romanesque churches in Italy (Pisa complex), France (Abbey Aux Hommes) and England (Tower of London)
- **Gothic Architecture in France**: Development of Gothic architecture in France (Religious and social influences) - Evolution of vaulting and development of structural systems - Outline of Architectural characters - Examples: Notre Dame at Paris.
- **Gothic Architecture in Italy & England**: Development of English gothic vaulting - Outline of

Architectural character in England -Examples: Westminster Abbey and Hampton Court Palace at London | Development of gothic architecture in Italy - Outline of Architectural characters - Examples: Doges Palace at Venice, Milan Cathedral

- **Renaissance Architecture in Europe 1**: Italian Renaissance - The idea of rebirth and reJuryl of art – Factors influencing renaissance architecture -Outline of Architectural character during the early Renaissance, High Renaissance and Baroque Periods (brief) -Features of a typical Renaissance palace - Examples. Palazzo Ricardi. | Study of the contributions of the following architects: Brunelleschi, Michelangelo and Andrea Palladio - Examples - St. Peters basilica at Rome, Villa Capra in Vicenza
- **Renaissance Architecture in Europe 2**: Factors influencing French renaissance - Architectural character during the classical & Rococo periods (brief) - Examples - Chateau de Chambord and the Louvre at Paris. | Factors influencing English renaissance – Introduction to domestic architecture in Britain during the Elizabethan, Jacobean, Baroque and Georgian periods (brief) - Study of the works Sir Christopher Wren &Inigo Jones, Examples - St. Paul's Cathedral at London and Banqueting House at Whitehall.

Module 2: Indian Architecture in medieval times - Hindu Temple

Learning Strategies:

- Unit wise lectures on how the built form in the region is a manifestation of its socio cultural, climatic, political, economic context
- Drawing exercises on various significant architectural works in various eras/ geographies
- Lectures/ assignments on construction techniques
- Lecture/ discussion on observation of periodical changes and cross influences between various geographies
- Each lecture will have Pre- requisite readings and each module will have to specify self-learning component in the lecture plans

Module Contents:

- **Evolution of Hindu Temple**: Early shrines of the Gupta and Chalukyan periods - Tigawa temple and Ladh Khan temple | Introduction to the development of the Indo-Aryan & Dravidian style - Examples - Papanatha and Virupaksha temple at Pattadakal
- **Dravidian Style Temples 1**: Dravidian style – Definition / explanation of Mandapas&Rathas. Masonry temples & Rock cut architecture of Pallavas - Shore temple and five rathas at Mahabalipuram Dravidian Orders – Evolution of Dravidian orders under pallavas, Chola's and Pandya's. (brief)
- **Dravidian Style Temples 2**: Example of Chola style - Brihadeeswara temple at Tanjore. | Evolution of Gopuram& temple complexes – Example of Pandyan style - Meenakshiamman temple, Madurai
- **Indo-Aryan Style of Temples**: Classification of Indo-aryan temples Salient features of an Indo Aryan Temple - Examples at Orissa - Lingaraja temple at Bhuvaneshwar& Sun temple at Konarak - Example in central India - KhandaryaMahadev temple at Khajuraho - Example in Gujarat - Surya Temple at Modhera

Module 3: Indian Architecture in medieval times - Islamic Architecture

Learning Strategies:

- Unit wise lectures on how the built form in the region is a manifestation of its socio cultural, climatic, political, economic context
- Drawing exercises on various significant architectural works in various eras/ geographies
- Lectures/ assignments on construction techniques
- Lecture/ discussion on observation of periodical changes and cross influences between various geographies
- Each lecture will have Pre- requisite readings and each module will have to specify self-learning component in the lecture plans

Module Contents:

- **Islamic Architecture - Imperial style 1**: Classification of Islamic architecture in Indian, religious and secular typologies of Islamic architecture | Examples under imperial style; slave dynasty - Qutb Complex, Quwwat –ul-islam mosque, Qutbminar. | Khalji dynasty - Alai Darwaza at Delhi (concept of squinch arches)
- **Islamic Architecture - Imperial style 2**: Tughlaq dynasty - Tomb of GhiasuddinTughlaq, Khirki masjid | Sayyid dynasty – Tomb of Mubarak Sayyid | Lodi dynasty – Tomb of Sikanderlodi | Suri dynasty – Tomb of Sher Shah Suri, Bihar)
- **Islamic Architecture - Provincial style 1**: Characteristics of the provincial styles in different regions through examples (brief) - Punjab style - Tomb of shah RukniAlam - Bengal style - Chotasona masjid at Gaur –
- **Islamic Architecture - Provincial style 2**: Gujarat style - Jami masjid at Ahmadabad - Deccan style – Golgumbaz at Bijapur and Charminar at Hyderabad
- **Islamic Architecture - Mughal Style 1**: Characteristics of Mughal architecture, planning, materials and architectural elements. Development of the Mughal style under different rulers - Humayun- Humayuns Tomb at Delhi
- **Islamic Architecture - Mughal Style 2**: Akbar- examples -FatehpurSikhri (planning, Bulanddarwaza, DiwaniKhas, Tomb of SalimChisti) and Akbars Tomb at Sikandara. Shahjahan - examples - The TajMahal, at Agra - Red Fort at Delhi (Diwan-i- Aam, Diwanikhas, Mumtazmahal and Rang mahal)

Reference:

- An Architectural survey of Temples of Kerala. (1978). Published by ASI.
- Brown, P. (1983). *Indian architecture (Islamic Period*. Bombay: Taraporevala and Sons.
- Ching, F., Jarzombek, M. and Prakash, V. (2010). *A global history of architecture*. Hoboken, NJ: Wiley.
- Fletcher, B. (1999). *A history of architecture*. CBS Publication (Indian Edition).
- Grover, S. (1991). *The architecture of India (Islamic Period)*. New Delhi: Vikas Pub. House.
- Guruswamy, V. (2003). *Gateway to Indian Architecture*. Edifice Publication.
- Hillenbrand, R. (1994). *Islamic architecture Form, Function and Meaning*. Edinburgh University.
- Lloyd, S., Martin, R. and Müller, H. (1986). *History of World Architecture – Series*. London: Faber and Faber Ltd.
- Michell, G. (2009). *Architecture of the Islamic world*. Farnborough: Thames et Hudson.
- Michell, G. and Davies, P. (1990). *Monuments of India, Vol I, Buddhist, Jain*. London, England: Viking.
- Nuttgens, P. (1983). *The story of architecture from antiquity to the present*. H F Ullmann Publishers.
- Pier Luigi, N. (1972). *General Editor – History of World Architecture – Series*. New York: Harry N. Abrams, Inc. Pub.
- Tadgell, C. (1990). *The history of architecture in India*. London: Phaidon.
- Volwahsen, A. (1969). *Living Architecture – India (Buddhist and Hindu)*. London: Oxford and IBM.
- Webb, C., Schaeffer, P. and Palm, F. (1962). *Western civilization Volume 1*. New York: Van Nostrand.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
III	II	19AR03005	Theory of Structures 3	2			2	50		100	150

Course Overview:

The course primarily aims at providing the concepts of strength of materials and its importance in structural design. It focuses on the conceptual study of behavior and deformation of structural members upon flexure, compression and torsion.

Course Outcomes:

Upon completion of the course, the student should:

- be able to figure out the importance of engineering properties in selection of material.
- be able to develop basic skill to choose appropriate material for their project based on structural capability along with other criteria.
- be able to visualize the behaviour of flexure, compression and torsion in structural members to develop their design for a stable and practical structure.

Module 1: Strength of materials, Stress, Strain and Elastic constants.

Learning Strategies:

- Lectures on the below contents by presentation and discussion with relatively accessible mathematical equations and calculations.
- Lectures by using analogies and examples to explain structural concepts.

Module Contents:

- Introduction to strength of materials- Relevance of material strength in structural design.
- Stresses, Strains and Deformation – Concept, Normal stress (Compressive and tensile stress), shear stress, bending stress, Bearing stress and Torsional stress.
- Elasticity, strength and deformation – Relationship between stress and strain, Stress strain curve of mild steel and salient points. Ductile and brittle material. Elastic and plastic deformation.
- Elastic Constants – Significance of elastic constants, Modulus of elasticity, Modulus of Rigidity, Poisson's Ratio, Bulk Modulous. Comparative study of different structural materials based on elastic constants.
- Concept of Axial stresses - Bars of varying cross section, Deformation due to self-weight, Stress in composite bar.
- Temperature stresses – Concept, Temperature stress in composite bar.
- Principle of superposition and concept of strain energy.

Module 2: Behaviour of beams, Shear and Bending stress, Indeterminate structures

Learning Strategies:

- Lectures on the below contents by presentation and discussion with relatively accessible mathematical equations and calculations.
- Lectures by using analogies and examples to explain structural concepts.

Module Contents:

- Beams: Classification beams- simply supported Cantilever, Fixed, and overhang. Type of loads – Point load, uniformly distributed load, uniformly varying load, Concentrated Moment. Types of supports- Fixed, Hinged, Roller.
- Shear and bending moment –Analysis of simply supported, cantilever, overhanging beams Shear force and bending moment diagrams –only analytical method
- Bending (Flexural) stresses in beams- Theory of simple bending, Assumptions and derivation of bending equation. Bending rigidity/stiffness. Bending stress in symmetrical beams, Section modulus, Moment carrying capacity.
- Shear stresses in beams – Concepts, distribution of shear stresses in simple sections
- Indeterminate structures- static and kinematic indeterminacy. Determination of degree of static indeterminacy for beams and frames – (No Problems)

Module 3: Behaviour of Columns, Deflection of Beams, Concept of Torsion

Learning Strategies:

- Lectures on the below contents by presentation and discussion with relatively accessible mathematical equations and calculations.
- Lectures by using analogies and examples to explain structural concepts.

Module Contents:

- Columns and Struts – Concept of Long and short columns, Modes of failure - Effective length based on end conditions, critical load, slenderness ratio.
- Euler's equation for different end conditions (no derivation). Combined bending or eccentricity and direct stresses in short columns.
- Elastic bending of straight beams: Concept of Slope and deflections. Computations of slope and deflection of standard cases - Cantilever, simply supported and overhang beam for different load conditions using Double Integration method.
- Torsion – Concepts of torsion in beams, Assumptions in theory of pure torsion and torsion equation. Polar Modulus.
- Power transmitted, torsional rigidity/stiffness. Concept of shear centre.

Reference:

- Timoshenko.S.P, Strength of Materials, Part-1, D. Van Nostrand company, Inc. Newyork.
- Nag&Chanda, Fundamentals of Strength of Materials, Wiley India Pvt. Ltd.
- Bansal R.K., Strength of Materials, Lakshmi Publications, New Delhi.
- Bhavikatti S.S , Strength of Materials, Vikas Publishing House (P) Ltd.
- D.S. Prakash Rao, Strength of Materials, Vol. I, University Press (India) Ltd.
- Popov E.P., Engineering Mechanics of solids, Prentice Hall of India, New Delhi.
- Punmia B.C, Strength of Materials and Mechanics of structures, Vol.1, Lakshmi Publications, New Delhi.
- Vazirani V.N., Ratwani N. M., Analysis of Structures, Vol.1, Khanna Publishers, New Delhi.
- Kazimi S.M.A., Solid Mechanics, Tata Mc Graw Hill.
- Singh, Mechanics of Solids, , Prentice Hall of India, New Delhi.
- Arthur Morley, Strength of Materials, ELBS, Longman' s Green& Company.
- Devdas Menon, Structural Analysis, Vol.1, Narosa, Chennai.
- Bhavikatti S.S , Structural Analysis Vol. I, Vikas Publishing House (P) Ltd.
- Smith J.C. Structural Analysis, Macmillian Pub.Co.1985.
- Wang C.K.& Solomon C.G., Introductory Structural Analysis, McGraw Hill.1968.
- Norris & Wilbur, Elementary Structural Analysis, McGraw Hill.
- Timoshenko S.P, Young D.H., Theory of structures, McGraw Hill
- Punmia B.C., Strength of materials and theory of structures, Vol. II, Laxmi publications.
- Onouye, B. and Kane, K. (2015). *Statics and Strength of Materials for Architecture and Building Construction*. Boston, MA: Pearson.
- Prasad, I. (n.d.). *Applied mechanics -Dynamics & Statics*. Khanna Publishers.
- Punmia, B. and Jain (n.d.). *Strength of Materials and Theory of Structures - Vol 1*.
- Rajasekaran, S. and Sankarasubramanian, G. (n.d.). *Engineering Mechanics*. Vikas Publishing House Private Limited.
- Ramamrutham, S. (n.d.). *Strength of Materials*. DhanpatRai Publishing Company Pvt Limited.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
III	II	19AR03006	Climatology	2			2	50		100	150

Course Overview:

The subject primarily aims to provide a holistic understanding of climate in global, national and local contexts including a study of basic terminology used and various methods of classification and measurement of climatic data. The course also introduces the concept of human comfort and its relationship with climate and the built environment. Further, design strategies for built in the tropical region are stressed upon and concepts of lighting, ventilation and shading devices introduced.

Each concept shall be taught through an active use of the Climatological laboratory and using relevant traditional and contemporary buildings as case studies in both the International and Indian scenarios. In order to expose the students to the various design strategies for buildings in the tropical region, climate responsive strategies in shading, lighting and ventilation shall also be worked out in the architectural design studio.

Course Outcomes:

Upon completion of the course, the student should:

- learn how to analyze climatic factors in relation to the human comfort
- learn how to implement climatic factors in architectural design

Module 1: Introduction to Climate

Learning Strategies:

- Lecture notes
- Climatology lab
- Group discussion
- Debates
- Case studies
- Analysis
- E-resource

Module Contents:

- Climate & weather - Components and elements of climate, measurements and representations of climatic data.
- Climatic factors -Solar geometry the coordinates, earth's rotation, seasonal variations azimuth angles & altitude.
- Sun path diagram & solar envelope, earth's thermal balance, global winds.
- Climate classification -Global climate classifications (Koppen).
- Tropical climate, Indian climate classification (SP 41), characteristics, Design strategies for various climatic zones in India, Vernacular examples of architecture evolved from climate, Climate of Kerala. Analysis of a traditional building in Kerala context.
- Scales of climate - Macro, Meso& Microclimate, Urban and rural climate, Site climate.

- Factors affecting site Climate-Effect of landscape elements on site/micro climate, Site analysis concepts.

Module 2: Climate and Human Comfort

Learning Strategies:

- Lecture notes
- Climatology lab
- Hands-on Workshop
- Analyzing examples from books and journals
- E-resource

Module Contents:

- Thermal comfort factors - Physiological aspects, Body heat balance.
- Thermal Comfort indices, Thermal comfort chart - psychometric chart, Bioclimatic chart, ET chart, CET chart.
- Principles of heat transfer- transfer of heat through building envelope.
- Terminology - conduction, convection, radiation, Resistivity, Specific heat, and Thermal capacity. Performance of different materials with respect to its thermal gradient and periodic heat flow.
- Application of heat exchange in building- Passive design techniques in built fabric and un-built environment.
- Building orientation and design of openings to regulate heat gain by using solar chart in climatic design.
- Design of solar shading devices-movement of sun, locating position of sun, overheated period, shading devices, solar shading & shadow angles and their performance evaluation.

Module 3: Daylighting and Natural Ventilation

Learning Strategies:

- Lecture notes
- Climatology lab
- Hands-on Workshop
- Analyzing examples from books and journals
- E-resource

Module Contents:

- Day lighting: Climate & natural lighting, its transmission, reflection, diffusion and glare, Daylight parameters, Daylight factor, Advantages and limitations in different climatic zones, Daylight systems, strategies & devices. Daylight design for various occupancies using tables and graphs as given in SP 41.
- Natural ventilation: Functions of natural ventilation, Thermally induced air current - Stack effect &Venturi effect, Passive ventilation techniques, ventilation ducts.
- Air movements around and through the buildings- Air flow around the building, Wind shadows.
- Air flow through the building, Design considerations

Reference:

- Arvind, K., Baker and Szokolay (2002). *Climate responsive architecture*. New Delhi: Tata McGraw-Hill Pub. Co.
- DeKay, M., Bennett, S. and Brown, G. (1985). *Sun, wind & light*. John Wiley and Sons.
- Evans, M. (1980). *Housing, climate, and comfort*. London: Architectural Press.
- Givoni, B. (1982). *Man, climate and architecture*. London: Applied Science Publishers.
- Joseph, B. (2006). *Environmental science and engineering*. New Delhi: Tata McGraw-Hill.
- Koenigsberger, O. (1996). *Manual of tropical housing and building*. Bombay: Orient Longman.
- Konya, A. (1984). *Design Primer for Hot Climates*. London: The Architectural Press.
- Masters, G. (2004). *Introduction to environmental science and technology*. 2nd ed. Pierce Education.
- SP 41: Handbook on Functional Requirements of Buildings. (1987). Bureau of Indian Standards.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
III	II	19AR03007	Humanities	2			2	50		100	150

Course Overview:

Architecture serves as an ultimate embodiment of the human condition; it is shaped by the cultural, religious, socio-economic, and environmental forces of a people – among many other considerations that extend beyond simply aesthetics. How civilization shapes its space, and determines the shape of the built environment in relation to the natural world can speak volumes about what its core essence is, particularly as it transforms over time. Studying the philosophical meaning of shaping and reshaping the world throughout time offers the student a gestalt understanding of a physical and spatial exploration of the human condition and how they themselves fit within.

Students will be exposed to and asked to form an opinion about the myriad forces that shape the built environment and how it (architecture and urban form) contributes to the cultural identity of people, period, and place. At the beginning, through the semester, and at the conclusion students will reflect upon their personal definitions of architecture + humanity, and the inclusion of key concepts and considerations of the course will be assessed.

Course Outcomes:

Upon completion of the course, the student should:

- Comprehend what have been the major issues in the development of architectural design in socio- cultural context
- Illustrate the place specific nature of architectural design
- Appraise about architecture and its relationship to its historical, political, social, economic, technological contexts
- Develop an appreciation for space, and be able to discuss the role of design in enhancing life in the 21st century and before

Module 1: Sociology and Its Relation to Architecture

Learning Strategies:

- Lectures and written assignments

Module Contents:

- Definition of Sociology; nature, scope and utility of Sociology; branches of sociology
- Different social processes - cooperation, conflict, competition, accommodation, assimilation, progress and evolution
- Forms of social organization: society, community, family, culture
- Different family structures and architectural responses to different family types and housing typologies (traditional and contemporary)
- Relationship of social, economic and political systems to the built environment, relevance in Architecture.

Module 2: Man, Environment and Society

Learning Strategies:

- Lectures and written assignments

Module Contents:

- Journey of man from ancient through medieval to contemporary; formation of group living, settlements and beginning of community living as rural & urban
- Concepts of society, culture, traditions & civilization and their progressive development through different ages from Paleolithic to contemporary
- Culture and society, cultural lag, Deviant subculture, Culture and civilization.
- Different theories about culture and social identity with reference to architecture, social construction of space.
- Relation between culture and built form (exploration of architectural examples) based on design practices followed across India and the world
- Social development for Sustainable development, Sustainable Indigenous communities with case examples.

Module 3: Indigenization and Cultural Change

Learning Strategies:

- Lectures and written assignments

Module Contents:

- Society and environment, Social change, Factors of social change, Social stratification, Rural & Urban, class & caste
- Social and cultural aspects of building practices; Architecture as an identity; Loss of architectural identity and role of culture.
- Social changes in Kerala (structural, occupational, rural, religious and housing) including renaissance and social reform movement.
- Kerala Model Social development - characteristics, advantages and disadvantages.
- Urban Sociology focusing on study of life and interaction in cities and metropolitan areas, the economic, cultural and social changes of urbanisation leading to production or disintegration of identities.
- Study of demography, migration Social aspects of migration, gentrification, ghettoization, housing& slums and its effect on urbanisation and architecture.

Reference:

- An Introduction to Sociology. (n.d.). VidyaBhushan.
- Bart, P. and Frankel, L. (n.d.). *The student's sociological handbook*.
- Brinkerhoff, D. and White, L. (1998). *Sociology*. St. Paul, MN [etc.]: West Publ.
- Chitambar, J. (n.d.). *Introductory rural sociology*.
- Dr. Kumar, K. (n.d.). *Rural Sociology*.
- Dr. Valsyayan (n.d.). *Urban Sociology*.
- McCurdy, D., Shandy, D. and Spradley, J. (n.d.). *Conformity and conflict: Readings in Cultural Anthropology*.
- Philipchalk, R. and McConnell, J. (1994). *Understanding human behavior*. Fort Worth: Harcourt Brace Jovanovich College Publishers.
- Rapoport, A. (1969). *House form and culture*. Englewood Cliffs (N.J.): Prentice-Hall.
- Saile, D. (1986). *Architecture in cultural change: Essays in Built Form and Culture Research*. [Lawrence, KS]: School of Architecture and Urban Design, University of Kansas.
- Singh, K. (1973). *Principles of sociology*. Aminabad: Prakashan Kendra.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
III	I (c)	19AR03008(A)	Elective Workshop I: Architectural Photography	1		2	2	50	50		100

Course Overview:

This course aims at equipping students with the creation of successful images of exterior and interior architecture, as well as architectural models. The course discusses equipment, processes, and procedures necessary for the photography of built and unbuilt spaces, dusk/night architectural landscapes, and construction progress. Students will learn to use Digital SLR camera, lighting techniques, software and to create output. Students will be able to use High Dynamic Range (HDR): multiple exposures to create dramatic architecture/interior images without additional professional lighting.

Course Outcomes:

Upon completion of the course, the student will:

- impart the skills of capturing aesthetically appealing and creative architectural photographs through the use of appropriate cameras/ lenses and lighting conditions.

Module 1: Introduction to Photography

Learning Strategies:

- Lectures on relevant topics.
- Appraisal of famous photographs on the basis of principles and elements of photography.
- **Suggestive Exercises**: Task that would enable students to understand and explain the basic concepts of photograph.

Module Contents:

- General introduction to the art of photography; Origin and development of photography, Principles of design and its application in photography,
- Types of camera: DSLR, Mirrorless, Point and Shoot etc., Parts of camera, Basic Modes, Types of lenses and Application, Filters, Camera Accessories
- Basic Concepts: Exposure- Shutter speed, Aperture, ISO, Metering, Pixels, Resolution, Sensor size
- Lighting- Direction of lighting - front, side, back; shadows, texture, and effects of clouds; Types of artificial lighting, combined daylight and flash, Low light photography
- Color balance, Reading histogram, White balance and Color temperature.
- Perceptual Control, Effect of camera to subject distance, oblique angles, Depth of field and circle of confusion, Parallax Error
- Framing Views, Distortions, Composition, Applying the law of thirds
- Origins of architectural photography, Review of architectural photographs, Light and Shades

Module 2: Creativity in Shooting

Learning Strategies:

- Lectures and Discussions
- Introducing Digital Photo editing tools
- **Suggested Exercises**: Photography Exhibition on a theme that is related to the B.Arch. Degree Course- Object photography, Architectural Photography, Urban Photography

Module Contents:

- Understanding light and photography, External lighting- Direction of lighting - front, side, back, shadows, texture, and effects of clouds,
- Light modification, psychological effects, and types of artificial lighting, combined daylight and flash.
- Architectural photography- Interiors and Exteriors, Object photography, Photo documentation of architectural models.
- Communicating ideas through photography, Experimental manipulation. Photographic illustration. Double Exposure, Various trends in photography
- Overview of architectural photography, Color balance, Reading histogram, White balance and Color temperature.
- Finding Forms and Shapes, Elements and Principles of framing, Rules of composition, Aesthetic of framing and composition
- Perceptual Control, Depth of field and center of confusion

Module 3: Post production

Learning Strategies:

- Lectures and Discussions
- Workshops
- Labs

Module Contents:

- Introduction to software, RAW file editing, HDR Imaging, Adobe Photoshop and Lightroom, Retouching and color correction, Printing Preparation
- Framing Views- Single point and two point perspective- examples, distortions, emphasizing architectural elements,
- Effect of camera to subject distance, oblique angles, three point perspective- applications in interiors and exteriors -composition, symmetric composition, applying the law of thirds - examples, image capture to publication.

Module 4: Film Production

Learning Strategies:

- Discussions on Film as cultural texts to better understand the history and cultural manifestations.
- **Suggestive exercises**: Group work - Short film/ Video documentary on themes related to the subjects discussed in B.Arch. Degree course

Module Contents:

- Introduction to film theory and design for the dynamic media; creation of plan and scripting of a storyboard; Basic movie camera shooting, traditional analog and digital methods, Understanding video Camera and types
- Cinematography as an Artform, Framing, Composition, Camera Movements, Types of Shots, Lighting techniques
- Recording Sound, basic concepts and techniques
- Elementary film editing – video and audio, merging, morphing, transitions etc.
- File Formats and Conversion, memory manipulation and software compatibility.

Reference:

- Harris, M. G., & Harris, M. G. (1998). Professional architectural photography. Oxford: Focal Press.
- Rosa, J., & McCoy, E. (1994). A constructed view: The architectural photography of juliusshulman. Rizzoli Intl Pubns.
- Siskin, J. (2012). Photographing architecture: lighting, composition, post-production, and marketing techniques. Buffalo, NY: Amherst Media.
- Schulz A., Architectural Photography: Composition, Capture, and Digital Image Processing, O'Reilly Media Inc., 2010
- Michael Heinrich, Architectural photography, Birkhauser, 2009
- Michael G. Harris, Professional Architectural Photography, Taylor & Francis, 2002
- Kopelow A., Architectural Photography the Digital Way, Princeton Architectural Press, 2007
- Ken Dancyger, Technique of film and video editing, Theory & Practice, Routledge,2010
- S.E Browne, Video editing: A post production, Focal Press, 1996
- Roy, Thompson, Grammer of edit, Focal Press, 2013
- Reisz and miller, the techniques of film editing, Routledge,2010

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
III	I (c)	19AR03008(B)	Elective Workshop I: Carpentry and Welding	1		2	2	50	50		100

Course Overview:

This course provides students with an opportunity to learn carpentry and welding skills in repair and fabrication. Woodworking and welding workshop practice is a course designed to introduce students to general woodworking and welding practices. Students will expand their knowledge and experience through various projects, lessons, and vocabulary. Students will be expected to learn about and safely use hand tools, power tools, woodworking and welding machineries. The projects are designed to give students as much experience as possible by using many different machines and tools. The projects will also cover as many aspects of the building and woodworking industries as is possible in an entry level course.

Course Outcomes:

Upon completion of the course, the student will:

- have woodworking and welding skills that will be useful in any aspect of the construction industry.
- have a broader understanding of construction processes as well as more in-depth problem-solving skills

Module 1: Introduction to Carpentry

Learning Strategies:

- Workshops and labs

Module Contents:

- Need for the Work, Training, Relationship between timber, Tools and Carpentry
- Timber: Origin Structure of Timber, Types of wood conversion of timber, Types of sawing, Timber sections,
- Defects in wood: Seasoning of timber, Preservation, Types of preservatives, Other types of timber.
- Carpentry Tools: Classification of Tools, Measuring and Marking, Holding, Cutting, Grooving, Planning, Striking, Boring and Miscellaneous Tools, Care and maintenance of Tools, Precautions to be taken while using carpentry tools, sharpening tools, Wood working machines, Wood working lathe, Wood sawing machine, etc.
- Types of carpentry Work and Working Procedure: Marking, Sawing, Planning, Chiseling, Boring, Striking, Checking, Sharpening.
- Joints in Carpentry work: Classification, some associated terms, Lengthening/Widening Joints, Corner Joints, Framing Joints, Preparation of timber and making joint, Precautions in making a joint.
- Nails, Screws, Dowels, Bolts and Nuts, Adhesives etc.

Module 2: Introduction to Welding

Learning Strategies:

- Students may be encouraged to do Assembling projects that let them use their creativity.
- Students may design and make basic objects like a small shelf or a box, using wood and metal.
- The finished product shall be based on a design drawing meticulously prepared.
- They may estimate material requirements, create material lists and cut lists.
- The use of safety measures when working with tools may be ensured.

Module Contents:

- Define the welding process, welding terminology, and history of welding.
- Mechanical Properties of metal: Explain the mechanical properties of metals and their importance in welding processes.
- Welding Joints: Identify the five basic welding joints and welding symbols.
- Safety Demonstrate safe setup, operation, and shutdown of an oxy-fuel torch. Demonstrate safe setup, operation and breakdown of basic plasma arc cutting equipment. Explain the importance and use of ventilation
- Welding Work and working procedure: Welding Joints and Position, Basic Oxyacetylene Cutting, Basic SMAW/GMAW, Plasma Cutting

Reference:

- Engel, A. (n.d.). *Carpentry complete*. [Place of publication not identified]: Taunton Press.
- Finch, R. (n.d.). *Welder's handbook*.
- Hayward, C. (2009). *Carpentry for beginners*. Mansfield Centre, CT: Martino Pub.
- Ruth, K. (2004). *Welding basics*. Chanhassen, Minn.: Creative Publishing International.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
III	I (c)	19AR03008(C)	Elective Workshop I: Sculpture	1		2	2	50	50		100

Course Overview:

The course aims at introducing the art of sculpture, the associated skill sets and basic technical knowledge. This may be carried out as a studio-based course giving maximum freedom for creative exploration of the three-dimensional form. Students may create works of art as part of the studio, individually and in group, and the process may be considered as important as the product. They may present/ exhibit their work in a public platform and may be given opportunity to verbally express their work.

Course Outcomes:

Upon completion of the course, the student will:

- be enabled to express their idea of complex forms as three dimensional models
- be familiarized with properties of various materials and associated tools and processes involved.
- be creative freedom in the sculpture studio will help in explorations in architectural design
- develop team work skills and involvement in the community/society

Module 1: Introductory Discussions and Exercises

Learning Strategies:

- Lectures, workshops

Module Contents:

- Sculpture as an Art form, what is Art?
- Sculpture in history, Sculpture today
- Discussion on relationship between Sculpture and Architecture, 'Building as sculpture'
- Discussion using examples on how sculpture interacts with Building Interior, Nature landscape, Urban landscape
- Types of sculpture- based on materials, style, process etc. Additive and Subtractive processes, Carving, Moulding, Casting; Relief sculpture, Kinetic sculpture etc. Armature.
- Task 1: Basic form making exercises using Clay, Plaster of Paris, Wire mesh, Paper pulp, Foam board, Styrofoam, Wax, Wood etc.

Module 2: Exploring Materials and Techniques

Learning Strategies:

- Workshops and labs

Module Contents:

- Any of the 2 materials (minimum) given below shall be explored in the studio
- Terracotta: Theoretical understanding on Mixing of clay, Properties, Tools used, Possibilities and limitations, Methods in Pottery, working of a Kiln, understanding Ceramic and Porcelain, Finishes. Practical exercises to get familiarized with the material.
- Cement concrete: Theoretical understanding of Cement concrete, Properties, Types of

reinforcements used, Possibilities and limitations, Tools used, Methods, Safety aids, Finishes. Practical exercises to get familiarized with the material.

- Fiber Glass: Theoretical understanding of the admixtures involved, Properties, Possibilities and limitations, Tools used, Making mould, Methods, Safety aids, Finishes. Practical exercises to get familiarized with the material.
- Metal- Steel/ Copper/ Bronze/ Tin: Theoretical understanding of the admixtures involved, Properties, Possibilities and limitations, Tools used, Methods, Welding, Soldering, Brazing, Safety aids, Finishes. Practical exercises to get familiarized with the material.
- Task 2: Making a Relief Sculpture / a table top sculpture individually. The final product shall be completed to a stage so that it can be exhibited in a Gallery. Terracotta, Cement concrete, Fiber glass, Metals etc. shall be used. The process shall be documented.

Module 3: Artistic Expression and Team Work

Learning Strategies:

- Workshops and labs

Module Content:

- Task 3: Making a Kinetic Sculpture in group/ Making an Assemblage in group. The final product shall be completed to a stage so that it can be exhibited in a Gallery. The process shall be documented.
- Task 4: Making an outdoor sculpture/ Installation (in the campus or outside the campus) and documenting the process. Any material shall be used. Upcycling shall be encouraged.

Reference:

- Rudolf Wittkower, “Sculpture: Processes and Principles”, Penguin Books, 1991
- Karin Hessenberg, “Sculpting Basics: Everything You Need to Know to Create Fantastic Three-Dimensional Art”, Barron's Educational Series ,2005
- Hal Foster and Richard Serra, “Conversations on Sculpture”, Yale University Press, 2018
- Frederick Hartt, “Art: A History of Painting, Sculpture, Architecture”, Harry N Abrams Inc, 1989
- Nancy Adajania ... [et al.], “Vitamin 3-D: new perspectives in sculpture and installation”, Phaidon, 2009
- Tristan Manco,” Raw + material = art: found, scavenged, and upcycled’, Thames & Hudson, 2012

37. FOURTH SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	I (a)	19AR04001	Architectural Design 4		10		10	250	250		500

Course Overview:

Contextual response, Understanding site topography and emphasis on Design detailing

- To encourage students to study the context and elements of built and un- built spaces in an observable setting to develop a holistic understanding of the aspects that influence the built environment.
- To equip students to design multi space/ multi-functional spaces up to two storeys of moderately complex nature emphasizing the process of design through developing concepts, project briefs, Site analysis, Circulation diagram, Function, Form, Structural system. To familiarize with a systematic approach in design process
- To create an understanding of architecture on sloping sites
- To create an awareness of Building rules/National Building code of India / Universal design standards /other regulations.
- Special emphasis on architectural design detailing and constructability of the design intent.
- **Sustainable design objectives:** To create an awareness of the sustainable design principles considering Climate, Materials, Natural Lighting, ventilation and its influence on building envelope

Course Outcomes:

Upon completion of the course, the student should have:

- An understanding of functional aspects of built environment and formulating appropriate response
- An understanding the site context and reciprocate in a sustainable and environment friendly approach.
- An understanding of design outcomes with an emphasis on architectural design detailing

Major Project

Design of a built environment (Built up area not exceeding 1000 SQM) where different user groups interact such as school, day care center, primary health center, nursing home, hostel, motel etc. through a systematic design approach with a focus on design development process. The design possibility on a sloping site may be explored.

Emphasis may be given on:

- Response to the Site, context and sociocultural aspects
- Analysis of relationship between the spaces
- Analysis of interactions among user groups
- Analysis of site topography and formulation of appropriate response based on site slope
- Structural Systems in the built forms
- Sustainable approaches such as Rain water harvesting, passive cooling techniques, use of

low embodied energy materials etc.
- Climatic responsive design

Minor Project

Architectural appraisal/ appreciation of architectural elements/ building. Preparation of a report incorporating analysis, documentation, inferences and conclusion.

Time bound project

- Short duration of (one week) projects to boost the imagination/innovation and speedy decision making- such as Design of kiosk/bus shelter/exhibition pavilion/, saloon, internet cafe or other buildings/ spaces of similar nature
- Site visit to buildings under construction/completed (Detailed site visit report preparation)

Reference:

- Cross, N. (1984). *Developments in design methodology*. John Wiley & Sons.
- De Chiara, J. and Crosbie, M. (2001). *Time-saver standards for building types*. New York: McGraw-Hill.
- Heath, T. (1984). *Method in architecture*. Chichester: John Wiley & Sons.
- Johnston, D. and Gibson, S. (2008). *Green from the ground up*. Newtown (CT): Taunton Press.
- Lynch, K. (1962). *Site planning*. Cambridge, Mass.: The MIT Press.
- Miller, S. (1995). *Design Process: A Primer for Architectural and Interior Design*. New York: Van Nostrand Reinhold.
- Roth, L. (1993). *Understanding Architecture: Its Elements- History, and Meaning*. Icon Editions.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	I (b)	19AR04002	Building Materials and Technology 4	1	3		4	100	100		200

Course Overview:

The subject primarily aims at developing understanding in use of appropriate construction technique and material in building design based on feasibility of technology, physical properties (like density & specific gravity, strength, thermal properties), aesthetic value, socio-cultural impacts and relevance, socio-economic factors, Ecological footprint etc.

The course introduces the technological aspects of a building design from the perspective of functional building component where use of natural and artificial materials is discussed based on their application. Each material would be taught in a manner such that its application would be discussed in a sequential manner, starting from foundation level, followed by plinth & others (sill, lintel, sunshades, window/door openings, walling material, as a floor & flooring) and culminating at roof and parapet wall. Construction technology and appropriate materials for structural systems, roofing, enveloping and interior finishes shall be considered under this subject from simple examples to complex.

Course Outcomes:

Upon completion of the course, the student should:

- develop necessary decision-making skills in using appropriate construction technologies and materials while designing buildings, based on understanding of their potentials and properties.
- develop the skill to represent various construction techniques as well as materials through drawings supporting their building design.

Module 1: RCC Structures I

Learning Strategies:

- Lecture on RCC and framed structures
- Site visits to understand framed structures
- Detailed drawings of RCC slabs and details

Module Contents:

- Introduction to framed structures. - Concrete floors, walls, beams and columns.
- Types of Concrete constructions – Plain Concrete, Reinforced Concrete, High density concrete, polymer concrete, High strength concrete, light weight Concrete, Ready mix concrete, Shotcrete, Vacuum concrete, Limecrete, Glass concrete, Asphalt concrete,
- Reinforced cement concrete: Reinforcements used in RCC – Suitability & performance - Reinforcement details of RCC elements like column, beam, lintel, slab, waist slab etc. BIS specification. Details of construction joints, expansion joints in buildings – Method of construction – Filling of joints – Water proofing.
- Steel Reinforcement: Hot rolled bars, CTD bars, TMT bars, Welded wire fabrics; Steel for Pre-stressed Concrete; Structural steel; Stainless steel and steel alloys
- RCC Shuttering, Scaffolding – advances in practice.

Module 2: RCC Structures II

Learning Strategies:

- Lecture on various types RCC slabs & Structural members
- Site visits to construction sites during various stages
- Drawing studios on representation of different RCC Slabs

Module Contents:

- RCC one-way slab and one-way continuous slabs: Principles and methods of construction.
- RCC two-way slab and two-way continuous slabs: Principles and methods of construction.
- RCC cantilever slabs, sloping slab and waist slabs: Principles and methods of construction.
- Waffle slabs and coffer slabs - Principles.
- Post tensioned and Pre-Cast concrete – Principles and methods of construction - floors, slabs, structural members.

Module 3: Vertical transportation

Learning Strategies:

- Lecture on various types lifts and their applications
- Site visits to construction sites during various stages
- Drawing studios on lifts and other related systems.

Module Contents:

- Lifts – Calculation of requirements and number of lifts considering quality and quantity of services
- Details of construction of lift shaft, lift pit, lift car – machine room etc. Standard sizes – Lifts of various types such as machine room less, passenger, goods, hospital etc.
- Modern development in the field of vertical transportation – sky lobby concept, double decker lifts etc.
- Escalator – Different types – provision to be made during construction – installation of escalator. Escalator details.
- Travellator – Functions and types

Module 4: Roofing

Learning Strategies:

- Lecture on different types of roofing materials, application and relevance.
- Site visits to construction sites during various stages
- Drawing studios to understand fixing systems.

Module Contents:

- Introduction to roofing materials, desirable properties and climate related aspects.
- Roofing Tiles – clay and cement tiles, different types - properties and method of fixing.
- Light roofing materials - Galvanised iron sheets, asbestos cement sheets, corrugated aluminum sheets,
- Sandwiched aluminum panels, PVC sheets and other light roofs like glass fiber reinforced plastic sheets, bituminous sheets with accessories, shingles etc. and method of their fixing.
- Tensile membrane roofing.

List of drawings for Jury (Minimum 7 sheets)

- Beam with reinforcement details
- Cantilevered beam with reinforcement details
- Waist slab with reinforcement details
- Expansion joints and construction joints with water proofing details
- One way and two-way slabs
- Cantilevered slab
- Lifts – with machine room and without machine room
- Roofing with fixing details – tiles, shingles, light roofing materials etc.
- Tensile roofing – fittings and details

Reference:

- Ching, F. (1975). *Building construction illustrated*. VNR.
- Lyons, A. (1997). *Materials for architects and builders: an introduction*. London: Edward Arnold (Publishers) Ltd.
- McKay, W. (1981). *Building construction*. London: Longman.
- Ramchandra, S. (1984). *Design of steel structures*. Delhi: Standard Book House.
- Rangwala S. C. (1997). *Engineering materials*. Charotar Publishing House, India.
- Shetty, M. (2007). *Concrete technology*. Ram Nagar, New Delhi: S. Chand.
- Varghese, P. (2005). *Building materials*. New Delhi: Prentice-Hall of India Pvt. Ltd.
- Relevant BIS Code Pertaining to Materials of Construction

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IV	I (c)	19AR04003	Professional Skill Enhancement 4			4	2	50	50		100

Course Overview:

This course intends to provide/ enhance the soft skills in order that students perform well in their academics and beyond. These skills are intended to support the student to perform better in her/his core subjects and also build up robust performance through hands-on workshops and laboratory training. This course is subdivided into two categories – Mandatory and Optional. Mandatory courses help in preparations for respective semester subjects. The optional category helps students to take personal initiatives to develop in specific areas that can widen their horizon of their understanding of architecture and also initiate action at the society level. There are also options to work on competitive exercises alongside other similar institutions.

Course Outcomes:

Upon completion of the course, the student should:

- be given an exposure of varied skills that can bring in confidence in handling their core subjects such as workshops, communication skills, computer applications etc.
- be able to develop team spirit and interpersonal skills to manage complex situations.
- be able to cope with stress and develop multi-tasking capabilities.

Module 1: Computer Applications 2

Learning Strategies:

- Computer lab sessions guided by experts
- Group discussions and Interactive sessions
- Prepare presentation drawings, generating 3D and rendered views.

Module Contents:

- To comprehend tools and systems for 3d modelling in CAD
- Develops and draws various architectural volumes, forms and surfaces through 2D Cad
- Convert and draw 2D architectural drawings to 3D forms

Module 2: Social Initiatives or any other co-curricular activities

Learning Strategies:

- student initiated activities
- hands on workshops, competitions etc.

Module Contents:

- Optional content to be developed by each institution in order to help students to take part in activities that involve larger groups and facilitate peer learning.
- The activities could be student initiated societal activities or participation in NASA or similar student led group initiatives which has an academic content as well.

Reference:

- Cadfolks (2018). *AutoCAD 2019 for Beginners*. 1st ed. Kishore.
- Omura, G. and Benton, B. (2018). *Mastering AutoCAD 2019 and AutoCAD LT 2019*. 1st ed. Sybex.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	II	19AR04004	History of Architecture 4	2			2	50		100	150

Course Overview:

The subject principally aims at sensitizing the students towards understanding architecture as a product of historic evolution along the timeline through socio cultural and political changes as well as technological advancements. This course also intends to expose the students to detailed studies on how ideological and technological advancements drastically influenced the transformation of architecture in the modern times till contemporary era around the world and India.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to relate and identify built forms through socio cultural, climatic, political, economic influences in respective geography and timeline
- Possess skill to formally (visually and theoretically) analyse and appreciate architectural works
- Be able to use a theoretical base developed from architectural history in their design process
- Be exposed to plethora of contemporary architecture practices in India

Module 1: World Architecture in modern times

Learning Strategies:

- Lecture on evolution of architecture in various geographies around the World (industrial and post-industrial time)
- Lecture/ discussion on major changes and influences during industrial era
- Model making/ Drawing exercises on significant architecture works around the World during the era
- Create theoretical and philosophical understanding of modernism, structuralism and industrialization in relation to people-built forms and way of life.
- Each lecture will have Pre- requisite readings and each module will have to specify self-learning component in the lecture plans.
- This module requires a minimum of four one-hour lectures to be included in the lecture plan.

Module Contents:

- Introduction to industrialization and industrial era, mode of production, use of technology and resultant changes in built forms, its design, material and quality
- Prominent art/ architectural movements during industrial era, modern movements, art and craft movement Avant grade movements
- Major ‘isms’ in industrial and post-industrial era, modernism, structuralism, cubism, minimalism, brutalism, tropical Modernism
- Analyzing works of major architects- Louis Sullivan, Peter Behrens, Antoni Gaudi, Victor Horta,
- Analyzing works of major architects- Adolf Loos, Walter Gropius, Mies van der Rohe, Frank Lloyd Wright
- Analyzing works of major architects- Le Corbusier, Alvar Aalto, Louis Kahn, Geoffrey Bawa

Module 2: Post Modern and Contemporary Architecture

Learning Strategies:

- Lecture/ discussions on Post Modern and Contemporary Architecture
- Create theoretical and philosophical understanding of Post-modernism, Post-structuralism and Contemporary trends in architecture in relation to people-built forms and way of life
- Each lecture will have Pre- requisite readings and each module will have to specify self-learning component in the lecture plans
- This module requires a minimum of four one-hour lectures to be included in the lecture plan
- Drawing/ Model making exercises on various significant architectural works

Module Contents:

- Introduction to postmodernism, post-structuralism, postmodernism in architecture
- Biomimetics / Biomimicry, discussing works/ideas of Michael Pawlyn, Antonio Gaudí, Santiago Calatrava
- Introduction to Contemporary Architecture and trends
- Discussing works of Robert Venturi, Peter Eisenman, Frank Gehry, Zaha Hadid
- Discussing works of Rem Koolhaas, Daniel Libeskind, Bernard Tschumi, Shigeru Ban

Module 3: Indian Architecture in modern times

Learning Strategies:

- Lecture on chronological evolution of modern architecture in various geographies within India
- Lecture/ discussion on observation of changes and influences
- Drawing exercises on various significant architectural works
- Each lecture will have pre-requisite readings and each module will have to specify self-learning component in the lecture plans
- Note for Unit 1: Emergence of new typologies examples considered are Clock towers, Town halls, Hill stations, Civil lines, Clubs, Gymkhanas, Hotels, Parks, Gardens, Bungalows, etc. Also, introduction to building regulations (Building laws, ASI, PWD, MES)
- Reference for Unit 2 and 3 Terminology- Jon Lang, A Concise History of Modern Architecture in India

Module Contents:

- **Colonial Architecture 1**: Introduction to Colonialism and its impact on built form in different regions | Emergence of New Typologies | Colonial style in India under Portuguese - Goa - Goan Houses, The Basilica of Bom Jesus. | Dutch - Malabar Coast Kochi - Mattancherry Palace/Dutch Palace
- **Colonial Architecture 2**: French - Pondicherry – characteristics of buildings in French Colony | English - Calcutta (The Victoria Memorial), Mumbai (Chattrapathi Shivaji Terminus/Victoria terminus) and Delhi (Rashtrapathi Bhavan/ Old Viceroy's House)
- **Evolution of Modern Architecture in India post- Independence 1**: First- and Second-generation Modernist architects (1947-80) | Modernist Architecture or that influenced by Modernism e.g.Golconde
- **Evolution of Modern Architecture in India post- Independence 2**: work and influence of Le

Corbusier and Louis Kahn | Habib Rahman, Hasmukh Patel, Anant Raje, Achyut Kanvinde, Otto Koenigsberger, Joseph Allen Stein

- **Evolution of Modern Architecture in India post- Independence 3**: Evolution of Post-Modernist Architecture (1975-1995): Alternate practices and Critical regionalism- works by Laurie Baker, Nari Gandhi, etc. |
- **Evolution of Modern Architecture in India post- Independence 4**: Early and later works by Charles Correa, BV Doshi and Raj Rewal | Changes in practice Post Liberalization

Reference:

- Curtis, W. (1987). *Modern architecture since 1900*. London: Prentice Hall PTR.
- Frampton, K. (1980). *Modern architecture*. London: Thames & Hudson.
- Ghirardo, D. (1996). *Architecture after modernism*. London: Thames and Hudson.
- Jencks, C. (2012). *The Story of Post-Modernism*. Hoboken: John Wiley & Sons.
- Lang, J. (2010). *A concise history of modern architecture in India*. Ranikhet: Permanent Black.
- Lang, J., Desai, M. and Desai, M. (2000). *Architecture and independence*. Delhi: Oxford University Press.
- Mehrotra, R. (2011). *Architecture in India*. Mubai: Pictor.
- Nuttgens, P. (1983). *The Story of Architecture from antiquity to the present*. H.F. Ullmann Publishers.
- Pawlyn, M. (2011). *Biomimicry in architecture*.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	II	19AR04005	Theory of Structures 4	2			2	50		100	150

Course Overview:

The course primarily aims at giving an overview of possibilities of Concrete as structural material and its applications in Architectural design. It focuses on understanding of the various structural systems, designs and theory of RCC structural members.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to develop basic skill to choose an appropriate structural system and technique in RCC from various possibilities.
- Be able to determine an approximate determination of member sizes of structural members to enhance their Architectural design.
- Be able to understand the possibilities and limitations of RCC.
- Be able design a single storey RCC framed and load bearing structures.

Module 1: Basic design concepts of RCC, Structural planning, Limit state method, Design of beam.

Learning Strategies:

- Lectures on the below contents by presentation and discussion on Architectural projects to make students understand structures in the context of Architecture.
- Lectures by using analogies and case study on failures to explain structural design concepts.

Module Contents:

- Introduction to Concrete: Brief history, Advantageous and disadvantageous. Overview, concept and its application of Plain cement concrete, Reinforced cement concrete, important properties of concrete and steel.
- Pre stressed concrete, Precast concrete, Fiber reinforced concrete and Ferrocement concrete.
- Basic design concepts of RCC – Steps involved in construction, Roles and responsibilities of designers, Design considerations, Concept of Analysis and design, Overview of Design philosophies – Working stress method, Ultimate load method, Limit state method, Codes and specifications, Loads and load combinations. Permissible stresses-factor of safety-assumptions.
- Limit state method: Concepts-assumptions –characteristic strength and load, partial safety factors- limit states-limit state of collapse –limit state of serviceability. Code recommendations for limit states.
- Introduction to R.C.C beams, behavior of R.C.C beams, types of beams, effective span, size of beam, covers to reinforcement.
- General design procedure, Design of Singly reinforced beams, Doubly reinforced beams.

Module 2: Design of slabs and Design of staircase

Learning Strategies:

- Lectures by using analogies and case study on failures to explain structural design concepts.

Module Contents:

- Slabs: Introduction to slabs, Behavior of slabs
- General design procedure, Design of one-way slabs.
- Design of two-way slabs
- Design of Flat slab (concept only).
- Staircase: Classification and behavior of staircase based on spanning– spanning transversely – (slab cantilevered from spandrel beam or wall, doubly cantilevered from central spine beam, supported between two stringer beams), spanning longitudinally. (Theory only).
- Design of Staircase, straight single flight.

Module 3: Structural patterns, approximate load calculations. Design of foundation and columns.

Learning Strategies:

- Lectures on the below contents by presentation and discussion of a single or double bay single storey building.
- Lectures by using analogies and case study on failures to explain structural design concepts.

Module Contents:

- Structural patterns: – Introduction, Defining the structural grids – Orthogonal and radial grids, Complex or irregular grids, Integration of Structural, spatial and contextual patterns
- Approximate load calculation: - Contributory area method, Dead load and live load calculations at the base of column.
- Soils and Foundations: -Bearing capacity of soil, Criteria for selection of foundation. Types of foundation and its behavior – Shallow foundation – Isolated, Combined, Strip, and Raft. Deep foundation – Pile. (Theory only)
- Design of isolated footing subjected to axial compressive loads.
- Compression members: - Proportioning of columns, effective length of the column, loads on columns, slenderness limits.
- Design of short column subjected to axial loads.

Reference:

- Relevant IS codes. (I.S 456, I.S 875, SP 16)
- Park R and Pauloy T, Reinforced concrete structures, John Wiely & sons Inc.
- Purushothaman P, Reinforced concrete structural elements-Behaviour, Analysis and Design, Tata McGraw Hill publishing company Ltd.
- Unnikrishna Pillai S. & D. Menon, Reinforced concrete design, Tata McGraw Hill Publishing company Ltd.
- Mallick S.K., Reinforced concrete, Oxford & IBH Publishing company.
- Varghese P.C., Limit state design of Reinforced concrete, Prentice Hall of India Pvt Ltd.
- Ashok .K. Jain, Reinforced concrete- Limit state design, New Chand & Bose.
- S.S Bhavikatti, Design of Reinforced concrete structures, I.K.International Publishing house Pvt.Ltd
- Prestressed Concrete Structures by P.Dayaratnam
- Precast concrete, Materials, Manufacture, Properties and Usage, M.levitt
- Structural Competency for Architects, Hollee Hitchcock Becker
- Dr. Shah, V. and Dr. Karve, S. (n.d.). *Illustrated design of Reinforced Concrete structures*.
- Subramanian, N. (n.d.). *Design of Reinforced concrete structures*.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	II	19AR04006	Building Services 1	2			2	50		100	150

Course Overview:

Services are the lifeline systems of any built form making it functionally habitable. They also make them efficient, comfortable and safe. Building services essentially include fluid systems, electrical & energy systems, lighting systems, HVAC systems, security systems etc.

This course as the first of the 3 courses in Building services is intended to give the students an overview of the plumbing systems at various levels, their architectural considerations and their coordination with other services.

Course Outcomes:

Upon completion of the course, the student should:

- develop an understanding about the importance of services in buildings and its coordination in the built environment.
- be able to critically understand various water supply, sewerage and drainage systems in our built environment.
- be able to conceptualise and integrate such services into small scale buildings. (up to G+2) and produce a schematic drawing for the same.

Module 1: Importance of Building Services - Water supply & Sanitation

Learning Strategies:

- Lectures on the history and relevance of Building services and broad overview of different systems.
- National and International study reports on the topic – Based on Literature studies from LEED, IGBC, GRIHA.

Module Contents:

- Introduction to building services, Historical overview of development of water/ sewerage systems - (Mesopotamia, Indus, Roman, Egyptian)
- Importance of water supply and sewerage. - History of Sanitation with respect to human civilization, Importance of Health, Hygiene, Cleanliness, Waterborne, Water-related, and Water based Epidemic diseases, Conservancy system to water carriage system – importance of conserving water carriage system (watershed management, groundwater recharge, reservoir formation, means of conserving river, streams, canals, aqueducts etc.)
- Urban sanitation – Load on system, types of waste management system, Government schemes related to the topic
- Rural sanitation - Load on system, types of waste management system, Government schemes related to the topic

Module 2: Water Supply for Urban Area

Learning Strategies:

- Lectures on different aspects of Water supply systems.
- Site visits to understand the systems on water treatment plants.
- Market surveys to familiarize materials, fittings and equipment.

Module Contents:

- Sources and Quality of water, impurities in water and its treatment. - Quality of supply for different uses as per national and international standards, Water treatment plant, Treatment of water for different uses, filtration, softening, disinfection etc.
- Water demand calculations; norms and standards, Quantity of water for different usages,
- Water storage – private and public, overhead tank, and sump.
- Water distribution system (Gravity, pumping, combined) and Distribution networking (Dead-end, radial, grid iron, ring at city/ neighborhood overview, Guidelines for laying of water mains, distribution.)
- Water distribution systems- gravity system, hydro-pneumatic system etc.
- Water pipe materials, apparatus, joints, fixtures and valves - Material of construction like GI, PPR, PB, CPVC, Composite pipes, Copper, Flow control Valves – Gate valve, Globe valves, butterfly valves, Pressure Reducing valves &station. (at an urban scale)

Module 3: Domestic Water Supply

Learning Strategies:

- Lectures on different aspects of Water supply systems.
- Case studies to understand the building systems
- Market surveys to familiarize materials, fittings and equipment.
- Applications of knowledge water supply and sewage design
- Preparation of drawings excluding hydraulic design

Module Contents:

- Principles of water supply in domestic buildings. - Basic considerations in supply of water
- Water supply in low-rise and multi-storeyed buildings - basic considerations - design of storage tanks, fire demand, head loss, direct and indirect supply, design considerations for plumbing shafts.
- Hot-cold water supply network and connections, solar water heating systems
- Pipe materials, fixtures, joints, equipment - Water supply piping – hot, cold, flushing water, piping in sunken areas, false ceiling areas. (at a domestic scale)
- Roof top water drainage, Storm Water treatment, disposal systems and Rain water harvesting systems.

Module 4: Domestic Sewage System

Learning Strategies:

- Lectures on different aspects of Sewage systems.
- Case studies to understand the building systems
- Market surveys to familiarize materials, fittings and equipment.

Module Contents:

- Principles of domestic sewer systems norms and standards - Basic considerations in disposal of waste water (hygienic considerations, head loss, networking/pipe system (domestic and public) etc.)
- Components of sewer conveyance network, Calculation for Gradient and slope in sewage disposal.
- Connection of house drainage to public sewer - Inspection chamber, intercepting trap, man holes etc.
- Various sanitary fixtures and its connections, Sewage disposal to septic tank, cess pool, soak pit, design of septic tank.
- Types of traps used and water seal.

Reference:

- Plumbing Engineering by Dr. Subhash Patil
- International Plumbing Code by Indian Code Council
- Modern Plumbing by E. Keith Blankerbaker
- Plumbing Basics by Dr. Rick Peters
- Building Construction Illustrated by Dr. F.D.K Ching
- Building Construction by Sushil Kumar
- Building Construction by B.C Punmia
- Building Construction by Rangwala
- Mechanical and Electrical Equipment for Building by Walter T. Gondzik
- Birdie, G. S. and Birdie J. S. Water Supply and Sanitary Engineering, Dhanpat Rai Publications, 2010

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	I (c)	19AR04007	Site Planning & Landscape Design	1	2		3	75	75		150

Course Overview:

- The subject primarily aims to introduce the students about site planning and landscape architecture and to imbibe the importance of integration of landscape design with architectural design.
- The course introduces the natural and man-made components of landscape that generate the decisions in the planning of any site, and the role of landscape architecture for the judicious co-existence of man with nature and its patterns and systems. This course shall have a direct application in the design studio of the same semester as well as subsequent semesters for site planning and landscape design of the respective design assignments.

Course Outcomes:

Upon completion of the course, the student should:

- be equipped to site planning process and its significance; establishing relationship between site characteristics and design requirements.
- Understand the elements of landscape, principles of landscape design and its application in the landscape design of unbuilt environment of the site.
- Understand road layout and grading in sloping sites
- Understand of environmental issues and application of site planning and landscape design in addressing the same.

Module 1: Elements of landscape and Site Analysis

Learning Strategies:

- Lectures
- Studio exercise: Site analysis (of the site dealt in Architectural Design studio-IV) leading to site suitability/ zoning

Module Contents:

- Introduction of landscape architecture and need for integration of landscape design with architectural design
- Natural elements of landscape: land, water, vegetation
- Landform studies: Contours, ridges, valleys, watershed etc.
- Man-made elements of landscape: Built elements, Services, etc.
- Other aspects like cultural, historic, social, environmental, visual etc.
- Study of natural systems: topography, hydrology, geology, wind patterns etc.
- Slope analysis
- Study of co-existence of natural systems with man-made elements
- Influence of natural manmade and other elements on site leading to site analysis & site suitability.
- Landform modifications like cutting, filling, terracing etc.
- Basics of grading, road layout in sloping site and road grading.

Module 2: Hardscape and Softscape design

Learning Strategies:

- Lecture on principles of landscape design
- Design studio using elements and principles of Landscape Architecture – minor project
- Market study of hardscape materials and systems

Module Contents:

- Principles of landscape architecture
- Study of hardscape materials
- Study of vegetation: trees, groundcovers, shrubs etc.
- Different types of plants used in tropical landscape, its purpose and appropriate usage in relevant context (avenues, shading, borders, focal point etc.)
- Association of hardscape and softscape elements
- Vertical gardens and terrace landscaping
- Minor design project applying principles of landscape design, hardscape and softscape elements. Eg: plaza design

Module 3: Site specific planning and Planting design

Learning Strategies:

- Lecture on site planning based on site analysis and suitability
- Lecture on Hierarchies of open spaces
- Group discussion on current environmental issues and application of site planning and landscaping in addressing the same
- Presentation on landscape design projects to enable students do site planning and detailing

Module Contents:

- Site planning based on site analysis and suitability
- Hierarchy of open spaces
- Preparation of planting plan
- Major project: Landscape design (Preferably S4 AD project) with site plan and planting plan.
- Study of relevant landscape design projects necessary for studio.

Jury requirements

1. Any relevant market study (may be individual/ group on hardscape materials, planting etc.)
2. List of drawings(minimum):
    - Minor project: Landscape layout plan, sections, views etc. Emphasis to be given on application of principles of landscape design, appropriate usage of hardscape materials & planting.
    - Major project:
        - Site analysis and synthesis
        - Landscape layout plan (an understanding of hardscape materials used in design is required)
        - Sections, views etc. necessary to explain the design
        - Planting plan

Reference:

- Bose, T.K. and Choudhary, K. Tropical Garden Plants in Colour. Horticulture and Allied Publishers. 1991.
- Dee, C. Form and Fabric in Landscape Architecture: A visual introduction, UK: Spon Press.2001.
- Grant.W. Reid, Landscape Graphics: From concept sketch to presentation rendering: Watson-Guptill,1987
- Hackette Brian, Planting Design, NY: McGraw Hill Book Co. Inc. 1979
- Jellicoe, G. & Jellicoe, S. The Landscape of Man, London: Thames and Hudson.1991.
- Laurie, M. An Introduction to Landscape Architecture, NY: American Elsevier Pub.Co Inc.1975.
- Lyall S. Designing the New Landscape. UK: Thames & Hudson. 1998.
- Lynch, K. Site Planning, Cambridge: The MIT Press. 1962
- McHarg I. Design with Nature. NY: John Wiley & Co. 1978.
- Motloch, J. L. Introduction to Landscape Design, US: John Wiley and sons.
- Simonds, J.O. Landscape Architecture: The Shaping of Man's Natural Environment
- Steven Storm, Kurt Nathan, Jake Woland; Site Engineering for Landscape Architects: John Wiley & Sons Ltd, 2009
- Charles Harris, NicholasTimesaver standards for landscape architecture: McGraw Hill Book Co. Inc.1998
- Grant.W. Reid. From concept to form in landscape design; John Wiley & Sons, 2007

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	II	19AR04008(A)	Elective Theory I: Applied Ergonomics	2			2	50		100	150

Course Overview:

- To expose the students to the requirements of designing for the human comfort in accordance with anthropometry.
- The students will have knowledge of ergonomics and its applications in design including designing for the physically challenged and the elderly.

Course Outcomes:

Upon completion of the course, the student should:

- Be capable of designing inclusive spaces.

Module 1: Introduction to Human Function, Ergonomics and Design

Learning Strategies:

- Assignment based on activities of students in a college campus

Module Contents:

- Human being in the manmade world and importance of ergonomics, Gross human anatomy.
- Introduction to Anthropometrics, static and dynamic anthropometrics.
- Ergonomics of the physical environment - for spaces in residence and workplace.
- Muscles and work physiology, Static and Dynamic work including maximum capacity.

Module 2:Disability, Ageing and Inclusive Design

Learning Strategies:

- Case studies of child and old age friendly spaces

Module Contents:

- Built environment for the physically handicapped, Ramp, toilets and corridor design, Spatial Requirements for wheelchair movement.
- Public spaces for differently abled.
- Design issues in the design of old age homes and public places.
- Criteria to be considered when designing for the visually impaired.
- Designing for children – school, home, play.

Module 3:Environmental Ergonomics

Learning Strategies:

- Case studies on inclusive design of work environments.

Module Contents:

- Problems of maintaining human comfort, activity and health in stressful environments.
- Biomechanics. Bio transducers and nervous system including their limitations
- Environmental Condition including, thermal, illumination, noise and vibration.
- Environmental stressors- Controls and Displays, hot and cold stress
- Occupational hazards in work environment, Visual stress, Postural Stress, Stress due to commuting.

Reference:

- Chaira, J. D. and Callender, J. H. (1987). *Time Savers Standards for Building Types*. Singapore: McGraw-Hill.
- Crosbie, M. J. and Watson, D. (2005). *Time Savers Standards for Architectural Design: Technical data for Professional Practice.* 8th Ed. The McGraw-Hill Company
- Yutaka TochiharaTadakatsuOhnaka. *Environmental Ergonomics - The Ergonomics of Human Comfort, Health, and Performance in the Thermal Environment*

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	II	19AR04008(B)	Elective Theory I: Art Appreciation	2			2	50		100	150

Course Overview:

- To introduce art as a fundamental human activity, its characteristics and ways in which it can be understood.
- To introduce the vocabulary of art and to enable the appreciation of art.
- To understand different productions of art as manifestations within particular contexts

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding and appreciation of art as basic and varied human creation related to cognition and experience.
- Be aware of important art productions in the West and India.
- Be Sensitive towards collective and individual cultural productions as unique expressions of historical and geographic context.

Module 1: Introduction to Art and Vocabulary of art

Learning Strategies:

- Art appreciation of a selected work on the basis of elements and principles of design, cultural and regional context.

Module Contents:

- Definition, need and role of art. Art, reality, perception, representation, Concept of beauty and aesthetics.
- Categories of art in terms of media and technique.
- Introduction to the vocabulary of art constituted by elements (line, shape, form, space, colour, light, value, texture).
- Principles of design (unity, variety, harmony, rhythm, balance, proportion, emphasis, contrast, movement)
- Introduction to theories: Golden proportion, Theories of scale and proportion, Vitruvian theory, Modular man.
- Art evaluation and criticism

Module 2: Art timeline

Learning Strategies:

- Lectures and discussions.

Module Contents:

- Timeline of art from the beginning of western art to the birth of modern art.
- Important works from the following movements will be understood and appreciated in terms of their form, content and context: Modern art – Impressionism, Post Impressionism, Fauvism, and Expressionism.
- Abstract/ Non Objective art, Cubism, Dadaism,
- Surrealism, Futurism, Constructivism, Suprematism, De Stijl,
- Abstract Expressionism, Pop art, Op art.
- An introduction to Contemporary art

Module 3: Indian Art

Learning Strategies:

- Examining a selected traditional art piece on a different medium.

Module Contents:

- Outline of art in India over history. Important works from the following art traditions and movements will be understood and appreciated in terms of their form, content and context: Indus Valley art, Hindu, Buddhist and Jain art.
- Mughal and Rajput miniature art, art during the colonial period.
- Indian folk arts – Warli, Madhubani, Kalamkari, Tanjore.
- Kalighat, Patachitra, Gond, Phad.
- Modern Indian art and contemporary directions in India

Reference:

- Fred, S. Kleiner, 'Gardener's Art through Ages', Wadsworth Publishing, 2012.
- Bernard S. Myers, 'Understanding the Arts', Holt Rinehart and Winston Inc, 1964.
- H.H. Arnason, 'History of Modern Art', Thames and Hudson, 1977.
- ParthaMitter, 'Indian Art', Oxford University Press, 2001.
- Edith Tomory, 'A History of Fine Arts in India and the West', Orient Blackswan, 1989.
- Peter and Linda Murray, 'The Penguin Dictionary of Art and Artists', Penguin, 1989.
- E.H. Gombrich, 'The Story of Art', Phaidon, 2002.
- E.H. Gombrich, 'Art and Illusion', Phaidon, 2002.
- 'Indian Art since the early 1940s- A Search for Identity', Artists Handicrafts Association of Cholamandal Artists Village, Madras,1974.
- A.K.Coomaraswamy, Fundamentals of Indian Art, Historical Research Documentation Programme, Jaipur, 1985.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
IV	II	19AR04008(C)	Elective Theory I: Traditional Architecture of Kerala	2			2	50		100	150

Course Overview:

- To inculcate an appreciation of ancient principles used in Architecture and planning, their development over a period of time and its evolution under changing Socio-cultural environment of Kerala.

Course Outcomes:

Upon completion of the course, the student should:

- develop an understanding of the influence of planning principles in traditional Kerala architecture.
- impart an understanding about temple architecture and town planning in Kerala.

Module 1: Introduction to Kerala traditional Architecture principles- Vastu

Learning Strategies:

- Introduction to Kerala traditional Architecture through understanding the principles of Vastushastra

Module Contents:

- Philosophy of Brahmanda and Pindanda
- Basic concepts of Vastu shastra – Universe, Prakrithi and Purusha, Vastupurusha, Mandala, Padams, Padavinyasam, Sutrams and Marmams their significance in physical planning
- Selection of Sites, Sectors and their significance in planning – fixing cardinal direction – planning principles
- Ayadi formula, concept of veethi – 4 veethi and 9 veethi concept in planning – minimum width of veethi and its relation to Habitable space -
- Measurements basic Unit- Anthropometrics - Matrangulam – Horizontal and vertical measurements - Manangulam or Standard Angulam – Its significance in physical aspect – Actual measurement based on modern scales

Module 2: Evolution and study of traditional building typologies in Kerala

Learning Strategies:

- Case study and analysis of residential building typologies in Kerala

Module Contents:

- Design of Buildings- concept of Aaroodham
- Unit house - kettu, Sala- Naming of Salas – Design of Salas
- Different proportions - Gunavistaram, Ishtadeergham –Concept of Pariantham and its relation with Ayadi formula
- Introduction to Dvisala and Trisala- Nalukettus- Its characteristics

- Positioning of Nalukettu in Kshetrakhandam - size of Nalukettu w.r.to Kshetrathandam and vice versa in 4 veethis and 9 veethis
- Difference between kettu and Koottikkettu - Higher forms of residences - Ettukettu, Pathinarukettu

Module 3: Influence of traditional principles in temple and town planning

Learning Strategies:

- Through Site visits and lectures imparting planning principles of design of temples and towns

Module Contents:

- Planning of Temples –Talamanan and its use in Iconography- Basic module and its relation to the temple planning – Anthahara, Madhydhara and Bahirhara of temples
- Design of Mahakshetram – Panchaprakarams and its relation to the module. Design of Sanctum, Gopuram and other ancillary units
- Planning of towns and villages with respect to the temple
- Basic principles of Padavinyasam and veethi nirnayam and the adaptation in town planning - System planning principles followed in town planning
- Locational aspects of planning – Characteristics of towns with respect to location, activity, road pattern
- Villages planning in Ekakudumbaka Gramam and Bahukudumba Gramam.

Reference:

- Dr. Balagopal T.S. Prabhu, 'A Text Book of Vastuvidya'
- Dr. Aashaltha Thampuran, 'Traditional Residential Architecture of Malabar Coast'
- Dr. Balagopal T.S. Prabhu, 'Manushyalayachandrika'
- Chennasa Narayanan Namboodirippad, 'Tantrasamuchayam Silpabhagam'

38. FIFTH SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
V	I (a)	19AR05001	Architectural Design 5		10		10	250	250		500

Course Overview:

Spatial planning of a multistoried built form with an emphasis on services

- To instill the importance of service integration in spatial planning and Detailing in multi-storied building Design.
- To understand the complexities involved in the design of multi-storied building. The design parameters shall include climatic response, structural system, appropriate material, universal design standards and services such as sanitary and water supply, lighting and ventilation, firefighting, lifts, escalators, etc.
- To understand the derivation of structural grid and functional grid. To create an awareness of Building rules/National Building code of India /other regulations such as cinemas regulation act, CRZ, firefighting etc.
- **Sustainable design objectives**: To equip the students to adopt sustainable design techniques considering climate, building envelope, HVAC, Natural and green certified materials, natural lighting and fresh air ventilation such as Rainwater harvesting, passive cooling techniques, use of low embodied energy materials etc. To introduce students to green building rating systems – IGBC/GRIHA/LEED etc.

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding of efficient service integration in built environment
- Develop a design approach considering the sustainability principles and resource savings through efficient service incorporation.
- Learn about efficient integration of vertical and horizontal circulation in a building

Major Project

Design of a single multi storied building (built up area not exceeding 2500 SQM distributed in different levels, preferably high-rise) in a specific context to learn the complexities of service integrated design of a complex built environment. Projects such as hospital, hotel, high rise residential, long span structure etc. may be considered

Emphasis may be given on:

- Structural and functional grid
- Service integration
- Universal access
- Fire fighting requirements
- Facades
- Parking efficiency
- Site services

Minor Project

Settlement study of an area to understand the influence of culture on architecture and preparation of necessary study reports, videos, power point presentations etc. of the same. Possibility of a vertical studio with 19AR03001 may be explored. (Maximum of 7 days duration)

Time bound project

Design detailing of any part of the Major project (E.g.: Canteen/ restaurant, operation theatre), calculation of service requirements and design of appropriate systems for the same (E.g. Water requirement for the building and design of storage tanks/vertical circulation and services). Design of basement parking and optimum usage of structural grid for parking and other utilities.

Reference:

- Francis D.K Ching "Building Construction" illustrated, John Willey & Sons, 2008.
- Sam F. Miller, "Design Process: A Primer for Architectural and Interior Design", Van Nostrand Reinhold, 1995.
- Manual of water supply and treatment, Second edition, CPHEEO, Ministry of works and housing, New Delhi, 1977
- AFE Wise, JA Swaffied Water, "Sanitary & Waste Services in buildings", V Edition, Mitchell Publishing, Co. Ltd., 2002.
- Renewable energy, basics and technology, supplement volume on integrated energy systems, Auroville, 1998.
- Elevators, Escalators, "Moving Walkways", Manufactures catalogues, John Wiley, 1967.
- National Building Code, Kerala Building Rules (KPBR /KMBR)
- "Time saver standards", Callender Etal., Mc Graw Hill

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam Jury	University Exam Written	Total
V	I (b)	19AR05002	Building Materials and Technology 5	1	3		4	100	100		200

Course Overview:

The subject primarily aims at developing understanding in use of appropriate construction technique and material in building design based on feasibility of technology, physical properties (like density & specific gravity, strength, thermal properties), aesthetic value, socio-cultural impacts and relevance, socio-economic factors, Ecological footprint etc.

The course introduces the technological aspects of a building design from the perspective of functional building component where use of natural and artificial materials is discussed based on their application. Each material would be taught in a manner such that its application would be discussed in a sequential manner, starting from foundation level, followed by plinth & others (sill, lintel, sunshades, window/door openings, walling material, as a floor & flooring) and culminating at roof and parapet wall. Construction technology and appropriate materials for structural systems, roofing, enveloping and interior finishes shall be considered under this subject from simple examples to complicated examples.

Course Outcomes:

Upon completion of the course, the student should:

- Understand about different systems in construction.
- Understand the possibilities available and developing modern trends in architecture.

Module 1: Composite Materials and Timber products in construction

Learning Strategies:

- Lectures on the syllabus content
- Case studies of material applications
- Market survey

Module Contents:

- Plastic based materials: Applications of Polycarbonates - poly urethane, epoxy flooring and tile/ stone joint filler, Polycarbonate panels for curtain walls.
- Engineered wood products &applications: Timber board – Veneers, Plywood, Block Boards, Particles, MDF, HDF, Mica Laminated boards, WPC, flush door applications
- Metal based applications – Aluminum Composite Paneling systems, Zinc cladding systems, weathering steel (COR-TEN Steel), for curtain wall or facade works, Gypsum board, cement fiber board, calcium silicate board, false ceiling systems with steel and aluminum framework systems, insulated / sandwiched panel or puff board for wall and roof applications.
- Paper, fibers and organic based materials – wall papers, leather tiles and cladding, paper structural systems,
- Recycled materials – Reducing carbon footprints using recycled or up cycled materials, Application of recycled or up cycled paper, metal, glass, cloth, plastics as construction materials for various components of a building – wall, roof, fenestrations, floor etc.

Module 2: Construction detailing

Learning Strategies:

- Lectures on the syllabus content
- Case studies of material applications
- Site visits to observe construction process
- Market survey

Module Contents:

- Floor finishing – Tiles, natural stone, vinyl, parquet, carpet finishes – laying process, substrates used, spacers, grout, thresholds, trims
- Wall finishing – Installation process of Dry and wet cladding, textured finish, wall papers, wall trims
- Ceiling finishing – types, components – process of grid system, gypsum, metal ceilings.
- Staircase details – rise and tread details with tiles, natural stone & vinyl finishes, Types of balusters and balustrades – fixing details of wooden, steel, aluminum& glass balustrades.
- Roof details – application of water proofing details, torch on membrane, flashing, expansion joint details, green roof details, insulation.

Module 3: Large span structures

Learning Strategies:

- Site visits and documentation of construction methods
- Market study of current trends and systems

Module Contents:

- Lattice truss –Its functional Requirements, Types of lattice trusses
- Steel portal frames, Long span steel portal frame and short span portal frame
- Folded plates and shell roof
- Types of shell roof, Advantages and disadvantages of shell roof
- Introduction to tensile structures, Type of membranes
- Cable structures, Pneumatic structures

List of drawings for Jury (Minimum 7 sheets)

- Gypsum board ceiling
- Column base plate and Gusseted Base plate
- Single bay symmetrical pitch lattice steel roof, two bay symmetrical pitch lattice steel roof.
- Single bay north light lattice steel roof on steel columns.
- Prismatic lattice steel roof.
- Tensile roof - connections
- Lightweight roofs.
- Light deflecting facade for offices.
- Reinforced concrete barrel vaults
- Presentation of collected materials from market survey and case study presentation for the jury.

Reference:

- Barry's advance construction of buildings –Stephen Emmit &Christopher A Gorse
- Helmut koster, dynamic daylighting architecture.
- M.S. Shetty, 'Concrete Technology', S. Chand & Co.ltd, New Delhi, 1986.
- S.C. Rangwala, 'Engineering Materials', Charotar Publishing House, India, 1997.
- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005.
- Don A. Watson, 'Construction Materials and Process', McGraw Hill Co., 1972.
- Jack M. Launders, 'Construction Materials and Methods', Careers, South Holland, Illinois, Wilcox Co.Ltd., 1986.
- Chudley, Construction Technology, ELBS, 1993
- Barry, Construction of Buildings, East West Press, 1999

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
V	I (c)	19AR05003	Professional Skill Enhancement 5			4	2	50	50		100

Course Overview:

This course intends to provide/ enhance the soft skills in order that students perform well in their academics and beyond. These skills are intended to support the student to perform better in her/his core subjects and also build up robust performance through hands-on workshops and laboratory training. This course is subdivided into two categories – Mandatory and Optional. Mandatory courses help in preparations for respective semester subjects. The optional category helps students to take personal initiatives to develop in specific areas that can widen their horizon of their understanding of architecture and also initiate action at the society level. There are also options to work on competitive exercises alongside other similar institutions.

Course Outcomes:

Upon completion of the course, the student should:

- be given an exposure of varied skills that can bring in confidence in handling their core subjects such as workshops, communication skills, computer applications etc.
- be able to develop team spirit and interpersonal skills to manage complex situations.
- be able to cope with stress and develop multi-tasking capabilities.

Module 1: Building Information Modelling

Learning Strategies:

- Computer lab
- Group discussions and Interactive sessions

Module Contents:

- Concepts of modeling, understand computer modeling through various basic shapes and its composition
- To develop solid and surface models with architectural scale, proportion and elements
- To understand Camera, movement, shades and shadows, daylighting and lighting conditions, setting up a scene through modeling
- To edit and develop materials, surfaces and computer aided photo realistic rendering and understanding its adjustments
- Using predesigned materials/maps from various sources 3-D Models
- To develop animation and photo realistic animations and short movies

Module 2: Presentation skills

Learning Strategies:

- Computer lab
- Group discussions and Interactive sessions

Module Contents:

- Composition and presentation though different vector based and page setting tools
- Combining photo editing modelling and rendering and presentation methods to produce photo realistic brochures and documents
- Development of concepts to real proposed scenarios through computer aided software

Module 3: Social Initiatives or any other co-curricular activities

Learning Strategies:

- Participations in symposiums and workshops

Module Contents:

- Optional content to be developed by each institution in order to help students to take part in activities that involve larger groups and facilitate peer learning.
- The activities could be student initiated societal activities or participation in NASA or similar student led group initiatives which has an academic content as well.

Reference:

- Cadfolks (2018). *AutoCAD 2019 for Beginners*. 1st ed. Kishore.
- Faulkner, A. and Chavez, C. (n.d.). *Adobe Photoshop CC Classroom in a Book 2019 release*.
- Omura, G. and Benton, B. (2018). *Mastering AutoCAD 2019 and AutoCAD LT 2019*. 1st ed. Sybex.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
V	II	19AR05004	Human Settlement Planning	2			2	50		100	150

Course Overview:

To give an insight to the students on the evolution of settlements through various stages of human history. The course tries to lay a foundation for a general understanding of Human Settlements through analysing the fundamental elements that has moulded the very existence of human race made possible by a habitat. This course also aims to familiarize the students with evolution of cities and to give an over view of Planning concepts and process in Urban and Regional Planning.

Course Outcomes:

Upon completion of the course, the student should:

- Acquire a basic understanding of the spatial quality, the modifying factors and perception to express habitat as a basic element of human life.
- Understand the history, development and concepts of planning in India and abroad and its relevance and application along with an understanding of settlements.
- Familiarize the students with the process of evolution of cities, concepts related to humanitarian planning processes and skill development to identify planning issues in existing areas and develop solutions at basic levels.

Module 1: History and Theory of Planning

Learning Strategies:

- Lecture notes, literature-based case examples through books, journal e-resource, documentaries
- Overview of Origin and evolution of Human settlements through introductory lecture.

Module Contents:

- Characteristics of Settlement planning in ancient, medieval, renaissance, industrial & postindustrial age.
- Characteristics of Settlement planning in India – Town planning in ancient, medieval, colonial and modern cities.
- Theories of Town planning – central place theory, concentric zone theory, sector theory, multiple nuclei theory
- Evolution of planning concepts: Garden cities, Radburn city, neighborhood concept, Planning concepts by Le Corbusier.
- Contributions to modern town planning thoughts by-Patric Geddes, Constantino A. Doxiadis, Lewis Mumford

Module 2: Concepts of Town planning

Learning Strategies:

- Lecture notes, through books, journal e-resource, case studies, documentaries

Module Contents:

- Definition of town. Classification of Towns.
- Terminologies – Urban Outgrowth, Urban Agglomeration, Conurbation, Satellite Town, Suburb, Green belts, Peri urban development, Ribbon Development, Urban Rural continuum.
- Urban Planning process - survey techniques and data collection methods
- Different Types of plans- Structural plan, Perspective Plan, Development Plan, Annual Plan, Plan Schemes and Projects.
- Concept of master plan, its elements- Land use Plan

Module 3: Present Planning Scenario

Learning Strategies:

- Lecture notes, through books, e-resource, case studies, analysis and documentaries

Module Contents:

- Need for town planning legislation. Town planning acts- Kerala Town Planning Act, 2016, Rehabilitation and Resettlement Act (LARR), Coastal Regulation Zones and its relevance, URDPFI Guidelines
- Town Planning Agencies - National, State & Local levels – NITI Ayog, Town Planning Authorities, Development Authorities, and ULB's. Role of these agencies in plan implementation
- Contemporary urban problems, growth and challenges.
- Need of sustainable city planning with illustrative case studies
- Modern Town Planning concepts – Transit Oriented Development (TOD), Smart cities.

Reference:

- Arthur B. Gallion, "Urban Pattern",
- Keeble Lewis,Principles and Practice of Town Planning
- Kevin Lynch, Image of the city
- AEJ Morris, History of Urban Form
- C.L. Doxiadis, Ekistics: An Introduction to town and Country planning
- Peter Hall, Urban and Regional Planning
- Peter Hall &Ulrich Pfeiffer, Urban Future 21
- Ministry of Urban Affairs Govt. of India- Urban Development Plans Formulation and Implementation Guidelines
- John Ratcliffe Introduction to Town and Country Planning
- An Introduction to the Science of Human Settlements by C.L. Doxiadis; Ekistics Hutchinson, London, 1968.
- Housing and Urban Renewal by Andrew D. Thomas, George Allen and Unwin; Sydney, 1986.
- Ministry of Urban Affairs and Employment; Government of India, New Delhi,1999
- Urban Development Plans: Formulation & Implementation; Guidelines, 1996.
- Sustainable Human Settlements by R. S. Sandhu; Asian Experience, Rawat publications, 2001.
- Living Plans: New concepts for advanced housing by P. Gastek; Brikhauser publications, 2005
- URDPFI Guidelines Vol I-2014 (http://moud.gov.in/URDPFI)
- URDPFI Guidelines II A-II B-2014(http://moud.gov.in/URDPFI)

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
V	II	19AR05005	Theory of Structures 5	2			2	50		100	150

Course Overview:

The course primarily aims at giving an overview of possibilities of Steel as structural material and its applications in Architectural design. It focuses on understanding various structural systems, designs and theory of steel members.

The course aims to impart knowledge & develop understanding about the structural behavior of various types of steel structural systems that are commonly employed in the building construction industry presently.

It also exposes the student to the methods that are used to design a steel structural system for a specific condition & loading. Interpretation of structural detail drawings in the site is also intended.

Course Outcomes:

Upon completion of the course, the student should:

- Get an introduction to the design concepts of Steel structures.
- Get confidence to correctly choose structural systems
- Be equipped to design simple steel structures.

Module 1: Introduction to steel, Connections, Design of tension member (tie)

Learning Strategies:

- Lectures on the below contents by presentation and discussion on Architectural projects to make students understand structures in the context of Architecture
- Lectures by using analogies and case study on failures to explain structural design concepts.

Module Contents:

- Introduction to Steel structures, common Steel structures, Types of Steel. Loading standards - I.S structural sections - I.S specifications –Design Philosophies- Limit state method. - Assumptions.
- Connections: Welded and bolted connections- Types and classification, Types of failure in connections.
- Design of bolted connections for members subjected to axial forces.
- Design of truss
- Design of tension member (tie) – plate, single angled member.
- Tension member splice (concept only)

Module 2: Design of beams

Learning Strategies:

- Lectures on the below contents by presentation and discussion on Architectural projects to make students understand structures in the context of Architecture
- Lectures by using analogies and case study on failures to explain structural design concepts.

Module Contents:

- Beams- classification of cross section, plastic moment carrying capacity of a section.
- Design procedure, bending strength and shear strength of a laterally supported beam. Deflection limits, web buckling, web crippling,
- Design of built up beam.
- Design strength of laterally unsupported beam
- Effective length of lateral torsional buckling.

Module 3: Design of columns

Learning Strategies:

- Lectures on the below contents by presentation and discussion on Architectural projects to make students understand structures in the context of Architecture
- Lectures by using analogies and case study on failures to explain structural design concepts

Module Contents:

- Compression members -- Short and Long columns –buckling class of cross section. Slenderness ratio.
- Design of Strut-normal sections, single angled section.
- Behaviour of different column sections under axial and eccentric loading
- Design of compression members, Built up columns - Design
- Laced and battend column (concept only)
- Column base -Slab base: - Design of slab base.
- Gusseted base, column splice. (concept only), Types of failure in column.

Reference:

- Bhavikatti, S. (n.d.). *Design of steel structures*. I.K. International Publishing house Pvt.Ltd.
- Duggal, S. (n.d.). *Design of steel structures*. Tata Mc Graw-Hill.
- Pillai, S. and Menon, D. (n.d.). *Reinforced concrete design*.
- Punima, B. (n.d.). *Design of steel structures*. Laxmi publications.
- Ramchandra (n.d.). *Design of steel structures Vol. I & II*. Delhi: Standard book house.
- Relevant IS Codes. (IS 800-2007, IS 875, IS 805, IS 801, IS 811, IS 6533 Part 1, Part 2, Steel Tables). (n.d.).
- Subramanian, N. (n.d.). *Design of steel structures*. Oxford University Press.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
V	II	19AR05006	Building Services 2	2			2	50		100	150

Course Overview:

- Services are the lifeline systems of any built form making it functionally habitable. They also make them efficient, comfortable and safe. Building services essentially include fluid systems, electrical & energy systems, lighting systems, HVAC systems, security systems etc.
- This course as the second of the 3 courses in Building services is intended to give the students an overview of the Electrical services, Firefighting and Illumination at various levels, their architectural considerations and their coordination with other services.
- This course is designed to enable students to understand various systems of Electrical services, Firefighting and Illumination, its design application for a small and large building.

Course Outcomes:

Upon completion of the course, the student should:

- develop an understanding about the importance of services in buildings and its coordination in the built environment.
- be able to critically understand various electrical, lighting and firefighting in our built environment.
- be able to choose from different systems available within each service component to suit any specific built environment design.

Module 1: Electrical Services

Learning Strategies:

- Lectures on the history and relevance of Building services and broad overview of different systems.
- National and International study reports on the topic.
- Market survey on various products and services related to electrical services.
- Schematic electrical layout of small-scale buildings. (G+2)

Module Contents:

- Basic principles of electricity and macro level distribution; norms and standards
- Site level -High side electrical system - Transformers and switch gears – Layout of substations, Electrical distribution system at site level overview, Types of distribution networks at site level.
- Micro level-Planning electrical wiring for building – Main and distribution boards, Types of wires, wiring systems and conduit, Fixing of electrical fixtures and switches
- Electrical safety: Necessity of earthing, pipe and plate earthing, lightning protection in buildings.
- Materials, apparatus, joints, fixtures and breakers –Market survey

Module 2: Lighting

Learning Strategies:

- Lectures on Illumination systems involved at domestic level and their design.
- Case studies to critically understand the different systems.
- Market survey to familiarize the fixtures and materials application.

Module Contents:

- Basic principles and definitions of Illumination: units of lighting, light in the electromagnetic spectrum, optical performance, color temperature, color rendering index, efficacy, Utilisation factor, Depreciation factor, LLF.
- Types of lamps and luminaries, Architectural lighting fixtures.
- Different types of lighting arrangements and distribution systems.
- Design consideration of good lighting scheme – Quantity, quality and energy - cost efficient systems. Basic design technique- determination of quantity: point by point method, lumen method. Calculating the layout (number and spacing) of light fixtures in a room using Lumen method.
- Determination of quality: visual comfort probability – Glare, types and methods to reduce glare.
- General illumination design: residential lighting, street lighting, industrial lighting, office lighting, departmental stores lighting, indoor stadium lighting, theater lighting, street lighting and lighting for displays.

Module 3: Fire Fighting System

Learning Strategies:

- Lectures on firefighting systems and their design.
- Case studies to critically understand the different systems.
- Market survey to familiarize the fixtures and materials application.

Module Contents:

- Causes and spread of fire, Combustibility of materials, safety norms, fire rating and assessment.
- Passive Fire Protection Strategies.
- Active Fire Protection Systems.
    - Fire Detection Systems.
    - Alarm Systems.
    - Fire Extinguishing Systems.
    - Smoke Control.
- Designing Fire Escapes for Life Safety.
- Code Provisions- occupancy, building heights & areas

Module 4: Sustainable aspects in Electrical & Lighting services

Learning Strategies:

- Lectures on vertical transportation system and their design.
- Case studies to critically understand the different systems.

Module Contents:

- Alternative sources of energy including solar, bio based, wind, micro hydel sources and other innovations etc.
- Solar energy harvesting - types, components & design - on grid & off grid systems
- Energy efficient lighting practices - natural/passive lighting, lighting automation, devices and equipment.

Reference:

- Basic electrical engineering by D.P Kothari, I.J Nagrath
- Introduction to the design and analysis of building electrical system by John Mathew
- Electrical design guide for commercial buildings by William H. Clark
- Handbook of electrical design details by Neil Sclater
- Building construction illustrated by Dr. D.K. Ching
- Mechanical and electrical equipment for building by Walter T. Gondzik

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
V	I (c)	19AR05007	Interior Design & Detailing	1	2		3	75	75		150

Course Overview:

The subject primarily aims at familiarising the students with the planning, layout and design of interior spaces. The course deals with the creation and evolution of objects, structures and systems at human scale that aim to improve the quality of life in the immediate living and working environment, while looking at sustainable and innovative use of diverse materials and processes.

Course Outcomes:

Upon completion of the course, the student should:

- Be equipped with the theoretical, conceptual, creative and practical aspects of Interior Design along with its allied fields.
- Improve on their detailing skills and identify construction methods and techniques in interior design.
- Apply aspects from building services like lighting, electrical, plumbing.

Module 1: Principles of Interior Design

Learning Strategies:

- Lecture on the elements and principles of design with reference to Interior design.
- Documentation of existing site, office spaces /residences.
- Group discussion and case study analysis.

Module Contents:

- Development of interior design concepts- A historic review (History of interior design)
- Spatial analysis and theme analysis.
- Basic components of interior spaces
- A site visits.
- Group discussion and case study analysis.
- Design/Drawing Hours: The major project- Design a space of 100sq.m.-200sq.m which may be a retail space, work space or hospitality.

Module 2: Ergonomics and Anthropometry

Learning Strategies:

- To enable the students to understand the importance of ergonomics and anthropometry in architecture with the help of an introductory lecture, group exercises and sketches.

Module Contents:

- Principles of Ergonomics
- Anthropometry
- Furniture-Basics of furniture details

Module 3: Colour and Lighting

Learning Strategies:

- To enable students to learn the concepts of colour and lighting through case studies and site visits.

Module Contents:

- Concept of colour - significance of colour in the interiors and exteriors-Dimensions of colour
- Hue, value, intensity, Effects of Hue, value and Intensity.
- Application of colour harmonies in the interiors and exteriors –Effects of light on colour,
- Psychology of colour, effect of colour on each other.
- Importance of lighting – Lighting in interiors – importance, classification based on sources, uses,
- illumination, factors to be considered in lighting for different areas of house.
- Natural lighting and Artificial lighting-
- Types and uses of light, specific factors in lighting.
- Basic of Acoustics.

Design/Drawing Hours: Minor Project- A one day time problem of a room/space in the AD project maybe designed and detailed.

Module 4: Materials and Detailing

Learning Strategies:

- To learn the different types of materials and to use them effectively and innovatively.
- Students will apply their learning from BMC and come up with good detailed drawings.
- Students will also apply their learning from building services classes and do the relevant service drawings.

Module Contents:

- Design/Drawing Hours: Working drawings of the major project and the relevant service drawings.
- Model making of major project/3d models/physical model.

Reference:

- Pile, John.F, “Interior Design”, Pearson; 4 editions (2007)
- Ching, Francis D.K., “Interior Design Illustrated”, John Wiley & Sons; 3 editions (2012)
- Panero, Julius and Zelnik, Martin, “Human Dimension and Interior Space: A Source Book of Design Reference Standards”, Watson-Guptill; New edition (1979)
- DeChiara, Joseph, Panero, Julius and Zelnik, Martin “Time Saver’s Standards for Interior
- Design”, McGraw-Hill Professional (2001)
- Rengel, Roberto J, “The Interior Plan: Concepts and Exercises”, Bloomsbury Academic
- USA; 2nd Revised edition (2016)
- Mitton, Maureen, “Interior Design Visual Presentation: A Guide to Graphics, Models and
- Presentation Techniques”, John Wiley & Sons; 4 editions (2012)
- Pile, John.F, “A History of Interior Design Hardcover”, John Wiley & Sons Inc (2000)
- Kurtich, John & Eakin, Garret, “Interior Architecture”, John Wiley & Sons (1995)

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
V	II	19AR05008(A)	Elective Theory 2: Advanced landscaping	2			2	50		100	150

Course Overview:

The course aims to provide the knowledge base regarding history of landscape architecture with the various theories that has guided the landscape design through the ages till present. It also introduces the criteria for selection, type and function of planting to be adopted in landscape design in detail. The course discusses about water as an element in landscape design and the different forms in which it is used in design. This course shall have a direct application in the design studio of the ongoing as well as subsequent semesters for site planning and landscape design.

Course Outcomes:

Upon completion of the course, the student should:

- Learn the History of landscape architecture from past till present
- Learn the Role of vegetation and planting design
- Use Water as an element of landscape and forms of usage in design

Module 1: History of landscape

Learning Strategies:

- Presentation on landscape gardens
- Lectures on relevant topics

Module Contents:

- Significance of Time in Landscape Design Landscape Development in historical perspective, chronological evolution of landscape development; Ancient: Mesopotamia, Egypt, Greece, Rome
- Western: Europe, Italy, France, England
- Middle-east: Persian traditions, Eastern: China and Japan, Ancient and medieval period in India; Mughal and Rajput landscapes.
- Parks movement in America; Contribution of Ian Mcharg
- Contemporary works
- Cultural landscapes

Module 2: Planting design

Learning Strategies:

- Lecture/ presentation on planting types
- Visit to botanical garden/nursery for familiarizing with plant species

Module Contents:

- Study of vegetation: trees, shrubs, ground cover, climbers; Physical characteristics and habit; Plant selection criteria - Functional, visual, ecological, economic and microclimatic aspects.

- Species used in dry and arid regions, coastal areas, shelter breaks controlling soil &wind erosion, and air pollution, noise pollution, etc.
- Species used for specific colour, season of flowering, size, mass planting, afforestation, focal point, barriers, edging, etc.
- Salt and drought resistant species, wetland species, fast growing, air quality improving species etc.
- Horticulture: planting and transplanting, planting techniques, techniques of propagation, cutting, pruning, grafting etc. Lawns, preparation and maintenance.
- Hydroponics, Bonsai, Indoor landscaping: Functions and behavior of indoor plants, light, air and water requirements, plant materials, Terrace gardens, vertical landscape etc.
- Conservation of flora and fauna- Botanical gardens, Arboretums, Sanctuaries, National parks, eco-reserves, etc.

Module 3: Water in landscape

Learning Strategies:

- Lecture/ presentations in relevant topics
- Site visits

Module Contents:

- Purpose of water in landscape, effects created by water-bodies, types: pools, freefall, flowing, cascade, spouts and jets
- Waterproofing, drainage and operation of designed water-bodies
- Natural pond habitat and design of ponds, supporting flora and fauna
- Swimming pools, reflecting pools etc.

Module 4:

Learning Strategies:

- Lectures and workshops

Module Contents:

- Environmental remediation through landscape design
- Revitalization
- Ground water Retention, Recharging, etc.

Reference:

- Appleton J., The Experience of Landscape, John Wiley & Sons, 1996.
- Bose, T.K. and Choudhary, K. Tropical Garden Plants in Colour. Horticulture and Allied Publishers. 1991.
- Charles W Harris. Nicholas.T. Stane, Timesaver Standards for Landscape Architecture: McGraw Hill Book Co. Inc. 1998
- Dee, C. Form and Fabric in Landscape Architecture: A visual introduction, UK: Spon Press.2001.
- Gopalaswamiengar, K. S., Complete Gardening in India, 4/e, Gopalswamy Parthasarathy, 1991.
- Hackette Brian. Planting Design, NY: McGraw Hill Book Co. Inc. 1979
- 2001Jellicoe, G. & Jellicoe, S. The Landscape of Man, London: Thames and Hudson. 1991.
- Laurie, M. An Introduction to Landscape Architecture, NY: American Elsevier Pub.CoInc.1975.
- Lyall S. Designing the New Landscape. UK: Thames & Hudson. 1998.
- McHarg I. Design with Nature. NY: John Wiley & Co. 1978.
- Motloch, J. L. Introduction to Landscape Design, US: John Wiley and sons.
- Randhawa M.S., Flowering Trees, National Book Trust, 1998.
- CPWD; A handbook of landscape, 2013

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
V	II	19AR05008(B)	Elective Theory 2: Behavioural Architecture	2			2	50		100	150

Course Overview:

- To impart knowledge about this relatively new field, born out of the synthesis between architecture and behavioral psychology.
- To expose the students to the importance of understanding people and their perception of environment in architectural design and planning
- To enable them to understand the various psychological aspects that can be incorporated in the design of built environment

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding of the multiplicity of living patterns, activities, geometric patterns in space and designing for the same.
- Get knowledge about the behavioral design process, techniques and design contexts.

Module 1: Introduction to Environmental Psychology and Behavioral Architecture

Learning Strategies:

- Lectures and group discussions
- Mapping of human behavior in varied environments through different exercises

Module Contents:

- Introduction to Environmental Psychology; Origin, principles and relevance of environment psychology, its difference from other branches of psychology; Theories and approaches in environmental psychology.
- Relation between human psychology and design of built environment; Elements of design (point, line, shape, etc.), Principles of architecture (rhythm, balance, contrast, etc.) and its role in evoking emotions.
- Concept of perception; Visual perception; Theories on environmental perception, Environmental perception and design;
- Designing for pattern and activities,
- Archetypal activities/Archetypal spaces: planning of public spaces with reference to age groups and activities.
- Room use, geometry & meaning, hidden behavioral assumptions, adjacencies, vertical bypass & horizontal bypass, various stages in the design of building subsystems.
- Geometry of spaces, their meaning & connotations, Social organization of buildings, Behavioral assumptions in the planning of new towns and neighborhoods, borrowed space.

Module 2: Behavioral Design

Learning Strategies:

- Lectures, group discussions and debate
- Analyzing behavior of an individual in different spaces and representing it in sketches.

Module Contents:

- Traditional observation and mapping methods- Setting data and interview method to study user; surveys, cognitive mapping, visual mapping
- Digital observation Methods for Human tracking and interaction detection – Visual sensors and radio frequency sensors; Comparison of digital versus traditional observation methods.
- Process organization chart, affinity matrices, pictograms: behavioral design process model, design context, activity/adjacency relationship, evaluation chart, Area use frequency program, simultaneous use, community utilization map, occupancy load profile, defensible space, EDRA etc.

Module 3: Urban Environment

Learning Strategies:

- Lectures, group discussions and debate

Module Contents:

- Different environments - Educational (class room design, ambient noise, attention), Workplace (types of office design), Health care, Commercial, Recreational, Public, Domestic, Urban, etc.; Multi-sensory spaces; Case studies.
- Residential environment- Concept of Home. Neighborhood concept & Neighborhood satisfaction. Place attachment theory, Work place environment and behavior; Application of the knowledge in design of a residence, neighborhood and other built environments.
- Patterns of activity in time and space, the ecology of a neighborhood park and playground, cross-cultural issues, social & psychological issues in the planning of new towns, environmental perceptions and migration, awareness and sensitivity to open spaces, environmental cognition.

Reference:

- Burnette, C. (1971). *Architecture for human behaviour*. Philadelphia Chapter: AIA.
- Canter, D. and Lee, T. (1974). *Psychology and the built environment*. New York: Halstead Press.
- Christopher, A. et al. (1977). *A Pattern Language*. New York: Oxford University Press.
- Clovis, H. (1977). *Behavioural Architecture.* McGraw Hill.
- Lynch, K. (1973). *The image of a city.*Cambridge: MIT.
- Sanoff, H. (1991). *Visual Research Methods in Design*. New York: John Wiley & Sons.
- Zeisel, J. (1984). *Enquiry by design: Tools for Environment-Behaviour Research*. Cambridge: Cambridge University Press.
- Zeisel, J. and Eberhard, J. P. (2006). *Inquiry by Design - Environment/Behaviour/Neuroscience in Architecture, Interiors, Landscape and Planning.* New York: W. W. Norton & Company.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
V	II	19AR05008(C)	Elective Theory 2: Inclusive Design	2			2	50		100	150

Course Overview:

Inclusive design is an introduction to the concepts of accessibility and universal design with a particular focus on the implications of ability and dis-ability on usability of the built environment; spaces, buildings, infrastructure and interfaces. The student will learn how to apply this knowledge in architecture, landscape architecture, interior design and planning. The interdisciplinary collaboration with disability studies, rehabilitation studies and social science research will provide students with an opportunity to learn and develop wider understanding about the subject.

Course Outcomes:

Upon completion of the course, the student should:

- Define inclusive design with a particular focus on the implications of ability and dis-ability on usability of the built environment; spaces, buildings, infrastructure and interfaces.
- Describe the standards, theories, legislation and principles of accessibility and universal design.
- Critique interdisciplinary connect with disability studies, rehabilitation studies and social science research.
- Distinguish between different concepts of accessibility and universal design. Review the condition of existing environment for universal access and suggest measures to address those. Apply this knowledge in architecture, landscape architecture, interior design and planning.

Module 1: Evolution of concepts of accessibility and universal design

Learning Strategies:

- Lectures, seminars and workshops

Module Contents:

- Knowledge of human ability relevant to design problems at home, workplace, infrastructure and community environments.
- An understanding of the evolution and limitations of Accessible Design
- Differences between Accessible and Universal Design.
- Understanding Principles of Universal Design that enable usability and inclusion across the spectrum of age, size, gender, ability and conditions, and contextual derivation of Universal Design Principles in India.
- Understanding legislative framework for practice in India; Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995 and Amendments.
- United Nations Convention for Rights of Persons with Disabilities (UNCRPD).

Module 2: Accessibility Standards

Learning Strategies:

- Lectures, seminars and workshops

Module Contents:

- Types of disability, Devices and Controls, Defining Architectural design requirements, Classification of Buildings and Access provisions.
- Design Elements within the buildings; Site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, ramps, stairways, lifts, toilets, signage, guiding and warning systems, floor finishes and materials.
- Design Elements Outside the building; kerb at footpath, road crossing, public toilet, bus stop, telephone booth, signage.

Module 3: Accessibility Considerations

Learning Strategies:

- Lectures, seminars and workshops

Module Contents:

- Provisions in residential buildings, auditorium, parks, restaurants, railway stations etc. Best examples and case studies in Universal Design practice.
- Access Audit; definition, purpose and method
- Retrofitting techniques for barrier free environment.
- Hands-on practice in assessing needs and developing design solutions; a project based on field research and design to learn how to design for all individuals, regardless of ability.

Reference:

- Mullick, A., Ostroff, E., Sanford, J., Steinfeld, E., Story, M. And Vanderheiden, G., Center for Universal Design. North Carolina State University, Raleigh, NC. Available athttps://www.ncsu.edu/ncsu/design/cud/about_ud/udprinciples.htm
- Universal Design by Goldsmith, S. -(2000) Architectural Press. Guidelines and Space Standards for Barrier Free Built Environment for Disabled and Elderly (1998), CPWD,
- Ministry of Urban Affairs and Employment, India. Persons with Disabilities Act. (1995). Government of India. Available at disabilityaffairs.gov.in/upload/upload files/files/PWD_Act.pdf.
- Universal Design Handbook by Preiser, Wolfgang, Editor in Chief; Elaine Ostroff, Senior Editor – McGraw Hill, 2000.
- Enabling Environments by Steinfeld, E., Danford, G. Scott. (1999). Plenum Press, New York.
- Creating Universal Environment by Steinfeld, E., Maisel, J. (2012). John Wiley and Sons INC, Hoboken, New Jersey.
- The universal design file: Designing for people of all ages and abilities by Story, M. F. (1998). Available at http://design-dev.ncsu.edu/openjournal/index.php/redlab/article/viewFile/102/56.
- UNCRPD. (2006). Convention on the Rights of Persons with Disabilities at the United Nations and the Optional Protocol. Available at http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf

39. SIXTH SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VI	I (a)	19AR06001	Architectural Design 6		10		10	250	250		500

Course Overview:

Course familiarize the students with campus planning principles

- Design of built environment of complex nature in a campus incorporating campus planning, urban design and sustainable design principles with detailed site analysis and site suitability.
- Development of zoning and site planning incorporating function, climatic response, structural system, materials, universal design, services, etc.
- To understand planning principles suitable for the topography and appropriate landscaping strategies to learn design detailing of an Assembly buildings with emphasis on angle of vision, raking design, acoustics etc.
- To create an awareness of Building rules/National Building Code of India / Universal design standards /other regulations such as cinemas regulation act, CRZ etc.
- **Sustainable design objectives**: To equip students with sustainable campus design principles considering climate, building envelope, site preservation, HVAC, green materials, renewable energy, natural lighting, fresh air ventilation, efficient landscape etc. To equip the students to adopt sustainable building techniques in campus design such as usage of renewable energy, Rain water harvesting, passive cooling techniques, use of low embodied energy materials, water and waste management etc. To familiarize the students with the concepts of Indian Green building standards such as IGBC, GRIHA, ECOHOUSING and other relevant rating systems.

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding of campus planning principles, importance of site planning and built form/open space relationship
- Understand the relationship between built and un-built and the aesthetics of 3dimentional composition of built form
- Understand the sustainable approaches in campus planning through efficient utilization of energy, water and materials

Major Project

Design of an urban or rural campus by developing a master layout plan and designing of various built and un-built spaces that constitute the campus. Architectural design and detailing of at least two major built components (Built up area up to 4000 SQM) and open space design and detail.

Emphasis may be given on:

- Campus planning principles
- Hierarchy of built and un-built spaces
- Detailing of pathways and road network
- Suitable response to site topography

- Appropriate Structural System in the built forms
- Climatic responsive planning approach
- Alternative energy systems
- Water conservation techniques and waste management strategies

Time bound project

Design and detailing of an Assembly building incorporating applicable regulations and standards. with reference to applicable norms and standards.

Minor project (Maximum up to 2 weeks)

Design and detailing of urban design elements incorporating principles of campus planning. (Design of gateway structures, landmark spaces or built forms, open spaces, Pathways, Road network and suitable sections incorporating service layout). Application of sustainable urban design principles (water management, energy efficiency, sustainable materials etc.) demonstrated in the campus layout

Reference:

- Urban design: a typology of procedures and products. Lang, Jon T
- Richard P. Dober, “Campus Planning” - Society for College and University Planning, 1996.
- Campus Design in India by Achyut Kanvinde
- Kevin Lynch, “Site planning”, MIT Press, Cambridge, 1967
- National Building Code/ Kerala Building Rules
- Joseph De Chiara, Michael J Crosbie, “Time Saver Standards for Building Types”, McGraw-Hill Professional, 2001.
- Ernst Neuferts, “Architects Data,” Blackwell, 2002.
- Joseph De Chiara, Julius Panero, Martin Zelnik, “Time Saver Standards for Interior Design and Space Planning”, McGraw Hill, 2001.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VI	I (c)	19AR06002	Working Drawings 1		4		4	100	100		200

Course Overview:

The subject primarily aims to introduce the concept of Working Drawings and Details; Coordination between Architectural, Structural, Services and other disciplines; Preparation of Architectural Working Drawings for a design project.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to familiarize the students to learn the techniques of preparing drawings which are used for construction of buildings and working details of project execution on site.
- Understand the organization of various building services inside the layout of a building
- Be familiarized with the networking and coordination skills among various disciplines to put together a working drawing
- Be taught in congruence with the previous year design projects.

Module 1: Introduction to Working Drawings

Learning Strategies:

- Lecture on various working drawing practices
- Workshops to learn specifications and standards

Module Contents:

- Overview of Working Drawings; It's importance; historical perspective; consultants involved in preparation of working drawings, their role and scope; reading, error checking, sequencing of drawings for construction, problems in working drawings.
- Drafting Conventions: Representation of materials, graphic symbols, line type conventions, grid lines, dimensioning, lettering, color codes, paper sizes, title blocks, office practices, standardization of details.

Module 2: CAD Drawings/BIM

Learning Strategies:

- CAD Workshops to familiarize drafting methods with emphasis on multidisciplinary working environment.

Module Contents:

- CAD Drawings/ BIM: Working within a disciplined and systematic software environment using layers, blocks, templates, assemblies, libraries, layouts, plot styles, error checking, editing, xref, annotations etc.

Module 3: Project work

Learning Strategies:

- Drafting Studios to design a working drawing
- Manual drafting may be encouraged for thorough understanding of details
- Workshops to design custom drafting styles, blocks, and assimilation for drafting library

Module Contents:

- Project work: Preparation of Architectural Working drawings and details for a Design project from previous semesters- G+1 structurer (Residence, Primary Health Center or School etc.). Preparation of Site Layout, Setting out and centre line drawings, Plans at all levels, Roof/Terrace Plan; all Elevations; two Cross Sections (minimum) passing through staircase & lift shaft; Profile Sections; Details to include: Toilet, Kitchen, Staircase, Door, Window, Grills/ Jali works, Handrails, Compound walls, Gates, Sky-light.

Reference:

- Architectural Graphics by Francis D. K. Ching
- Building construction illustrated by Francis D.K. Ching
- Building construction metric Vol 1-5 by W.B. Mckay
- Detail in Contemporary Residential Architecture by Virginia Mc Leod

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
VI	I (c)	19AR06003	Professional Skill Enhancement 6			4	2	50	50		100

Course Overview:

This course intends to provide/ enhance the soft skills in order that students perform well in their academics and beyond. These skills are intended to support the student to perform better in her/his core subjects and also build up robust performance through hands-on workshops and laboratory training. This course is subdivided into two categories – Mandatory and Optional. Mandatory courses help in preparations for respective semester subjects. The optional category helps students to take personal initiatives to develop in specific areas that can widen their horizon of their understanding of architecture and also initiate action at the society level. There are also options to work on competitive exercises alongside other similar institutions.

Course Outcomes:

Upon completion of the course, the student should:

- be given an exposure of varied skills that can bring in confidence in handling their core subjects such as workshops, communication skills, computer applications etc.
- be able to develop team spirit and interpersonal skills to manage complex situations.
- be able to cope with stress and develop multi-tasking capabilities.

Module 1: Portfolio workshop

Learning Strategies:

- Workshop
- Presentations and discussions

Module Contents:

- Portfolio content and design
- Compiling and presenting techniques
- Personalizing

Module 2: Innovations

Learning Strategies:

- Computer lab, workshop
- Group discussions and Interactive sessions

Module Contents:

- Learn how to utilise sustainable materials.
- Work on a live project with a focus on social engagement and innovative green agenda.
- Collaborate with a local collective of artists or craftsmen.
- Get hands-on experience using cutting edge facilities in custom built studios and workshops

Module 3: Social Initiatives or any other co-curricular activities

Learning Strategies:

- Technical and hands on workshops
- Group discussions and Interactive sessions
- Self- initiatives

Module Contents:

- Optional content to be developed by each institution in order to help students to take part in activities that involve larger groups and facilitate peer learning.
- The activities could be skill oriented like Photography or Crafts training or student initiated societal activities or participation in NASA or similar student led group initiatives which has an academic content as well.

Reference:

- Uday Kumar Haldar, (2010), *Leadership and Team Building*, 1st edition, Oxford University Press
- John J. Murphy, (2017), *How to Unleash the Power of Your Subconscious Mind: A 52-week Guide*, 1st edition, HarperCollins
- Ace McCloud, (2017), *Team Building: Discover How to Easily Build & Manage Winning Teams (Strategies for Building and Leading Powerful Teams)*, Pro Mastery Publishing
- Alvarado & Anthony, (2015), *DIY Magic*. Perigee
- Damon Jones, (2019), *Shipping Container Homes: The best guide to building a shipping container home and tiny house living, including plans, tips, FAQs, and more!* 1st edition, Ingram Publishing

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VI	II	19AR06004	Housing	2			2	50		100	150

Course Overview:

To introduce the students into the field of housing-to make them understand its significance in the context of both global and national scenario, and thereby to make them sensitive to the critical social and economic issues related to housing especially in developing countries like India and Kerala in particular, with emphasis on the analytical study of relevant housing initiatives. To introduce them to the diverse factors in designing a composite housing layout.

Course Outcomes:

Upon completion of the course, the student should:

- Understand the importance of housing and its relation with poverty.
- Recognize housing issues at national and international context in terms of magnitude of problems, outcomes of initiatives and related factors.
- Understand the issues related to slums and affordable housing to poor and innovative approaches towards mitigating it.
- Be equipped to have a comprehensive understanding of the complexities of a housing project.

Module 1: Introduction to Housing

Learning Strategies:

- Lecture notes, literature-based case examples through books, journal e-resource

Module Contents:

- Concept of housing-Shelter as a basic requirement, Determinants of housing
- Housing shortage, housing need and demand. Affordability – House hold size, household income.
- Housing and its impact on national economy. Economics of Housing as an industry.
- Global Housing scenario, Challenges.
- United Nations Policies relevant to Housing and Planning - Habitat Agenda, Millennium Development Goals. International case studies.
- Urbanization and Poverty issues -Housing Shortage as a result of Population Explosion.
- Study of Slums as a consequence of rapid urbanization and industrialization, and its impact on the urban housing scenario in India and abroad.

Module 2: Housing Scenario in India

Learning Strategies:

- Lecture notes, through books, journal e-resource, case studies, data analysis.

Module Contents:

- Nature and magnitude of the housing problem in India. History of Housing and Planning Policies in India, Five Year Plans.
- Study on the changing priorities in the housing policies and the major housing programs carried out in the various five-year plans in India.
- National Housing and Habitat Policy and its need, objectives and role in the field of housing in the present-day context.
- Housing design and standards conforming to the local climatic and socio-economic

conditions.

- Literature case studies of the some of the major Slum clearance and Slum Improvement Schemes successfully carried out in India.
- Important earlier & prevailing Housing Schemes in India for various categories like HIG, MIG, LIG, EWS etc.
- Innovative approaches to social housing. International, National & state level Cases studies.

Module 3: Housing Finance

Learning Strategies:

- Lecture notes, through books, e-resource, case studies, analysis of prevailing housing concepts & schemes.

Module Contents:

- Factor affecting demand and supply of housing. Housing Finance & Land economics.
- Housing Finance, Sources of Housing Finance and its essential characteristics.
- Different Finance agencies involved in Housing - Formal & Informal housing finance agencies, National and State level
- Role of the informal housing finance system as a major source of housing finance for the urban and rural poor
- Illustrative case studies of relevant and innovative housing schemes or projects in India and Kerala in particular.

Workshop/Group Assignment.

- Design for a composite Housing Layout of around 2 acres.
- Deliverable: Basic sketches & Block model

Intension of the exercise:

1. Introduction to Planning & Design principles.
2. Understanding categories, Densities, Land use, Circulation, Infrastructure, Open spaces
3. Interpreting FAR, Coverage and other regulatory principles.

Reference:

- K. Thomas Poulose- 'Innovative Approaches to Housing for the poor'
- Dr. Misra and Dr.B.S. Bhooshan- 'HabitatAsia'
- Dr. Misra and Dr.B.S. Bhooshan- 'Habitat India'
- Arthur Gallion- 'Urban Pattern'
- Reading Material in Housing -Compiled by K. Thomas Poulose for ITPI students
- Five Year Plans-Government of India Publications
- Shadow cities by Robert Neuwirth
- The economics of urban property market by Paschalis A. Arvanitidis
- The modern economics of Housing by Randall Johnston
- Urbanization and urban systems in India by R. Ramchandran
- Urbanization in India Ed. by R.S. Sandhu
- Planning sustainable cities- UNHabitat

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
VI	II	19AR06005	Specification and Cost Estimation	2			2	50		100	150

Course Overview:

Specification is an integral part in the design process through which the quality of our built environment could be upheld. The course shall cover the aspects of specification, the related aspects of cost estimation and the strategies of realizing them. The students will be introduced and familiarized with the various techniques and processes of preparing an estimate, tender documents and the process of tendering. The exercises taken shall be based on the design exercise done by them in the previous semester. Another important role an Architect plays is of a Valuer for immovable properties. The students will be introduced and made aware of the various methods and techniques for doing the valuation of a property. The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to technically specify aspects of the built environment and validate them as per quality standards approved nationally or internationally.
- Be able to understand estimates and prepare them for small scale projects.
- Be able to understand valuation and the related aspects to critically use them in the design process.

Module 1: Quantity surveying

Learning Strategies:

- Lectures
- Case studies of projects and their contract documents

Module Contents:

- Introduction to the basic terms used in Estimation
- Important considerations while preparing an Estimate
- Introduction to various types of Estimates
- Various Techniques of Preparing the Estimates and BOQ's

Module 2: Specifications

Learning Strategies:

- Lectures
- Visiting a QS office to understand the process and procedures

Module Contents:

- Introduction to specifications
- Important considerations while writing the specifications

- Specifications as per CPWD, PWD etc., and how to read them
- Writing specifications for building works
- Writing specifications for Interior finishing and furnishing Works

Module 3: Analysis of Rates

Learning Strategies:

- Lecture notes
- Through books & E-resource
- Case studies
- Analysis and prevailing concept in real estate housing design.

Module Contents:

- Introduction to Schedule of Rates
- Importance of Rate Analysis
- Considerations done while doing the Rate Analysis
- Calculations for basic building materials like RCC, Brick work Calculating the various quantities of materials required per unit
- Introduction to Valuation
- Process of valuation

Reference:

- Estimating, costing and valuation: professional practice and quantity surveying by Rangwala
- Estimating and costing in civil engineering: theory and practice by B.N. Dutta
- Estimating costing and building economics for architects by Prof. Harbhajan Singh
- Estimating, costing, specification and valuation in civil engineering: principles and applications by Manojit Chakraborti
- Quantity Surveying and Valuation (Estimation, Costing and Contracting) by S.P Mahajan and Sanjay Mahajan
- CPWD Specifications by Central Public Works Department
- Delhi Schedule of Rates by CPWD
- Valuation of real properties by Rangawala

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VI	II	19AR06006	Building Services 3: Mechanical Services & Acoustics	2			2	50		100	150

Course Overview:

- Services are the lifeline systems of any built form making it functionally habitable. They also make them efficient, comfortable and safe. Building services essentially include fluid systems, electrical & energy systems, lighting systems, HVAC systems, security systems etc.
- This course as last of the 3 courses in Building services is intended to give the students an overview of the HVAC systems and Acoustic systems employed in our built environment.

Course Outcomes:

Upon completion of the course, the student should:

- Develop an understanding about the importance of services in buildings and its coordination in the built environment.
- Be able to critically understand various HVAC systems and the determinants in choosing between such systems.
- Develop an understanding on the acoustic design with respect to spaces and materials and be able to propose acoustical solutions.

Module 1: Fundamentals of Heating, Ventilation and Air Conditioning

Learning Strategies:

- Lectures on the fundamentals of thermodynamics and HVAC
- National and International professional handbooks on HVAC.

Module Contents:

- Introduction to HVAC - basic concepts, standards - national and international
- Terminologies related to humidity and temperature – Dry bulb and wet bulb temperature, Dew point temperature, Absolute humidity, Relative humidity, Specific humidity, sensible heat gain, Evaporative cooling and condensation. Application of psychrometric chart.
- Heat load and types, External Factors contributing to heat load in an enclosed space, internal parameters contributing to heat load.
- Methods of reduction of internal / enclosed heat load - Natural (Active and passive cooling) and artificial ventilation.
- Thermal conductivity. Building materials with low thermal conductivity.
- An outline on HVAC related energy efficient rating systems.

Module 2: Types of HVAC Systems

Learning Strategies:

- Lectures on HVAC system types and their application criteria.
- Case studies on various HVAC systems
- Guest lectures by specialists.

Module Contents:

- Artificial ventilation - Refrigeration Cycle and types (Vapour Compression System & Vapour Absorption system). Basic components of an Air conditioning System- Evaporator, Compressor, Condenser.
- Types of AC - Window Air Conditioners, Split Air Conditioners, Packaged Air Conditioners, Direct Expansion Air Conditioning Systems, Central or All-water Air Conditioning Systems.
- Components - Plant Room, AHU room, FCU, VRV, VRF, terminal unit.
- Basic Air Duct Design & Principles, Duct system, Air Duct Routing Concept of return air – Thermal and acoustical treatment of ducts.
- Inlets and outlets (Grills, registers and diffusers), dampers and filters in duct system and their location.
- Standard Refrigerants & Properties, CFC free refrigerants.

Module 3: Introduction to Basics of Acoustics

Learning Strategies:

- Introduction to acoustics
- Lab experiments to understand acoustical properties
- Market studies on Acoustical materials

Module Contents:

- Basic laws and terminologies related to Acoustics.
- Sound Intensity, Sound Intensity Level, and sound level meter. (Classroom exercise)
- Behavior of sound in rooms- Sound Absorption, Transmission, Reflection, Diffusion and Diffraction, Room shapes, room resonance.
- Free field conditions and Inverse Square Law for noise reduction with distance.
- Acoustic Materials –characteristics and applications

Module 4: Acoustics in Buildings

Learning Strategies:

- Case studies on acoustically treated spaces.
- Understanding behavior of sound in various enclosed spaces.
- Understanding impact of sound in built environment.
- Acoustical design project of an existing space.

Module Contents:

- Requirement for good acoustics – Reverberation Time and its importance for acoustical performance of an enclosure, Sabin's Equation and Eyring's formula
- Acoustical defects and design of auditorium and other acoustically sensitive enclosures meant for speech, music, lecture, etc. (Class rooms, room for music, recording studios, open air theatre, multi-purpose rooms)
- Brief introduction to Sound Amplification Systems.
- Noise- types, its transmission and its effects.
- Sound Insulation, Transmission Loss, control of mechanical noise and vibrations.

Reference:

- National Building Code 2005
- Mechanical and Electrical Equipment for Buildings by Walter T. Grondzik, Alison G. Kwok, Benjamin Stein.
- Basic Refrigeration and Air Conditioning by A. Ananthanarayana.
- Building Construction by Rangwala.
- Architectural Acoustics by M. David Egan.
- Room Acoustics, Heinrich Kuttruff
- Architectural Acoustics, Bruel & Kjaer
- Principles and Applications of Room Acoustics - Volume 1 and 2, Lothar Cremer (Author), Helmut A. Muller (Author), Theodore J. Schultz (Translator)

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VI	I (c)	19AR06007(A)	Elective Workshop 2: Cost Effective Technology in Building Construction	1		2	2	50	50		100

Course Overview:

- To familiarize and understand the materials and techniques in cost effective construction.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to incorporate cost effective techniques in design.
- Be able to develop and understanding about the concepts of ecosystem carrying capacity, carbon footprint, sustainability and sustainable development.
- Be able to aware about the consequences of the emerging vulnerabilities of global warming and climate change and to understand the contribution of building industry to the same.

Module 1: Introduction to Cost Effective Techniques

Learning Strategies:

- The course would be conducted through research and seminars.

Module Contents:

- Cost effective techniques: Need, Planning aspects, construction aspects, maintenance and longevity
- Aspects.

Module 2: Methodology

Learning Strategies:

- The course would be conducted through live case studies, field works and workshops.

Module Contents:

- Choice of materials in India/Kerala conditions, indigenous building materials, organic and inorganic building materials, alternative building materials, use of industrial and agricultural wastes - Survey of such materials development by research organizations like CBRI, SERC, IITs etc.
- Significance of cost-effective construction technology: Relevance of improving of traditional technology, relevance of innovative technology/alternate technology, survey of such technologies by various research institutes.

Module 3: Critical Analysis

Learning Strategies:

- The course would be conducted through worksheets and critical writing.

Module Contents:

- Critical analysis (in terms of initial investment, maintenance cost and longevity of buildings) of the local adaptation of the innovative technologies by various agencies.

Reference:

- A.G. Madhav Rao, D.S. Ramachandra Murthy – Appropriate technologies for Low Cost Housing – Oxford & IBH Publishing, 1996.
- G.C. Mathur – Low cost Housing in Developing Countries.
- Proceedings of International Seminar on Low cost Housing and Alternative Building Materials (1988), CBRI Roorkee.
- Jagdish and Singh – Better Houses with Mud
- CBRI – Live Better with Mud and Thatch, SERC AND NBO, Baker Laurie (1988) – Mud, Publications of COSTFORD.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VI	I (c)	19AR06007(B)	Elective Workshop 2: Geographic Information System	1		2	2	50	50		100

Course Overview:

The course is intended to provide students with a foundation for basic GIS techniques which are relevant to architectural analysis and Presentation. The elective is intended to establish a bridge between the conceptual realms - Architecture /Site -Terrain Analysis/ Landscape architecture/Urban planning.

Course Outcomes:

Upon completion of the course, the student should:

- Be introduced to the basic concepts of Geographic Information System (GIS)
- Get introduced to geospatial data acquisition and its process.
- Will be equipped to produce digital and printed maps.

Module 1: Introduction to GIS

Learning Strategies:

- Lectures, workshops and labs

Module Contents:

- Introduction to Geospatial technology
- Overview of remote sensing, Applications
- Fundamentals of GIS, GIS as a Hardware/software, Components of GIS
- Map projections- methods, Coordinate systems-Geographic and Projected coordinate systems, Data Types- Spatial and attribute data, Raster and vector data representation-Data Input methods- Data capture & methods, Coordinate reference systems
- An overview of Google Earth & KML, Google Objects, Descriptive HTML in Placemarks, Ground overlays, Screen overlays, Paths, manipulating a path Polygon, taking profiles of site, creating KML files and exporting to GIS format.

Module 2: Raster and Vector Data

Learning Strategies:

- Lectures, workshops and labs

Module Contents:

- Overview of Global Positioning System, Application
- Capturing survey data through GPS device or mobile application. Traversing boundary of site, bringing routes and way point data into GIS.
- Spatial data, loading raster files, Mosaic raster, Geo referencing raster and vector files, Loading data from OGC web services, databases.
- Creating vector data layers, joining tabular data, Topology errors & tools, analyzing raster data, combining raster and vector data, Raster surface through interpolation, leveraging the power of Spatial database, Vector and raster analysis, Vector Spatial analysis (Buffers), Spatial analysis (interpolation).

Module 3: Spatial Analysis

Learning Strategies:

- Lectures, workshops and labs

Module Contents:

- Terrain Analysis & scientific computing of Raster data set: Creating Digital elevation model (DEM) from point data, Hill shade, Slope, Aspect
- Creating & Composing maps: Vector styling, Labelling, using appropriate software for composing multiple vector layers of maps, Designing print maps, Publishing GIS 2D maps on the web

Reference:

- Anita Graser, "Learning QGIS" PAKT open source, 2016.
- John Van Hoesen, Luigi Pirelli, Richard Smith Jr., Kurt Menke, " A refreshing look at QGIS: Mastering QGIS", PACKT Pub., 2016.
- Carson, Tom, Baker, Donna L., "Adobe® Acrobat® and PDF for Architecture, Engineering, and Construction", Springer publication, 2006
- Kang-Tsung Chang, “Introduction to GIS”, Tata McGraw-Hill Publishing Co. Ltd, 8e, 2016
- https://sites.duke.edu/envgis/tutorials/introduction-to-google-earth/
- CBSE Textbooks on Geospatial Technology

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
VI	I (c)	19AR06007(C)	Elective Workshop 2: Vernacular Architecture	1		2	2	50	50		100

Course Overview:

To inculcate an appreciation of vernacular architecture; as an expression of local identity and indigenous traditions of the culture.

Course Outcomes:

Upon completion of the course, the student should:

- Develop an understanding of vernacular architecture as a process and not a product and explore the concepts of culture and civilization and their impact on these architectural products.
- Develop an understanding of vernacular architecture as an outcome of various social, political and economic influences and as a response to the cultural and climate conditions.
- Develop an understanding of the physical experience of buildings in order to appreciate the complexity of the physical and metaphysical influences bearing on architecture.

Module 1: Introduction to Vernacular Architecture

Learning Strategies:

- The course would be conducted through seminars and field work.

Module Contents:

- Introduction to the approaches and concepts to the study of vernacular architecture,
- History and organization of vernacular buildings of different regions in the Indian context; with an understanding of forms, spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction techniques.
- Study of factors that shape the architectural character and render the regional variations of vernacular architecture - geographic, climatic, social, economic, political and religious aspects, local materials and skills available in the region, etc.

Module 2: Methodology

Learning Strategies:

- The course would be conducted through field work and case studies.

Module Contents:

- Methods of observation, recording, documenting and representing vernacular architecture with examples.
- Study and documentation of vernacular architecture of selected building typologies.
- Rigorous documentation, accuracy in measuring, collating the recorded information and drawing them up in specified formats and scales.

Module 3: Critical Review

Learning Strategies:

- The course would be conducted through method seminar and research.

Module Contents:

- A critical review of the relevance and application of vernacular ideas in contemporary times.
- An appraisal of architects who have creatively innovated and negotiated the boundaries of 'tradition' while dynamically responding to the changing aspirations and lifestyles of the world around.

Reference:

- Carter, T., & Cromley, E. C. Invitation to Vernacular Architecture: A Guide to the Study of Ordinary Buildings and Landscapes. Knoxville: The University of Tennessee Press. 2005
- Cooper, I. Traditional buildings of India. Thames and Hudson Ltd, London, 1998
- Oliver, P. Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VI	II	19AR06008(A)	Elective Theory 3: Facilities Planning	2			2	50	100		150

Course Overview:

- To make students familiar with different building typologies.
- The rules and regulations for the building.
- Exposing students to the basics of planning and design of special service-oriented spaces in relation to types of spaces, services, standards and management systems.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to do literature case studies and live case studies preferable for better understanding on hospital planning and services.
- Be able to perform research and critical analysis for the respective selected case study and implementation of innovative technologies and solutions

Module 1: Healthcare

Learning Strategies:

- Lectures and Seminars

Module Contents:

- Hospital project- planning considerations, composition of design team.
- Site selection criteria- Accessibility, Soil type, availability of public utilities such as fresh water, power, good drainage, sanitation, waste disposal etc. Consideration of detrimental factors like pollution, possibility for future expansion, total feasibility considerations
- Various Design approaches- the Indian healthcare architectural process, the American healthcare architecture process.
- Rules and regulations- American Association of hospital standards.
- Zoning and Circulation
- Emergency services, Outpatient services, IP services, Diagnostic services, surgical facility, ICU, CSSD, Mortuary, Support services.
- NBC, KBR, Fire norms for hospital.

Module 2: Hospitality

Learning Strategies:

- Lectures and Seminars

Module Contents:

- Site selection criteria
- Checklist of Facilities for Classification / Re-Classification of operational Hotels (star rating).
- Guidelines for classification of heritage hotels.
- Guidelines for classification of tented accommodation.
- Standards in TSS and Neuferts for hotel, Kitchen design, restaurant and Bars-Front of house, Back of House, Store

- Laundry, Housekeeping, Electrical, Plumbing HVAC, Lift maintenance, Janitors room, security, surveillance.
- NBC/ KBR Regulations for Hotel project

Module 3: Theatres, Convention centres, Educational buildings

Learning Strategies:

- Lectures and Seminars

Module Contents:

- The Kerala Cinemas (Regulation) Rules, 1988 - building, health and sanitation, fire precautions,
- electrical system, seating, etc.
- Guidelines for convention centres, Solid Waste Treatment, Crowd management, Security and surveillance Interior and Exterior
- Establishment and maintenance of school by government of Kerala Guidelines.

Reference:

- G.D. Gunders, Hospital facilities planning and management.
- NBC, KBR, Time saver standards.
- Guidelines by ministry of tourism, Government of India.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
VI	II	19AR06008(B)	Elective Theory 3: Services in High Rise Buildings	2			2	50	100		150

Course Overview:

- The course shall develop on the students basic understanding of services acquired during earlier semesters.
- To familiarise students with the particular requirements of High-rise buildings
- The course shall have up to date content regarding development in the field of High-rise services.

Course Outcomes:

Upon completion of the course, the student should:

- Upon completion of the course the student should
- Have a basic understanding of high-rise buildings and associated service requirements.
- Develop an awareness of relevant codes and regulations governing services in high rise buildings.
- Have an understanding of spatial implications with regard to the service requirements.

Module 1: Introduction to Services in High rise buildings

Learning Strategies:

- Lectures on the subject content
- Case studies of relevant projects
- Site visits to observe and understand the functioning of services.

Module Contents:

- Introduction to High rise buildings, definition as per various national and international codes and norms.
- Overview of services in High Rise Buildings - plumbing, drainage, sewerage, electric and lighting, HVAC, life safety, vertical circulation, service floors.
- Integration of services – IBMS, requirements, possibilities of integration, handshake systems, 3rd party integration, advantages
- Concepts of Intelligent Architecture- Building Service Automation particular to High rise

Module 2: Water supply, drainage and fire safety for High rise buildings

Learning Strategies:

- Lectures on the subject content
- Case studies of relevant projects
- Site visits to observe and understand the functioning of services.

Module Contents:

- Water Supply & Drainage -Water Supply and waste water system planning, collection, systems
- Water storage and distribution systems, Pressure zone, Pressure reducing valve, Pumps, Rain water harvesting
- Sanitary drainage systems – stack systems, terminal velocity and terminal length, hydraulic jump, suds pressure zones, sewage treatment, recycling and reuse of water.
- Waste management, collection and disposal systems
- Fire Safety in high rise buildings- Planning and design for fire safety, refuge areas, fire detection and fire alarm systems, fire hydrant systems, smoke management systems.
- Provisions in the National building code, International fire Code pertaining to High rise buildings.

Module 3: Electrical, Lighting, HVAC, Vertical circulation and other services

Learning Strategies:

- Lectures on the subject content
- Case studies of relevant projects
- Site visits to observe and understand the functioning of services.

Module Contents:

- Electrical & Lighting - Natural lighting systems, Energy efficiency in lighting systems, Load and Distribution, Planning for intelligent lighting system.
- Alternative energy sources in high rise buildings
- HVAC - Natural and Mechanical Ventilation Systems – Air-conditioning systems types for high rise, Air distribution systems, Planning and Design, Automation and energy Management.
- Planning of vertical transportation in tall buildings- planning concepts, sky lobby concept, double decker lifts, innovative concepts
- Planning of surveillance system, security management systems
- Façade engineering, façade maintenance systems

Reference:

- 'National Building Code of India'2005– Bureau of Indian Standards, 2005.
- International Fire Code, (2018), International Code Council
- Manual on Water Supply and Treatment (1991) third Edition, Central Public Health and Environmental Engineering Organization, Ministry of Urban Development, New Delhi.
- W.G. McGuiness and B. Stein 'Mechanical and Electrical equipment for buildings, John Wiley and sons Inc., N.Y.
- Riley Shuttle worth, (1983) 'Mechanical and electrical Systems for Construction', McGraw Hill Book Co. U.S.
- A. K. Mittal, (2009), Electrical and Mechanical Services in High Rise Building: Design and Estimation Manual, CBS
- ASHRAE: Handbook–HVAC Systems and Equipment (1992), HVAC Applications (1991) ASHRAE, Inc. Atlanta.
- Energy Conservation building code-2007-Bureau of Energy Efficiency-Govt. of India.
- ISHRAE the Hand Book on Green Practices.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VI	II	19AR06008(C)	Elective Theory 3: Indian Thoughts and Traditions	2			2	50	100		150

Course Overview:

The subject gives a basic introduction to the philosophies and inherent principles that generated the Art and Architecture of India. It also gives a glimpse of various schools of Indian thought and expression. The presentation of the subject may aim at developing a better appreciation and understanding of not only the Indian thoughts and traditions but also of many contemporary questions and issues that they handle in related disciplines.

Course Outcomes:

Upon completion of the course, the student should:

- Be made aware of the rich knowledge systems and traditions of India
- Be introduced to the underlying concepts in Indian Art and Architecture
- Have discussions on Indian Identity and Cultural Continuity are encouraged
- Have discussions on Ancient Indian wisdom and contemporary challenges are generated

Module 1: Overview of Indian Thought

Learning Strategies:

- Lectures and discussions

Module Contents:

- Historical origins of Indian thoughts and traditions- Pre-vedic, Vedic – Sources- Shruti and Smriti
- Concepts of Indian philosophy- Purusharthas, Varnasrama Dharma, Karma and Rebirth, Time
- Astika and Nastika schools- Understanding of Brahman, Atman, Samsara, Moksha- Implications
- Thoughts of Aurobindo, Tagore and Gandhi

Module 2: Indian Thought and Ecology

Learning Strategies:

- Lectures and discussions

Module Contents:

- Nature as Sacred, Panchabhutas
- Flora and fauna, Sacred Geography- Sacred Groves and Sacred Ponds
- *Vasudhaiva Kutumbakam*, 'Deep ecological' implications

Module 3: Indian Thought and Visual Arts

Learning Strategies:

- Lectures and discussions

Module Contents:

- Introduction to Indian Art, Shadaṅga -The six limbs of Indian art
- Symbols and Iconography, Rasa theory of Indian Aesthetics
- Sculpture and Painting- Cave Murals, Mughal, Pahari, Rajput, Tanjore, etc.
- Folk and tribal art forms- Kalamezhuthu, Madhubani, Warli, Pattachitra, Kalamkari, Gond etc.
- Mural traditions of Kerala- Study of style, Form and technique

Module 4: Indian Thought and Architectural Expression

Learning Strategies:

- Lectures and discussions

Module Contents:

- Underlying Philosophy of Vastusastra
- Sacred Geometry- Mandala, Bindu
- Stupa- The underlying philosophy and Architectural Expression
- Temple- The underlying philosophy and Architectural Expression

Reference:

- M. Hiriyanna, The Essentials of Indian Philosophy, 1995
- Meera Baindur, Nature in Indian Philosophy and Cultural Traditions, 2015
- S. Radhakrishnan, A Source Book in Indian Philosophy, Princeton University Press, 1957
- S. Radhakrishnan, J. H. Muirhead, Contemporary Indian Philosophy, 1936 (http://archive.org/details/Contemporary.Indian.Philosophy)
- Richard Lannoy, The Speaking Tree: A Study of Indian Culture and Society, 1971
- Lance E Nelson, Purifying the Earthly Body of God: Religion and Ecology in Hindu India, 1998
- Carman Kagal (Ed.), Vistara: The Architecture of India, 1986
- Aurobindo, Foundations of Indian culture, 1953 (https://archive.org/details/in.gov.ignca.1542)
- Kireet Joshi, Philosophy of Indian Art, 2011
- C.S. Gupta, Indian Folk and Tribal Painting, 2008
- Syamala Gupta, Art Beauty & Creativity Indian and Western Aesthetics,1999
- G. Michell, The Hindu Temple – An Introduction to its Meaning and Forms, 1977
- Thirumangalathu Neelakandan Moose, Manushyalaya Chandrika
- CBSE textbooks on Traditions and Practices of India
- S. Durai Raja Singam (Ed.), The Wisdom of Ananda Coomaraswamy: Reflections on Indian Art, Life, and Religion, 1979
- Yatin Pandya, Concepts of space in Traditional Indian Architecture, 2004

40. SEVENTH SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VII	I (a)	19AR07001	Architectural Design 7		10		10	250	250		500

Course Overview:

To familiarize students with housing design from a socio-economic perspective

- To observe lifestyles, social needs, human interaction, human normative behavior, tendencies, limitations and experiment with various housing typologies
- To introduce fundamental economics of project and density-based design
- To emphasize on dwelling community, neighborhood and housing infrastructure and services as major design parameters
- To introduce various tools and techniques of housing design- Land use survey, infrastructure, house hold surveys etc.
- To experiment with various construction methods and techniques suitable for mass housing
- To learn the efficiency of housing typology in various climatic zones, planning and circulation, health and hygiene, sanitation etc.
- To learn various techniques of affordable construction applicable in the housing typology
- **Sustainable design objectives**: To equip the students to adopt sustainable housing design principles considering climate, building envelope, site selection and planning, water efficiency, energy efficiency, indoor air quality, green materials and resources, green infrastructure, renewable energy, natural lighting and fresh air ventilation, efficient landscape etc. Various green building rating systems such as IGBC (Green Homes), GRIHA, ECOHOUSING or any applicable rating systems may be considered. Advanced simulation and modeling techniques to orient the buildings and decide energy performance parameters may be explored

Course Outcomes:

Upon completion of the course, the student should:

- Understand the Housing economics, public policy and formulate appropriate spatial response
- Learn principles of housing standards and evolution of settlement patterns
- Sensitize the students about land scarcity and expose them to different typologies of high-density housing
- Understand the challenges of bigger scale site planning

Major Project

The focus of the studio is to create housing typologies suitable to the context and experiment with different housing concepts. The project may focus on the design of a housing precinct/community with several housing types along with necessary amenities.

Projects can be formulated based on low-rise high-density housing and high-rise high- density housing depending on the context. Methodology may involve case studies, user interviews, questionnaire surveys, architect interviews, behavioral observations, meeting with housing

developers and job contractors, engineers, state housing department etc. may be used for collecting, comparing and analyzing information necessary for design decision making. Elaborate use of physical models and 3D models in addition to detailed drawings will be required to effectively communicate the design. Sample quantity estimates and specifications are to be prepared. Application of concepts of project phasing, fundamental economics of the project etc. may be considered.

Emphasis may be given on:

- Unit plan, cluster plan, zoning and block design
- Structure, density, land use, coverage
- Urban infrastructure, Site and services schemes
- Housing shortages
- Basics of housing finance
- Incremental housing
- Slums and squatter settlements
- Sustainability and energy efficiency
- Ventilation and day lighting
- Water and waste management
- Walkability and universal access
- Affordable technology and prefabrication techniques
- Participatory and community-oriented design approach
- Parking and amenity sharing
- Residents associations and conflict resolution
- Building regulations
  Safety and security services

Minor project

Detailing of a prototype unit and different permutations to achieve efficiency can be explored. Various techniques involved in modular construction/Prefabrication/ affordable construction techniques may be detailed out

Time bound project

Design of a simple public building/spaces such as banks, restaurants, food courts, supermarkets, public squares, monumental arches, memorials or any of similar scale and scope may be introduced for time bound evaluation of the student project

Reference:

- Christopher Alexander, “A pattern Language”, Oxford University press, New York 1977
- Saxena A. K., “Sociological Dimensions of Urban Housing and Development “, Common wealth Publications, 2004
- Leuris (S), Front to back: “A Design Agenda for Urban Housing”, Architectural Press, 2006.
- Richard Kintermann and Robert small, “Site planning for Cluster Housing”, Van Nastr and Reinhold company, London/New York 1977.
- Correa, C. (2010). A Place in the Shade: The New Landscape and Other Essays. New Delhi: Penguin Books.
- Brooks, R. G. (1988). Site Planning: Environment, Process and Development. Michigan.
- Clapham, D., Clark, W. A. V. and Gibbs, K. (2012). The Sage Handbook of Housing Studies. London: Sage Publications.
- HUDCO publications – Housing for low income, sector model.
- Greater London Council. (1978). An Introduction to Housing Layout: A GLC Study. London.
- Lee, K. E. (1984). Time Saver Standards for Site Planning. McGraw-Hill Ryerson.
- Levitt, D. and Levitt, B. (2010). The Housing Design Handbook. New York: Routledge.
- Root, B. J. (1985). Fundamentals of landscaping and site planning. AVI Publications.
- Untermann, R. and Small, R. (1977). Site Planning for Cluster Housing. Van Nostrand Reinhold.
- National Building Code
- KPBR/KMBR/ Other relevant local building code
- CPCB / State PCB regulations/impact study guidelines

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
VII	I (c)	19AR07002	Working Drawings 2		4		4	100	100		200

Course Overview:

The subject aims to build upon what was taught in the previous semester by introducing 'Good for Construction drawings', preparation of structural, electrical, water supply and sanitation drawings for the design project of the previous semester.

Course Outcomes:

Upon completion of the course, the student should:

- Develop necessary skills required to prepare 'Good for construction' working drawings
- Learn to draft and decipher supplementary working drawings of other disciplines and prepare coordinated working drawing sets.

Module 1: Project work

Learning Strategies:

- CAD Drafting Studios
- Workshops from industry experts including BIM as applicable.

Module Contents:

- Project Work: Project continued from previous semester; Preparation of structural and services drawings and details.
- Structural drawings: Conventions & symbols; Foundations, Columns, Beams, Slab.

Module 2: Services Working Drawing I

Learning Strategies:

- CAD Drafting Studios
- Workshops from industry experts

Module Contents:

- Electrical drawings: Conventions & symbols; Plans at all levels.
- Water Supply drawings: Conventions & symbols; Plans at all levels
- Sanitary drawings: Conventions & symbols; Plans at all levels; Site Plan, Terrace Plan

Module 3: Services Working Drawing II

Learning Strategies:

- CAD Drafting Studios
- Workshops from industry experts

Module Contents:

- Mechanical drawings: Conventions & symbols; Plans at all levels; Details of Lift.
- Complete integration of Architectural, Structural and Services drawings and details

Reference:

- Architectural Graphics by Francis D. K. Ching
- Building construction illustrated by Francis D.K. Ching
- Building construction metric Vol 1-5 by W.B. Mckay

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
VII	I (c)	19AR07003	Professional Skill Enhancement 7			4	2	50	50		100

Course Overview:

This course intends to provide/ enhance the soft skills in order that students perform well in their academics and beyond. These skills are intended to support the student to perform better in her/his core subjects and also build up robust performance through hands-on workshops and laboratory training. This course is subdivided into two categories – Mandatory and Optional. Mandatory courses help in preparations for respective semester subjects. The optional category helps students to take personal initiatives to develop in specific areas that can widen their horizon of their understanding of architecture and also initiate action at the society level. There are also options to work on competitive exercises alongside other similar institutions.

Course Outcomes:

Upon completion of the course, the student should:

- be given an exposure of varied skills that can bring in confidence in handling their core subjects such as workshops, communication skills, computer applications etc.
- be able to develop team spirit and interpersonal skills to manage complex situations.
- be able to cope with stress and develop multi-tasking capabilities.

Module 1: Team work skills

Learning Strategies:

- Practical hands on sessions
- Outdoor Workshops

Module Contents:

- Learning to work in a team as part of a large endeavour.
- Learning to contribute with strategy suggestions, ideas and effort.
- Cooperation and coordination.
- Assigning roles & responsibilities
- Resolving conflicts
- Reliability

Module 2: Entrepreneurship skills

Learning Strategies:

- Group discussions
- Interactive sessions

Module Contents:

- Identifying viable opportunities
- Ingenuity and creativity in conceptualising something that can take advantage of the identified opportunity.
- Establishing the resources needed for the conceptualised enterprise.
- Starting and establishing the new enterprise.
- Managing the enterprise
- Accepting risks
- Reaping the anticipated reward.

Module 3: Social initiatives or any other co-curricular activities

Learning Strategies:

- Technical and hands on workshops
- Group discussions and Interactive sessions
- Self- initiatives

Module Contents:

- Optional content to be developed by each institution in order to help students to take part in activities that involve larger groups and facilitate peer learning.
- The activities could be student initiated societal activities or participation in NASA or similar student led group initiatives which has an academic content as well.

Reference:

- HILL, N. (2019). *THINK AND GROW RICH*. SIMON & BROWN.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VII	II	19AR07004	Urban Design	2			2	50		100	150

Course Overview:

The subject is an overall understanding of urbanism and urban morphology as rising from history. The subject introduces the components of the modern city and their interdependencies, the scope and nature of urban design as a discipline. The key theories associated with urbanism and cities, an awareness of contemporary urban issues are addressed. The course introduces ways to perceive, document and explore cities.

Course Outcomes:

Upon completion of the course, the student should:

- Develop awareness on the evolution and characteristics of urban forms, their components and interdependencies.
- Understand urbanism through theories, aspects, issues and solutions.
- Attain skills to observe, interpret and analyze the various urban scenario in present day.

Module 1: Introduction & Theory

Learning Strategies:

- Lectures on urban design terminology, elements and principles.
- Book Reviews

Module Contents:

- Relationship between Architecture, Urban Design and Urban Planning, Brief review on urban design as a discipline – Objectives and scope of urban design.
- Principles of urban design – Character, Continuity and Enclosure, Scale and mass, Quality of Public Realm, Ease of Movement, Legibility, Adaptability, Diversity, Sustainability. Skyline studies.
- Circulation – Shape of city - Road forms and hierarchy, Road pattern – Grid, Radial, Concentric, etc. Pedestrian areas.
- Theories of Urban Design – Figure Ground, Linkage and Place theory - Urban solid and void
- Urban morphology – Urban form – Determinants of urban form, Open space and urban space, Urban spaces and their characteristics, urban square / plaza.
- Elements of urban form (Urban structure, urban fabric, urban grain and tissue, Density & mix, Height and massing, Streetscape - street character, façade, materials, street furniture, lighting, signage.)

Module 2: History and surveying methods

Learning Strategies:

- Lecture on evolution on urban design through various civilizations.
- Debates on traditional and modern cases and projects of urban design.

Module Contents:

- Texts and theories of cities and urbanism – Imageability and Lynch, Townscape and Cullen, Genius Loci and Schulz.
- Understanding of urban forms and spaces at various scales through examples from historic cities - river valley civilizations (Mesopotamia, Indus Valley, Harappa), Classical cities (Greek and Roman cities).
- Urban design elements in Medieval times (Castle town, Siena). Renaissance urbanism (Rome, ideal cities).
- Impact of industrialization on urbanism - modern concepts (Haussmanisation of Paris, Eixample district Barcelona, Garden cities, City beautiful movement, Parks movement.)
- Urban design projects in various scales: National, Metropolitan, City and project levels through Case studies.
- Perceiving cities - Surveying methods and techniques - Demographic surveys, Infrastructure survey, Visual Survey, ecological survey and infrastructure survey- surveying building use and condition, color coding.

Module 3: Urban design – issues, opportunities & related terms and Urban Interventions

Learning Strategies:

- Lectures on various components of urban fabric, urban massing, urban conservation, various agencies involved.
- Seminar on understanding the stages involved in urban design process.

Module Contents:

- Zoning, land use, Place making, urban decay, change and renewal, heritage & conservation
- Suburban sprawl, TOD, gated communities, gentrification, modal split, waterfront development, globalization, community participation.
- Evolution of regulation, Urban design policies, formulation of policies for environment, conservation, transportation, parking, streetscape, built form and character, skyline through case studies.
- Legal aspects – LA act and town Planning act, Land Pooling, TDR.
- Agencies involved in the execution - Urban development authority, Municipal corporation / Municipality, Town and country planning organisation (TCPO), State Industrial Development & Investment Corporation, Housing and Urban development corporation Ltd. (HUDCO), role of Urban Arts Commission
- Understanding aspects, issues and solutions related to urbanism today through study of literature and best practices/case studies (International and Indian) in urban design.

Reference:

- Paul D. Spreiregen, “Urban Design: The Architecture of Towns and Cities”, 1965, McGrawHill
- Kevin Lynch, 'The Image of the City' MIT Press, 1960.
- Gordon Cullen, 'The Concise Townscape', The Architectural Press, 1978.
- ‘Urban Design Reader’, 2006, Mathew Carmona and Steve Tiesdell.
- Jonathan Barnett, 'An Introduction to Urban Design', Harper Row, 1982.
- A.E.J. Morris, 'History of Urban Form before the Industrial Revolution', Prentice Hall, 1996.
- Gosling and Maitland, 'Concepts of Urban Design', St. Martin’s Press, 1984.
- Edmund Bacon, 'Design of Cities', Penguin, 1976.
- 'Time Saver Standards for Urban Design', Donald Natson, McGraw Hill, 2003.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VII	II	19AR07005	Project Management	2			2	50		100	150

Course Overview:

- To make the students familiar with the various facts of construction planning and network analysis
- To familiarize students on project management procedures and methods.
- To give an introduction to material management and safety measures in construction projects scheduling, resource and material management
- To introduce digital tools related to the subject

Course Outcomes:

Upon completion of the course, the student should:

- Be able to understand different stages of construction.
- Be able to use different equipments.

Module 1: Planning Process and Network Methods

Learning Strategies:

- Site visit should be there to understand different stages of construction

Module Contents:

- Introduction, Project Planning, Role of decision in project management
- Pre construction Planning Process, Pre construction planning Activities
- Scheduling and controlling, Importance of time, cost and resources
- Methods of planning and programming
- Introduction to Bar Chart, Development of bar chart
- Short comings of bar chart and remedial measures: - Lack of degree of details, review of project progress, Activity inter relationships, time uncertainties
- Network Method, Elements of network: -Event-Tail Event, Head Event, Dual Role Event,
- Activity –Representation and Identification, Inter relationships. PERT, CPM
- Network Analysis
- Network Crashing

Module 2: Construction equipment, Resource scheduling, Material Management

Learning Strategies:

- Students are introduced to different construction equipments.
- Students are introduced different systems in material management and site.

Module Contents:

- Introduction to construction equipments
- Construction Equipments-earth moving, handling, pneumatic and hoisting equipment – pile driving equipment– soil compaction & stabilization.
- Resource scheduling- resource allocation and resource leveling
- Material management, Material control systems
- Inventory principles, Procurement planning, ABC Analysis
- Fundamentals of Quality management
- Fundamentals of Quality Assurance

Module 3: Safety management, Risk Management, Maintenance Management

Learning Strategies:

- Site visit to understand the safety factors.

Module Contents:

- Recommended safety factors-Adjustment stress theory, Distractions theory. Chain of events theory
- Safety measures in different stages of construction – Pre planning programme. Implementation
- Risk Management, Types of risk in construction.
- Introduction to maintenance management in construction
- Introduction to software in project management

Reference:

- Robert Peurifoy, Clifford J. Schexnayder Construction Planning, Equipment and Methods, Mc Graw Hill
- Callaghan, M.T, Quackenbush, D.G. and Rowings-, J.E, 'Construction Project Scheduling', McGraw-Hill 3. Robert B. Harris-, 'Precedence and Arrow Network Techniques for Construction
- Stevens James D, 'Techniques or Construction Network Scheduling'
- Bhattacharjee S.K-,'Fundamentals of PERT/CPM and Project Management'.
- N. P. Vohra- 'Quantitative Techniques in Management'
- Construction Project management by Eddy M Rojas
- Project Planning and Control with PERT and CPM by Dr. B C Punmia, K. K Khandelwal

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VII	II	19AR07006	Environmental Science for Architecture	2			2	50		100	150

Course Overview:

- To enable understanding of the environment, and its interrelationship with living organisms.
- To help understand the importance of environment by assessing its impact on humans and to envision the surrounding environment, its functions and its value.
- To give understanding of dynamic processes and features of the earth's interior and surface.
- To give awareness about integrated themes and biodiversity, natural resources, pollution control and waste management.
- To inform about scientific, technological, economic and political solutions to environmental problems.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to make the students aware about the scientific knowledge and current debates on the environment at three nested scales, including their interlink ages – Global, Regional and Local.
- Enable the students to understand cause-and-effect relationships between various human, natural and climatic factors that impinges upon ecological systems and their linkages.
- Be thorough with its focus on real-life examples and through the medium of studio exercises, the student learns ways in which ecological and environmental concerns can be integrated (synthesis) into Architectural programs.
- Familiarize students with global & national environmental issues, the scale of impacts, important conventions, laws and policies in the field of biodiversity, and environmental protection.
- Familiarize students with global & national environmental issues, the scale of impacts, important conventions, laws and policies in the field of biodiversity, and environmental protection.
- Integrate with higher level studios that have complex briefs, including environmental and ecological concerns.

Module 1: Environment, Ecosystems and Biodiversity

Learning Strategies:

- Lecture notes
- Journals
- E-journals

Module Contents:

- Clean earth, nature and environment, environmental balance, the importance of environmental balance and sensitivity
- Natural cleansing and replenishing processes, life cycle systems, environmental models
- Environmental carrying capacity, pollution, environmental damage, reversible and irreversible changes
- Types of ecosystems - Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries)., details of each type with examples
- Energy flow in the ecosystem, ecological succession, food chains, food webs, ecological pyramids and other schematic models
- Biodiversity, the importance of biodiversity, biodiversity at global, national and local levels, bio geographical classification of India, social, ethical and aesthetic perspectives on biodiversity and conservation
- Conservation of biodiversity, in-situ and ex-situ approaches

Module 2: Human Impact on The Environment

Learning Strategies:

- Lecture notes
- Journals
- E-journals

Module Contents:

- Causes, cases, effects and control measures of different types of pollution including air, water, soil, marine, noise, thermal pollution, nuclear contamination
- Consumerism, waste generation, waste management, causes, effects and control measures of municipal wastes, role of an individual in reduction and prevention of pollution
- Over extraction and exploitation of natural resources, mineral resources, ecological impact of mining, case studies from Kerala.
- Water resources, use and overutilization of surface and groundwater, conflicts over water, water quality, toxicity, contaminants, construction of dams and their effects on forests and tribal people, case studies from Kerala.
- Forest resources, over-exploitation, deforestation with case studies from Kerala.
- Food resources, land use conversion, world food problems, overgrazing, effects of modern agriculture, monoculture, fertilizer-pesticide related problems, toxicity, soil salinity, case studies from Kerala.
- Energy resources - growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies.
- Land resources - land as a resource, land degradation, desertification, human link in disasters such as floods and landslides, human vulnerability, introduction to disaster mitigation, case studies from Kerala.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, potential human extinction events, case studies.
- Social impact, population growth, population explosion, disparity, skewed development, social/economic imbalance, inclusive growth

Module 3: Environmentally Sustainable and Conscious Development

Learning Strategies:

- Lecture notes
- Journals
- E-journals

Module Contents:

- Vision of sustainability, environmental sustainability, social sustainability, models and approaches to sustainability, conscious decision making, inclusive planning, reduce-reuse-recycle concepts, introduction to sustainable, ecological and green design
- Cost-benefit comparison of development projects
- Environmental mitigation, landscape ecology and reforestation
- Environmental legislation, environmental protection act, air (prevention and control of pollution) act, water (prevention and control of pollution) act, wildlife protection act, forest conservation act, law enforcement machinery, central and state pollution control boards.
- Role of governmental and non-governmental and multilateral organizations in environmental debate, policymaking, mitigation, management and remediation, Ramsar convention, Gadgil Report and Kasturirangan Report on Western Ghats.

Reference:

- Gilbert M. Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson
- Education, 2004.
- Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
- R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and
- Standards', Vol. I and II, Enviro Media.
- Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ.,
- House, Mumbai, 2001.
- Dharmendra S. Sengar, 'Environmental Law', Prentice hall of India PVT LTD, New Delhi,2007.
- Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
- "Report of the Western Ghats, Ecology Expert Panel". Madhav Gadgil Commission. The Ministry of Environment and Forests, Government of India

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VII	II	19AR07007	Professional Ethics & Practice	2			2	50		100	150

Course Overview:

The Architects Act 1972, was the turning of in the history of Professional practice in India. This course is to define a value system in the architecture profession (practicing architecture) in the given diverse socio-cultural and economic-political context of India. The course will develop the correct attitude towards the highest standards of professionalism, integrity and competence. The Main goal is to equip the future architects to handle the social responsibility to ensure harmony, environmental protection, building social justice and the development of healthy communities within a high moral framework.

Course Outcomes:

Upon completion of the course, the student should:

- Be aware of the professional responsibilities of becoming an Architect.
- Develop an understanding of the ethical responsibilities expected from an Architect.
- Familiarise with the professional engagements with other stakeholders in the profession

Module 1: Legalities of Profession

Learning Strategies:

- Analysis of judicial case studies
- Study of Bare Acts.
- Tender Documents and Contracts.
- Measurements and Valuation

Module Contents:

- Architectural Profession and legalities
- Identify and discuss the provisions of architectural practice in various acts namely: The Architects Act 1972, Labour Laws of India, the companies Act 2013, The Arbitration and Conciliation Act 1996, Indian Copyright Act 1957.
- Tenders – Tender Documents – EMD, Security deposit, Retention Amount, Bill of quantities and various abbreviations and Terminology used in tender document. Types of Tenders – their merits and demerits – Tendering procedure.
- Contracts – Articles of agreement and conditions of contract – Contract drawings – Contract Sum – Contract Bills – Consultants – Liquidated Damages – Variation and extras – Measurements - Certificates of Payments
- Measurements and Valuation. Mode of measurements - methods. Valuation Techniques
- Conventions and Charters
- Role of Various Bodies – Council of Architecture (Govt), Indian Institute of Architects (Professional). Being part of the collective thought of these bodies.
- Exposure to International Bodies like RIBA
- History of Architecture Profession in India

Module 2: Morals & Ethics of Practice

Learning Strategies:

- Case studies of various case examples from professional bodies.

Module Contents:

- Code of ethics for architectural practice
- Moral duties and responsibilities of an Architect.
- Standards of Profession – Professionalism, integrity and competence, discussions on provisions of Competition Commission of India
- Intellectual Property Rights Ancient Indian Texts

Module 3: Social Responsibilities and Duties

Learning Strategies:

- Case studies of various case examples on social issues relating to architectural profession and specific to the local context.

Module Contents:

- Social responsibilities of profession.
- Contributions to Government schemes and programmes, non-profit organisations, State and City level Improvement programmes.
- Public awareness of important architectural issues
- Inclusive design
- Architecture as an agent of change – socio-economic perspective

Module 4: Architectural Practice & Management of Office

Learning Strategies:

- Students may choose offices and present an analytical report on office structure, managements.
- Case Studies from various offices in the City as well as across India

Module Contents:

- Architectural practice and office
- Work structure of office
- Client management, office management, Human resource management, financial management
- Contracts and tenders and Fess structure
- Architectural practice and building byelaws & National Building Code

Reference:

- Architectural practice in India by Prof. Madhav Deobakta and Meera Deobakta
- Professional Practice by Roshan Namavati.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VII	I (c)	19AR07008(A)	Elective Workshop 3: Contemporary process in Architectural Design	1		2	2	50	50		100

Course Overview:

- To introduce theories of media and its influence on the perception of space.
- To enable study of the various aspects of digital architecture and its exploration through emerging phenomena that relies on abstraction of ideas.
- To give understanding of the works of contemporary architects who have illustrated the influence of the digital media in architecture.

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding of the effect of contemporary theories of media on contemporary architectural design.
- Have an insight into contemporary design process/theories and their relation to computation.
- Have the ability to understand specific aspects of contemporary processes appropriate to a design situation.
- Familiarise with architectural works derived from contemporary processes.

Module 1: Introduction

Learning Strategies:

- Lectures, seminars, workshops and labs

Module Contents:

- Investigation of contemporary theories of media and their influence on the perception of space and architecture. Technology and art. Technology and architecture. Digital technology and architecture.
- Aspects of digital architecture. Design and computation. Difference between digital process and non-digital process.
- Architecture and cyberspace. Qualities of the new space. Issues of aesthetics and authorship of design.
- Increased Automatism and its influence.

Module 2: Geometry and Surfaces

Learning Strategies:

- Workshops and labs

Module Contents:

- Fractal geometry.
- Shape grammar.
- Hyper surface.
- Liquid architecture.
- Responsive architecture.

Module 3: Contemporary process and Architect's Works

Learning Strategies:

- Study to be undertaken in the form of assignments/discussions/seminars/presentations.

Module Contents:

- Emerging phenomena such as increasing formal and functional abstractions.
- Diagrams, diagrammatic reasoning, diagram and design process.
- Animation and design. Digital hybrid.
- Ideas and works of architects related to contemporary processes. The architects to include Greg Lynn, Reiser + Umemotto, Lars Spuybroek / NOX Architects, UN studio, Diller Scofidio, Dominique Perrault, Decoi, Marcos Novak, Foreign Office Architects, Asymptote, Herzog and de Meuron, Neil Denari, Serie Architects, BIG Architects.

Reference:

- Walter Benjamin, 'The Work of Art in the Age of Mechanical Reproduction', in Illuminations, Schocken Books, New York, 1969
- Ignaci de Sola Morales,'Differences: Topographies of Contemporary Architecture', MIT Press,1997.
- William J Mitchell, 'The Logic of Architecture: Design, Computation and Cognition', MIT Press, 1995.
- Ali Rahim, 'Contemporary Process in Architecture', John Wiley & Sons, 2000.
- Ali Rahim (Ed), 'Contemporary Techniques in Architecture', Halsted Press, 2002.
- Peter Eisenmann; Diagram Diaries, Universe,1999.
- Grey Lynn, 'The Folded, The Pliant and The Supple, Animate form', Princeton Arch. Press,1999.
- Gillian Hunt, 'Architecture in the Cyberspace II', John Wiley & Sons, 2001.
- L. Convey et al, 'Virtual Architecture', Batsford, 1995.
- Rob Shields (ed.), 'Cultures of the internet: Virtual Spaces, Real Histories, Living bodies', Sage, London, 1996.
- John Beckman, 'The Virtual Dimension, Architecture, Representation and Crash Culture', Princeton Architecture Press, 1998.
- William J Mitchell, City of Bits: Space, Place and the Infobahn', MIT Press, Cambridge, 1995.
- Marcos Novak, 'Invisible Architecture: An Installation for the Greek Pavilion', Venice Biennale, 2000.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VII	I (c)	19AR07008(B)	Elective Workshop 3: Graphic Design	1		2	2	50	50		100

Course Overview:

To expose the students to the various graphical expressions and strategies. Upon completion of the course, the student shall acquire a basic awareness in creating and developing graphically mature designs at both smaller and larger scales, such as that of corporate logos to designer portfolios. They may continue to use this portfolio for Architectural Internship.

Course Outcomes:

Upon completion of the course, the student should:

- Be introduced to the discipline of Graphic Design
- Develop basic skills required in handling simple sheet presentations
- Describe the graphic design process and account for its conditions and terms
- Use basic sketching techniques to communicate ideas
- Plan, implement and present a poster, e-book, portfolio, logo etc.
- Use any CAD-software to design with the help of effective illustrative methodology
- Create a personal portfolio.

Module 1: Fundamentals of Graphic Design

Learning Strategies:

- Lectures, Discussion, workshops

Module Contents:

- Fundamentals of Graphic Design: Introduction to Graphic Design –works of prominent designers & the graphic design process.
- Overview of design basics – colour, harmony, rhythm, balance, proportion etc.
- Visual perception & graphical thinking.

Module 2: Graphic Design in detail

Learning Strategies:

- Workshops and labs

Module Contents:

- Tools of Graphic Expression. Styles of expression–an overview; Illustrations -developing manual presentation skills. Computer graphics - potentials & applications
- Designing for printing.
- Typography.
- Design of books, posters, promotional materials, stationery etc.
- Developing trade marks & corporate logos. Evolving a comprehensive corporate identity program.

Module 3: Project: Portfolio Design

Learning Strategies:

- Workshop on Architectural Portfolio Design

Module Contents:

- Introduction to graphic design softwares such as Adobe Illustrator, Photoshop, InDesign, etc.
- The student has to create a portfolio design either Architectural or individual subjects or themes as decided by individual faculties. This may be based on product design, photography, interior design, landscape, corporate branding or so on.

Reference:

- White, Alex W, "The Elements of Graphic design", AllworthPress,2011
- Lupton, Ellen, "Thinking with type", Princeton architectural press, 2004.
- Wheeler, Alina, "Designing brand identity", Jon Wiley and sons, 2012
- Rand, Paul, "A designer's art", Yale University press, 2001.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam Jury	University Exam Written	Total
VII	I (c)	19AR07008(C)	Elective Workshop 3: Product Design	1		2	2	50	50		100

Course Overview:

To expose the students to the various theoretical and practical aspects of ergonomics and product design. Upon completion of the course, the student shall acquire a basic awareness in conceptualizing the design of a product and presenting it and develop a general understanding of the basic rules of product design as well as the physical and psychological requirements of design.

Course Outcomes:

Upon completion of the course, the student should:

- Be introduced to the discipline of Product Design
- Develop basic skills required in handling simple product design projects
- Describe the product development process and account for its conditions and terms
- Use basic sketching techniques to communicate ideas
- Plan, implement and present a product design project
- Use any CAD-software to design products and with the help of top-down methodology,
- Create small prototype of the product

Module 1: Introduction to Product Design

Learning Strategies:

- Lectures, discussions and workshops

Module Contents:

- A brief introduction to Product Designing and concept generation. Design process and stages.
- Goals of Product Design and the Role of Product Designers.
- Factors affecting product design: Form, color, symbols, user specific criteria; material, technology and recyclability; packaging, cost, fashion, function, aesthetics, environment etc.
- Multiple utility-oriented approach to product design.
- Visual Design, Typography and Product Branding basics.

Module 2: Product Design and Ergonomics

Learning Strategies:

- Lectures, discussions and workshops

Module Contents:

- Study of Ergonomics and Anthropometrics. Product Ergonomics.
- Ergonomics and Human Factors. Human physical dimension concern. Posture and movement.
- Behavior and perception. Industrial Product design, user friendly design, design for serviceability, design for environment, prototyping and testing, cost evaluation.

Module 3: Project: Simple Product Design

Learning Strategies:

- Hands on Workshops on Product Design

Module Contents:

- Generation of themes, product brief and presentation. The student has to conceptualize a product and through the various stages of development reach a design for the product. This design stages may be manual or digital in nature. Final product has to be presented as a working or non-working prototype in a 1:1 scale (exceptions as decided by the faculty).

Reference:

- Will Potts, A-Level Product Design,
- Michael Ashby, Kara Johnson, Materials and Design: The Art and Science of Material Selection in Product Design,
- W.S. Green, Human Factors in Product Design,
- Lesley Cresswell, Product Design: Graphics with Materials Technology,
- Jacob Goldenberg, David Mazursky, Creativity in Product Innovation,
- Charles M. Eastman, Building Product Models
- Time Saver Standards for Interior Design
- An invitation to Design, Helen Marie Evans.

41. EIGHTH SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
VIII	I (c)	19AR08001	Professional Training			30	15	250	500		750

Course Overview:

This aims at creating an insight into the profession (practicing architecture) before completing the B.Arch. course. They are required to undergo Practical Training under a registered architect / Firm with minimum of 5 (five) years' experience after COA registration and approved by the teaching institution.

Course Outcomes:

Upon completion of the course, the student should:

- Have a general idea about the architecture profession and architect's office: Duties, responsibilities, how to function, coordination, services provided & Role of architect, do's and don'ts.
- Have a clear idea about the profession (in practicing architecture): from initial discussions, site surveys, design, presentation, client meetings, preparation of sanction drawings, schedules, inviting quotations/ Tenders, awarding of works, execution (soil investigation, setting out to the final completion along with site visits, stage certificates, measurements), valuation and arbitration.

The students are expected to get exposure in the following aspects:

i) Involvement in the Design process
ii) Site visits and site supervision
iii) Preparation of drawings for presentation, building permits, working drawings, service drawings etc.
iv) Preparation of B.O.Q, estimates, Q.OB.M, tender documents and contract documents.
v) Discussion/ Meeting with clients, contractors and other consultants.

Monthly report & Evaluation:

The students are required to send joining report and monthly reports of the works done (in the format prescribed by the Institution) duly signed by the Trainer architect / an authorised officer supervising the work, immediately after the completion of each month, to the faculty in charge of the Teaching institution.

The University Exam of the Professional Training will be conducted at the end of 8th semester. The students are required to submit a complete report including the details of works done by them during the entire training period, illustrating with sketches, printouts and other supporting documents related to the projects on which she/he has involved both in office and site, a work diary (showing the schedules/activities), originals of monthly reports, a certificate regarding their punctuality, performance and conduct of work done during the training period and regarding the successful completion of the training under the approved architect / Firm. In absence of all the above documents, students shall not be permitted to appear for the University Exam, which is part of the CA.

Minor Project:

Critical appraisal: The students are required to do a critical appraisal of one of the buildings designed by the architect under whom she/he undergoes Practical Training. All the students are required to submit a report on this at the end of Semester 8 (along with the Professional Training Report).

Reference:

- Professional Practice by Roshan Namavati.
- House of form and culture by Amos Rapoport
- Architectural Design by Jane Anderson
- Elements of space making by Yatin Pandya

42. NINTH SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IX	I (a)	19AR09001	Architectural Design 8		10		10	250	250		500

Course Overview:

- To familiarize students with urban design vocabulary and expose them to complexities of architectural intervention in urban settings
- To introduce the students to the analysis, planning and design with the understanding of a wide range of related issues in urban or rural context.
- To make the students understand the role of architecture in shaping the urban fabric and to create architecture which fits into a specific urban context.
- To understand the part to whole design process and improve communicative skills, team work etc.
- To sensitise the students about the interface between public and private domain
- **Sustainable design objectives:**
  To understand the relationship of urban design with economic, environmental and social sustainability. To equip the students to adopt sustainable urban design principles considering climate, urban heat island mitigation, building envelope, site selection and planning, water efficiency, energy efficiency, indoor air quality, green materials and resources, green infrastructure, compact city planning, green mobility, barrier free accessibility, renewable energy, natural lighting and fresh air ventilation, efficient landscape etc. Indian Green building standards such as IGBC (Green Cities), GRIHA, ECOHOUSING or other relevant rating systems may be considered.

Course Outcomes:

Upon completion of the course, the student should have an:

- Understanding of contemporary urban issues as well as learn about possible solutions
- Understanding of various components of urban environment and their interrelationship
- Understanding of people as users of various urban environment and design implications on the end user
- Understanding of mapping and diagramming techniques

Major Project

The project may focus to address varied components including large scale urban interventions, guidelines for heritage areas, adaptive reuse, transportation nodes and infrastructure additions, densification along transit nodes and corridors revitalization and renewal of urban fragments, new communities and community development, multi-use urban complexes, conservation and reuse of building in the context, Redevelopment of historic city center, revitalization of traditional urban cores, Green filed / Brownfield development, urban waterfront development, Market squares etc.

The students are expected to carry out urban intervention in a real-life location. The design considerations may involve context, views, orientation, volumetric study, skyline, vehicular and pedestrian circulation, figure ground study, utility, circulation network, street scape etc. The socio-cultural and economic perspectives may be well documented and analysis may be carried out to

finalize the suitability of intervention. Types of planning instruments such as structure plans, master plans and local area plans and zoning guidelines shall be introduced. The project will have to focus on the development of a physical environment considering planning norms, infrastructure network, built unbuilt relationship, connectivity and character.

Emphasis may be given on

- Understanding the Elements and principles of Urban design
- Urban Conservation, Reuse and Building in Context.
- Urban insert, relationship of building to urban character and existing form
- Urban renewal and urban sprawl
- Urban sector or Block, its structure and composition.
- Sustainability and reuse of buildings in context
- Infrastructure, building bye laws, co-relation of part to whole,
- Typo morphology
- Ecological concerns and sustainable urbanism
- Expressions of relationship to tradition urban forms
- Design communication and role of public participation
- Preparation of urban design guidelines

Minor Project

Urban design detailing - (built and landscape) – Plazas, city square, adaptive reuse-built form, residential/ public, commercial/mixed buildings, character of buildings in detail, sustainability and infrastructure detailing in site level, streetscape and street furniture, activity mapping, Preparation of urban design guidelines etc.

Time bound project

Tactical urbanism projects in their campus or any selected sector/street, design of a streetscape of the selected sector, Mental mapping of the selected sector, Understanding successful public places through individual live (video documentation & presentation) and literature case studies etc.

Reference:

- Gordon Cullen, *The Concise Townscape*, The Architectural Press, 1978
- Donald Watson, *Time Saver Standards for Urban Design*.
- Paul D. Spreinegar, *Urban Design, the Architecture of Towns and Cities*, Mc Graw Hill.
- Jonathan Barnett, *An Introduction to Urban Design*, Harper Row, 1982
- Geoffrey Broadbent, *Emerging Concepts in Urban Space Design*, Taylor & Francis, 2003.
- Kevin Lynch, *Image of the City*.
- Edurand Bacon, *Design of Cities*.
- Edward D. Mills, *Planning the Architects Handbook*.
- Julius Panero & Zeluik, *Human Decision and Interior Space*, Whitney Library of Design Publication, 1989.
- Jane Jacobs, *Death and Life of Great American Cities*.
- William H. Whyte, *The social life of small urban spaces*.
- Moughtin, C., Cuesta, R., Sarris, C. and Signoretta, P. (2003). *Urban Design - Methods and Techniques*. Oxford: Architectural Press.
- Lang, J. T. (2005). *Urban Design: A Typology of Procedures and Products*. Oxford: Elsevier/Architectural Press.
- Watson, D., Plattus, A. and Shibley, R. (2003). *Time-Saver standards for urban design*. New York: McGraw Hill.
- Marshall, S. (2009). *Cities design and evolution*. New York: Routledge
- Lynch, K. (1984). *Good city form*. Boston: MIT Press.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IX	I (b)	19AR09002	Advanced Building Technology	2	3		5	125	125		250

Course Overview:

The subject primarily aims at developing understanding in use of appropriate construction technique and material in building design based on feasibility of technology, physical properties (like density & specific gravity, strength, thermal properties), aesthetic value, socio-cultural impacts and relevance, socio-economic factors, Ecological footprint etc.

The course introduces the technological aspects of a building design from the perspective of functional building component where use of natural and artificial materials is discussed based on their application. Construction technology and appropriate materials for structural systems, roofing, enveloping and interior finishes shall be considered under this subject from simple examples to complex.

Course Outcomes:

Upon completion of the course, the student should:

- Develop necessary decision-making skills in using appropriate construction technologies and materials while designing buildings, based on understanding of their potentials and properties.
- Develop the skill to represent various construction techniques as well as materials through drawings supporting their building design.

Module 1: Pre-fabrication & Modular Co-ordination

Learning Strategies:

- Lecture on pre-fabricated components
- Market study on current construction practices
- Site visits and documentation to understand construction practices
- Detailed drawings of small prefabricated structures

Module Contents:

- Introduction to the concepts of standardization – need and importance.
- Introduction to concepts of Modular Coordination Objectives of Modular coordination & definition of Basic Module. Modular controlling dimensions, Planning Modules and preferred Multi-modules.
- Introduction to concepts of prefabrication. Advantages & disadvantages of onsite & off-site prefabrication. Methods of prefabrication & Examples of prefabricated components. Process of prefabrication. Various issues related to prefabrication industry & Examples of prefabrication concepts
- Modular and prefabricated construction using various materials – Concrete, Steel, Aluminum, Ceramics, Plastics, Wood – applications on wall, roof, structural members, floor, fenestrations.

Module 2: Advanced Architectural Building Structures

Learning Strategies:

- Lecture on various types advanced building structures
- Site visits to construction sites during various stages
- Case studies and presentations of different advanced building structures
- Detailed drawings of construction methods

Module Contents:

- Pre stressed concrete structures: Precast pre stressed construction. Use and examples of various pre stressed structures. Two-way waffle slab, Two-way flat plate, Two-way flat slab, Pre tensioning, Post tensioning, Hollow core slabs, T beam and slab.
- Tensile structures: Concept of tensile structures, formation, classification, use and examples of various cable structures. Application of cable structures in architecture. Materials and construction methods of membrane structures.
- Special Structures: Concept, Classification and Application of Pneumatic Structures, Kinetic Structures and Mobile Structures, Portal frames: Definition, and Application.

Module 3: Advanced Building Types

Learning Strategies:

- Lecture on various types advanced building structures
- Site visits to construction sites during various stages
- Case studies and presentations of different advanced building structures
- Detailed drawings of construction methods

Module Contents:

- Design of buildings for earthquake resistance - Structural Systems, Seismic Design Code Provisions, design of nonstructural elements.
- Seismic design and detailing of RC and steel buildings
- High rise structures – structural systems – braced frame, rigid tube, tube in tube, diagrid, bundled tube, space frame and mega frame.
- High rise structures - planning and scheduling for high rise building, scheduling, Typical Floor Construction Cycle, Self-climbing form work & cranes

Reference:

- M.S. Shetty, 'Concrete Technology', S. Chand & Co.ltd, New Delhi, 1986.
- S.C. Rangwala, 'Engineering Materials', Charotar Publishing House, India, 1997.
- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005.
- Don A. Watson, 'Construction Materials and Process', McGraw Hill Co.,1972.
- Jack M. Launders, 'Construction Materials and Methods', Careers, South Holland, Illinois, Wilcox Co.Ltd.,1986.
- Chudley, Construction Technology, ELBS, 1993
- Barry, Construction of Buildings, East West Press, 1999
- Emitt & Gorse (2006), "Barry's Advanced Construction of Buildings", Second Edition, Wiley India Pvt. Ltd.
- Mackay, J.K. (2015), "Building Construction", Fourth Edition, Pearson India.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IX	I (c)	19AR09003	Professional Skill Enhancement 8			4	2	50	50		100

Course Overview:

This course intends to provide/ enhance the soft skills in order that students perform well in their academics and beyond. These skills are intended to support the student to perform better in her/his core subjects and also build up robust performance through hands-on workshops and laboratory training. This course is subdivided into two categories – Mandatory and Optional. Mandatory courses help in preparations for respective semester subjects. The optional category helps students to take personal initiatives to develop in specific areas that can widen their horizon of their understanding of architecture and also initiate action at the society level. There are also options to work on competitive exercises alongside other similar institutions.

Course Outcomes:

Upon completion of the course, the student should:

- Be given an exposure of varied skills that can bring in confidence in handling their core subjects such as workshops, communication skills, computer applications etc.
- Be able to develop team spirit and interpersonal skills to manage complex situations.
- Be able to cope with stress and develop multi-tasking capabilities.

Module 1: Thesis Initiation workshop

Learning Strategies:

- Seminars on Thesis orientation

Module Contents:

- Identify the broad study area for thesis based on literature review and case study, and its oral and visual presentation.
- Interpretation drawings, visual presentation techniques with info-graphics.
- Literature review and identification of research area and stating the research question.
- Time-work schedule
- Presentation on-Selection of topic, reason for selection, justification, synopsis

Module 2: Career perspectives

Learning Strategies:

- Group discussions and Interactive sessions

Module Contents:

- Exploring the Future in Architecture
- Employment opportunities
- Diversifying skills
- Specializations in Architecture and allied fields
- Academic pursuits
- Research opportunities

Reference:

- Coles, R., Siener, W. and Coles, S. (2016). *Architecture + advocacy*. Buffalo Arts Publishing.
- CROUCH, C. (2019). *DOING RESEARCH IN DESIGN*. [S.l.]: BLOOMSBURY VISUAL ARTS.
- Indranil, S. (2018). *11 Steps to Architectural Thesis*. 1st ed. Notion Press.
- Spector, T. and Damron, R. (2013). *How architects write*. New York, N.Y: Routledge, Taylor & Francis Group

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IX	II	19AR09004	Green Built Environment	2			2	50		100	150

Course Overview:

- To give an understanding of the concept of human comfort and sustainable development.
- To enable understanding of the concept of sustainable communities and associated socioeconomic dimensions through case studies.
- To inform about the need to use alternative sources of energy in view of the depleting resources and climate change.
- To create awareness of current trends and futuristic ideas in the design of sustainable built environment.

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding of the concepts of ecosystem, carrying capacity, ecological footprint, human comfort and sustainable development.
- Have familiarity with approaches to achieving sustainable buildings and communities.
- Have familiarity with current trends in creating a sustainable built environment.

Module 1: Global Environmental Issues and Approaches Towards Sustainability

Learning Strategies:

- Lecture notes
- Journals
- E-journals

Module Contents:

- Overview of global warming, climate change and environmental degradation, impact on humans
- Approaches to sustainability, Space-Ship-Earth concept, global trends in environmental mitigation and remediation, Overview of green rating systems.
- Environmental ethics, polluter pays, environmental credits, carbon trading, global conventions, agreements and strategies, Climate protocols, Brundtland report
- Sources of energy & resources - renewable and nonrenewable, energy systems, energy crisis, energy demand, carbon emissions, embodied energy and transportation costs
- Green energy- Solar, Wind, Bio, On grid and off grid, hybrid systems and new technologies.

Module 2: Sustainable Development

Learning Strategies:

- Lecture notes
- Journals
- E-journals

Module Contents:

- Sustainable Development and Green cities, carrying capacity concepts, sustainability assessment
- Sustainable communities- social, cultural and economic factors, Low waste and net-zero community concepts, eco-communities
- Efficient urban mobility, multimodal public transport systems, electric vehicles & related infrastructure
- Sustainable urban waste management, Community level waste management
- Open spaces, recreational spaces and urban forestry, urban ecology, public health etc.
- Water and common resources management, Nuclear policy, Institutional framework for monitoring and promoting sustainability - Master plans, Development controls etc.

Module 3: Sustainable Design

Learning Strategies:

- Lecture notes
- Journals
- E-journals
- USGBC, IGBC and GRIHA web resources

Module Contents:

- Introduction to sustainable, ecological and green design, sustainable site selection and design
- Sustainable lifestyles, vernacular techniques and approach to sustainability, use of local materials in construction
- Thermal properties of materials, technological advancements in climatic control in different climatic zones with particular reference to Tropical climate, innovative construction materials and techniques
- Energy, water and resource conservation in design, reduced, reused and recycled products in construction, Energy and Water efficiency
- Indoor Environmental Quality - Importance of Ventilation, Low emitting materials, Lighting controls, Thermal comfort and Acoustical performance.
- Introduction to Green building rating system in India- Griha, IGBC, BEE-ECBC with suitable examples.

Reference:

- 'Manual on Solar Passive Architecture', IIT Mumbai and Mines New Delhi, 1999.
- Arvind Krishnan et al, 'Climate Responsive Architecture A Design Handbook for Energy Efficient
- Buildings', Tata McGraw Hill Publishing Company Limited, New Delhi, 2001.
- Majumdar M, 'Energy-efficient Building in India', TERI Press, 2000.
- Givoni. B, 'Passive and Low Energy Cooling of Buildings', Van Nostrand Reinhold, New York,
- 1994.
- Fuller Moore, 'Environmental Control Systems', McGraw Hill Inc, New Delhi,1993.
- Sophia and Stefan Behling, 'Solpower The Evolution of Solar Architecture', Prestel, New York,
- 1996.
- Patrick Waterfield, 'The Energy Efficient Home: A Complete Guide', Crowood press Ltd, 2011.
- Dean Hawkes, 'Energy Efficient Buildings: Architecture, Engineering and Environment', W.W.
- Norton & Company, 2002.
- David Johnson and Scott Gibson, 'Green from the Ground Up: Sustainable, Healthy and Energy
- Efficient Home Construction', Taunton Press, 2008.
- LEED v4.1 Building Design and Construction, US Green Building Council
- Abridged GRIHA Manual, Griha India

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
IX	II	19AR09005	Disaster Management & Mitigation	2			2	50		100	150

Course Overview:

The course intends to provide a general concept in the dimensions of disasters caused by nature beyond human control as well as the disasters and environmental hazards induced by human activities with emphasis on Natural disasters & Man-made disasters.

The subject primarily aims at developing a fundamental understanding of different aspects of Disaster Management. It would also provide basic knowledge, skills pertaining to Planning, Organizing and Decision-making process for Disaster Risk Reduction.

Course Outcomes:

Upon completion of the course, the student should:

- Develop a comprehensive understanding of the concepts and fundamentals of disasters caused by nature as well as the disasters and environmental hazards induced by human activities
- Develop a basic understanding of the principles and processes pertaining to disaster preparedness, response and recovery

Module 1: Introduction to Disaster Management

Learning Strategies:

- Lectures explaining the concepts & fundamentals of disaster management.
- Case analysis of global disasters
- Screening of documentaries on recent disasters

Module Contents:

- Disaster & Emergencies: Concept & Fundamentals of Disaster Management
- Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity & Equations of Disaster Management
- Types & Classification of Disasters
- Causes & Consequences of Disasters
- Global Disaster Trends - Changing Types & Patterns
- Disaster vs Development
- Emerging Risks of Disasters –Climate Change and Urban Disasters

Module 2: Disaster Management Cycle and Framework

Learning Strategies:

- Lecture on disaster management cycle & phases of disaster management
- Case analysis

Module Contents:

- Disaster Management Cycle
- Pre-Disaster –Risk Assessment and Analysis, Risk Mapping, Zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness
- During Disaster –Evacuation –Disaster Communication –Search and Rescue –Emergency Operation Centre –Incident Command System –Relief and Rehabilitation
- Post-disaster –Damage and Needs Assessment, Restoration of Critical Infrastructure –Early Recovery –Reconstruction and Redevelopment
- IDNDR, Yokohama Strategy, Hyogo Framework of Action

Module 3: Applications of Science and Technology for Disaster Management, Disaster Management Framework in India

Learning Strategies:

- Lectures
- National Disaster Management Plan, Ministry of Home affairs, Government of India http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)
- Manual on Disaster Management, National Disaster Management, Agency Govt of India.

Module Contents:

- Geo-informatics in Disaster Management (RS, GIS, GPS)
- Structural and Non-Structural Mitigation of Disasters
- Disaster Management in India - Disaster Profile of India, Disaster Management Act 2005, National Policy on Disaster Management
- Role of Government (local, state and national) - NDMA, NIDM, NDRF, Non-Government and Inter-Governmental Agencies

Reference:

- Disaster Management by Mrinalini Pandey Wiley 2014.
- Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015
- Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009
- Reducing Disaster Risk: A Challenge for Development, U.N.D.P.2004.
- Introduction to Natural and Manmade Disasters and their Effects on Buildings, Macdonald Roxana, Architectural Book Publication Co, 2003
- Introduction to International Disaster Management, Coppola D P, Elsevier Science (B/H), London, 2007.
- World Disasters Report, International Federation of Red Cross and Red Crescent, Switzerland, 2009.
- Management of Natural Disasters in developing countries, H.N. Srivastava & G.D. Gupta, Daya Publishers, Delhi, 2006
- Encyclopedia of Disasters –Environmental Catastrophes and Human Tragedies, Vol. 1 & 2, Angus M. Gunn, Greenwood Press, 2008
- Encyclopedia of disaster management, Vol I, II and IIIL Disaster management policy and administration, S L Goyal, Deep & Deep, New Delhi, 2006
- Tushar Bhattacharya Disaster Science and Management McGraw Hill Education (India) Pvt. Ltd.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IX	I (c)	19AR09006	Research Methodology	2			2	50	50		100

Course Overview:

This course is designed to explore the meaning of research and generate an understanding about the importance of research in the field of architecture and train to write a technical paper of related research topics good for publishing.

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding of the role of research in architecture.
- Develop abilities to interpret and evaluate research.
- Develop abilities to conduct architecture research.
- Have an understanding of data, information, and knowledge and present research results.
- Develop technical writing skills.

Module 1: Introduction to Research

Learning Strategies:

- Lecture/Workshop on significance of research and significance of research in the field of Architecture

Module Contents:

- Introduction to "Research", Meaning of Research, Significance of Research, Research world views and approaches.
- Types of Research, Scientific and Social Research, Research process
- Meaning of research and its significance in the field of Architecture, Types of research in the field of architecture, potential areas/types, qualitative and quantitative paradigms.

Module 2: Research Design

Learning Strategies:

- Lecture/Workshop on Research Design components & Research methods.

Module Contents:

- Components of Research design, formulating research questions, research objectives
- Choosing the research strategy- inductive and deductive research, Hypothesis types and testing
- Choosing the sample, Methods of data collection, specific techniques in architectural research.
- Literature search and review, significance, sources of information, the use of libraries and data bases, aim and structure of a literature review, Referencing and documenting the bibliography.
- Methods of Research in Architecture- Interview Techniques: Questionnaires /Face to face

Interviews / Internet survey. Designing a Questionnaire / Interview schedule. Visual Techniques: Observations (participant / nonparticipant / direct), activity mapping, accession/erosion trace observations, cognitive maps, etc. Content Analysis: Secondary data analysis.

Module 3: Quantitative Data Analysis and Introduction to Applied Statistics

Learning Strategies:

- Lecture/Workshop on Data analysis, interpretation & representation methods

Module Contents:

- Understanding the nature and scale of data collected and methods of analysis suitable for that data (graphical / numerical / descriptive). Converting data into numerical form for data analysis.
- Concepts of dependent and independent variables, unit of analysis.
- Introduction to the simple statistical methods of analyzing numerical data – measures of central tendency and dispersion, Introduction to the concept of tests, correlation and regression. Inferring from the data and interpreting the meaning of those inferences. Use of MS Excel for statistical data analysis.
- Techniques of presenting the numerical data – graphical (pie charts, bar charts, line graphs etc.), tabulations, verbal qualitative data, architectural drawings / maps.

Module 4: Research writing & Technical paper

Learning Strategies:

- Workshop on Research writing. Technical paper presentation

Module Contents:

- Significance of report writing, steps in writing report, structure of a report, Different sections of a research report, technical writing and language (tense, voice, etc.), the necessity for the development of writing skills, technical data about formal writing, the use of visuals.
- Introduction to scholarly writing and publishing a paper, guidelines for writing a research paper, structure of a research paper, sequence of tasks for research paper writing, writing and presenting a conference paper, presentation of scientific research.
- Use of primary and secondary references, bibliography, notation, cross-reference etc.
- Understanding the relative advantages, disadvantages and application of various methods mentioned above and choosing a method appropriate for a research to achieve its objectives. The student is required to write a technical paper good for publishing, on any of the approved topics at the end of the course.

Reference:

- Groat, Linda N. and Wang, David C. 2002. Architectural Research Methods. New York: John Wiley.
- Norman K Denzin and Yvonna S Lincoln (Eds.) Handbook of Qualitative Research, Thousand Oaks: Sage Publications, pp. 377392. 1994.
- Giere R.N. (1991), "Understanding Scientific Reasoning", Holt Rinehart & Winston, U.K.
- Moroney M.J., "Facts from Figures", Penguin, 1990.
- Day R.A., (1991) "How to Write and Publish a Scientific Paper", Cambridge University Press, R.K.
- Yin, R.K. (1994). Case Study Research- Design and Methods, Applied Social Research Methods Series. Vol V. Sage Publications. California.
- Krishnaswami, O.R. (1993). Methodology of Research in Social Sciences. Himalaya Publishing House. Bombay.
- Creswell John. W. (1994). Research Design – Qualitative and Quantitative Approaches. SAGE Publications.
- California.
- Thakur, N. (1998). "Building Knowledge through a Holistic Approach towards Architectural Education and Research". Proceedings of the seminar on Architecture and Interdisciplinary.
- Turabian Kate. L. (1982). A manual for Writers. The University of Chicago Press. Chicago.
- Bockman, J., R., and Couture, B. (1984). The Case Method in Technical Communication: Theory and Models. Texas: Association of Teachers of Technical Writing.
- Kothari C.R. (2004). Research Methodology- Methods and Techniques, New Age International (P) Ltd, Publishers, New Delhi
- Till, Jeremy. (2007), Architectural research: Three myths and one model, RIBA, UK
- Dve, Anne (ed.), (2014), How Architects use research- Case studies from practice, RIBA, UK
- Frayling, Christopher. (1993), "Research in Art and Design", Royal College of Art Research Papers.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
IX	II	19AR09007(A)	Elective Theory 4: Architectural Conservation	2			2	50	100		150

Course Overview:

To introduce the field of Architectural Conservation, and to familiarize the students with the principles and methodology of management of heritage buildings and historic settlements.

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding of Architectural Conservation as an approach that establishes a link between past, present and future.
- Familiarise the students with the history of the conservation movement and various agencies involved in the field of conservation worldwide and their policies.
- Be Introduced to international framework of conservation, definitions, principles and concepts. Various guidelines for the preservation, conservation and restoration of building, and an overview of current status of conservation and preservation in India are elaborated.
- Understand the concept of integrating development and heritage preservation, about opportunities and community participation are highlighted along with exposure to management of heritage buildings and sites.

Module 1: Introduction to Conservation

Learning Strategies:

- Introduction to the evolution of theories in conservation, and an introduction to planning theories, practice and world heritage.

Module Contents:

- Introduction to Architectural Conservation: Need for conservation, Objectives, Values, Ethics and Scope of Architectural Conservation: from material based, value based to living heritage approach.
- Definition: Architectural Conservation, Urban conservation & Cultural Landscapes. Understanding Heritage: Types - Cultural heritage, Natural heritage, Built heritage - Ancient Monument, Tangible & Intangible heritage.
- History of the Conservation movement in India & World view - Pioneers of conservation John Ruskin & William Morris, Eugène Viollet-le-Duc, Alexander Cunningham and others. Charters such as Venice charter (1964), Burra charter (1979), Florence charter (1982), Athens charter (1933), etc. Jirnodhar - the Indian philosophy of conservation.
- Values in Conservation, Ethics of Conservation practice, Authenticity & Integrity in Conservation practice, Nara document.
- Agencies involved in conservation - UNESCO, ICCROM, ICOMOS, Getty Conservation Institute, ASI, State departments of Archaeology, Town Planning departments, State Art and Heritage Commission & INTACH.
- World Heritage Sites & Nomination process & Endangered sites, elaborated with case studies (like Bhimbetka, Group of monuments at Hampi, Sydney Opera House, Angkor Was etc.

Module 2: Diagnosis of decay in materials and structures

Learning Strategies:

- The module emphasises on the causes of decay of historic building materials and the technical aspects of the methodical study and development of appropriate conservation interventions for historic building materials/systems.

Module Contents:

- Traditional and modern building materials used in India, from pre historic times till date: Earth, clay, stone, brick, timber, bamboo, lime, iron, metals, glass, steel and concrete. Materials used in structural, non – structural and decorative applications. Study of types of plasters, stucco work and paints.
- Causes of decay in materials and structure: Natural agents of deterioration and loss-Climatic causes – thermal movements, sun, rain, frost, snow, moisture, wind, gravity, ground water and dust. Botanical, biological and micro biological causes such as animals, birds, insects, fungi, moulds, lichens. Natural disasters – Fire, earthquakes, flood, lightning, storms. Human factors-Wars, pollution, vibration, vandalism, and neglect.
- Process of Identification of defects: Field investigations, Introduction to various types of tests such as Destructive Tests (DT), Minor Destructive Tests (MDT), Non-Destructive Tests (NDT), Monitoring techniques.
- Diagnosis and assessment of defects and common problems in historic building materials, Estimation and remedial measures for common material defects in historic structures. Cleaning and maintenance of Historic building fabric – damp proof course, corrosion protection, fire protection, termite proofing.
- Conservation of historic building: Immediate temporary emergency measures for distressed buildings: shoring, propping, underpinning, shuttering etc. Stabilization, consolidation, grouting, stitching, pointing, surface coating, retrofitting and replacement, Strengthening and stabilization of concrete structures using guniting or shortcreting, post tensioning, bracing, repair using polymers and epoxies, underwater repairs, jacketing etc.

Module 3: Principles, Methodology of Conservation & Introduction to Urban Conservation

Learning Strategies:

- The module focuses on the basic theories in the practice of conservation, an understanding of which is vital for responsible conservation of architectural heritage. Introduction to urban conservation and the role and link of conservation in development planning.

Module Contents:

- Understanding basic principles of conservation such as (a) Prevention (b) Preservation (c) Conservation (d) Restoration (e) Rehabilitation (f) Reproduction (g) Reconstruction (h) Adaptation
- Preparatory procedures for conservation- Identification of the ‘values/significance’ of the object, monument or site: ‘emotional’, ‘cultural’ and ‘use’ values. Preparation of Inventories, listing, Initial inspections/Inspection report, Documentation - Condition & Material mapping, Research, Analysis and recording (Reports).
- Case studies of Heritage building conservation and documentation of historic monuments and sites.

- Introduction to Urban Conservation: Morphology of historic towns, introduction to the concept of heritage zones, methodology and analysis of character of heritage zones. Interventions in conservation such as Reuse, Revitalization, Rehabilitation, Regeneration, Renewal, Up-gradation, Redevelopment of historic areas and cities. Examples of Urban Conservation.
- Multidisciplinary of conservation: Scope, parameters of Integrated Conservation, and its role/ link with development planning and environmental design and the concept of Historic Urban Landscapes.

Reference:

- Fielden, Bernard M. 2003, Conservation of Historic Buildings, Architectural Press, London.
- Ashurst, J. and Dimes, F.G., 1990, Conservation of Building and Decorative Stone, Butterworth-Heinemann, London.
- Historic England, 1988, Practical Building Conservation Series, Routledge, London.
- Jokilehto, Jukka 2002, A History of Architectural Conservation, Butterworth-Heinemann,
- ICOMOS, 1993, Earthen Architecture: The conservation of brick and earth structures- A handbook.
- Beckmann, Poul & Bowles, Robert 2004, Structural Aspects of Building Conservation, Elsevier Butterworth-Heinemann.
- Kain, Roger 1981 Planning for Conservation, St. Martin's Press, New York
- Dobby, Alan 1978 Conservation and Planning, Hutchinson.
- Worskett, Roy 1969, Character of Towns: An approach to Conservation, Architectural Press
- Harvey, J. H. 1972, Conservation of Buildings, J. Baker: London.
- Smith, J. F. 1978, A Critical Bibliography of Building Conservation, Mansell, England.
- Mathews, M. S. 1998, Conservation Engineering, Universitat Karlsruhe, Karlsruhe.
- Asian Heritage Management: Contexts, Concerns, and Prospects, 2013, Routledge, New York.

Websites:

- https://whc.unesco.org/en/list/
- http://asi.nic.in/
- https://cpwd.gov.in/Publication/ConservationHertBuildings.pdf
- https://www.nps.gov/tps/how-to-preserve/briefs.htm

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IX	II	19AR09007(B)	Elective Theory 4: Earthquake Resistant Architecture	2			2	50	100		150

Course Overview:

- To enable an understanding of the fundamentals of earthquake and the basic terminologies.
- To give basic knowledge of earthquake resistant design concepts.
- To provide familiarity with design codes and building configuration
- To enable understanding of the different types of construction details to be adopted in a seismic prone area.
- To give knowledge for applying earthquake resistant principles in an architectural design project.

Course Outcomes:

Upon completion of the course, the student should:

- Have the ability to understand the formation and causes of earthquakes
- Have an understanding of the factors to be considered in the design of buildings and services to resist earthquakes.

Module 1: Fundamentals of Earthquakes

Learning Strategies:

- The module focuses on the basic understanding about the fundamental theories and terminologies in earthquake resistant structures.

Module Contents:

- Basic understanding on fragile ecosystem, physiographic and geo-chemical data mapping, soil and topography, hydrological factors, climatic conditions. Site planning, building form and shape, considerations for earthquake resistant buildings
- Earth's structure, seismic waves, plate tectonics theory, origin of continents, seismic zones in India.
- Predictability, intensity and measurement of earthquake. Basic terms- fault line, focus, epicentre, focal depth etc.

Module 2: Site planning, Performance of Ground and Buildings

Learning Strategies:

- This module emphasis on the impact of earthquakes on structural and nonstructural elements

Module Contents:

- Historical experience, site selection and development.
- Earthquake effects on ground, soil rupture, liquefaction, landslides. Behaviour of different types of building structures, equipment, lifelines, collapse patterns.
- Behaviour of non-structural elements like services, fixtures in earthquake-prone zones

Module 3: Seismic design codes and Construction details

Learning Strategies:

- This module familiarise students various design strategies to be adopted for an efficient earthquake resistant building

Module Contents:

- Seismic design code provisions. Introduction to Indian codes.
- Building configuration - scale of building, size, horizontal and vertical plane, building proportions, symmetry of building - torsion, reentrant corners, irregularities in buildings like short storeys, short columns, etc.
- Seismic design and detailing of masonry structures, wood structures, earthen structures.
- Seismic design and detailing of RC and steel buildings.
- Design of non-structural elements – architectural elements, water supply, drainage, electrical and mechanical components.

Module 4: Design and Analysis of Earthquake resistant Buildings

Learning Strategies:

- This module equips students to analyse earthquake prone buildings and to design earthquake resistant structures

Module Contents:

- Vulnerability of existing buildings, facilities planning, fires after the earthquake, socio-economic impact after earthquakes.
- Conceptual design for earthquake resistance involving institutional masonry building with horizontal spread and height restriction, multi-storey RC framed apartment/commercial building.

Reference:

- Guidelines for earthquake resistant non-engineered construction', National Information centre of earthquake engineering (NICEE, IIT Kanpur, India), 2004.
- C.V.R Murthy, Andrew Charlson, 'Earthquake Design Concepts', NICEE, IIT Kanpur, 2006.
- Agarwal.P, 'Earthquake Resistant Design', Prentice Hall of India, 2006.
- Ian Davis, 'Safe Shelter within Unsafe Cities: Disaster Vulnerability and Rapid Urbanization', Open House International, UK, 1987
- 'Socio-economic developmental record'- Vol.12, No.1, 2005.
- Mary C. Comerio, Luigia Binda, 'Learning from Practice- A Review of Architectural Design and Construction Experience after Recent Earthquakes', Joint USA-Italy workshop, Oct.18-23, 1992, Orvieto, Italy.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IX	II	19AR09007(C)	Elective Theory 4: Green Building Rating system	2			2	50	100		150

Course Overview:

- To make students appreciate and learn the role and importance of Green Buildings in promoting sustainability and components involved in the planning and designing of Green Buildings
- To get awareness on the rating system.

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding about the importance in creating sustainable planning while conceiving building/ development projects and become environmentally responsive to construction requirements.

Module 1: Introduction to Green Building

Learning Strategies:

- To give an understanding of the basic concepts of Green building and its relevance in Building construction

Module Contents:

- Green Buildings—Introduction, definition, objectives, scope, role and importance Green building, Benefits of green building- Tangible & Intangible.
- Green Building's Design—Approach, components, design parameters, orientation, Integrated approach to building design
- Green Building Rating System - Concept of green building rating system
- Green building facilitation- Role of facilitator.
- Schemes and incentives provided for green buildings by different state govt with in India.

Module 2: Indian Green Building Rating System

Learning Strategies:

- A combination of Guest lectures, Field visits and debates enables the student to acquire knowledge about the latest trends in green buildings, rating systems in Indian context.

Module Contents:

Introduction to Indian rating system, certification process of –

- GRIHA, IGBC, ECBC etc.- approach, components, scoring, comparative and critical analysis.
    - Green Rating for Integrated Habitat Assessment- Introduction to GRIHA, Role of GRIHA in recognizing environment- friendly initiatives, Concept, its context, challenges, benefits, development and operationalization process and basic features, Process of rating buildings- registration and documentation, GRIHA evaluation process, Criteria for rating and Scoring points for GRIHA.
    - Indian Green Building Council system- Introduction to IGBC, Role of IGBC in recognizing environment- friendly initiatives, Concept, its context, challenges, benefits, development and operationalization process and basic features, Process of

rating buildings- registration and documentation, IGBC evaluation process, Criteria for rating and Scoring points for IGBC.
    - Energy Conservation Building Code- Introduction to ECBC, Role of ECBC & BEE in environment- friendly initiatives, Concept, its context, challenges, benefits, development and operationalization process and basic features, Process of rating buildings- registration and documentation, BEE evaluation process, Criteria for rating and Scoring points for BEE.
- Live & literature case studies Good Practices--Study of Selected Examples of Sustainable Architecture – Vernacular, Historical and Contemporary

Module 3: International Green Building Rating System

Learning Strategies:

- A combination of Guest lectures, Field visits and debates enables the student to understand the latest trends in Global rating systems for green buildings

Module Contents:

- LEED- USGBC, BREEAM, etc.- approach, components, scoring, comparative and critical analysis.
    - Leadership in Energy and Environmental Design- Introduction, History of LEED, Features of LEED, LEED -Vision, Structure and Services offered LEED NC overview and process- use of LEED NC, Registration, Credit Interpretation Ruling, Application, Review and Certification
    - BRE Environmental Assessment Method (BREEAM)- Introduction- BREEAM, drivers and users of BREEAM, Key Benefits of Users, Different Stages of BREEAM, BREEAM Criteria, Environmental Issues, History of BREEAM, Current Versions of BREEAM, Certification Process.
- Live & literature case studies Good Practices--Study of Selected Examples of Sustainable Architecture – Vernacular, Historical and Contemporary

Reference:

- Arvind Krishnan, 'Climate Responsive Architecture A Design Handbook for Energy Efficient
- Buildings', Tata McGraw Hill Publishing Company Limited, New Delhi, 2001.
- Majumdar M, 'Energy-efficient Building in India', TERI Press, 2000.
- Givoni. B, 'Passive and Low Energy Cooling of Buildings', Van Nostrand Reinhold, New York, 1994.
- Publications and Rating manuals- GRIHA, LEED, IGBC Etc.
- Energy Conservation Building Codes- BEE star rating system.
- Givoni, B., 1969. Man, Climate and Architecture, Elsevier Publishing Company Limited.
- Koenigsberger, O. H., Ingersoll, T. G., Mayhew, A., Szokolay, S. V., 1973. Manual of Tropical Housing and Building Part 1. Climatic Design, Orient Longman Pvt. Ltd.
- TERI, 2004. Sustainable Building Design Manual Volume 2, prepared under a European Union cofunded ASIA-URBS project under the leadership of InstitutCatala Energia (Spain), The Energy &Resources Institute, India.
- Scott Drake, 2009, The Elements of Architecture - Principles of Environmental Performance in
- Buildings, Earthscan, ISBN 9781844077175
- Bob Doppelt, 2010, The Power of Sustainable Thinking, Earthscan, ISBN 9781849710794
- Paul Appleby, 2010, Integrated Sustainable Design of Buildings, Earthscan, ISBN 9781849711173

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IX	II	19AR09008(A)	Elective Theory 5: Architecture and Sustainability	2			2	50	100		150

Course Overview:

To make aware of: -

- The environmental, Energy and Water scenario of our planet in general and Kerala in particular.
- To appraise them of the urgent need of making all future buildings sustainable.
- To equip them with the capacity to design and construct Sustainable building.

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding of the importance in creating sustainable planning while conceiving building/ development projects and become environmentally responsive to construction requirements
- Have critical awareness of existing environmental rating systems (3) Practical application possibilities sustainable construction practices in regional context

Module 1: Introduction to Sustainability

Learning Strategies:

- Lectures, discussions and seminars

Module Contents:

- Basics of Sustainability, Needs of Sustainable Outlook, State of the Art
- Pillars of sustainability, Sustainable Development
- Concept of Renewable/Non-renewable, Global warming, Space-Ship-Earth concept,
- Objectives of Sustainable/ Green Buildings,
- Different Indian and International Green building rating systems; LEED India rating & TERI GRIHA rating
- Examples of Green buildings (Case Studies, Analysis and Architectural design of Sustainable buildings as Tutorials).

Module 2: Energy efficiency

Learning Strategies:

- Lectures and seminars

Module Contents:

- Energy Efficiency, Reasons for the Energy Crisis, State of the Art
- Energy conservation, Need for the Energy Conservation
- Conventional and non-conventional sources, renewable, non-renewable energy sources
- ECBC rules, Energy and buildings,
- Concept of embodied energy & Transportation energy
- Total Energy assessment in buildings,

- Relation between Energy Efficiency and Sustainable development
- Energy Scenario of Kerala. (Case studies, Redesign of Own house to make it Energy Efficient as Tutorial)

Module 3: Water Efficiency

Learning Strategies:

- Lectures and Seminars

Module Contents:

- Water, Water cycle, Water Conservation, Waste recycling, Waste water, Methods and techniques for water conservation in buildings
- Rain data of Kerala, Calculation of tank sizes for storage of rain water in Kerala
- Green buildings and water conservation. (Case studies, Design of Rain Water tanks for buildings as Tutorials)

Module 4: Material Efficiency

Learning Strategies:

- Lectures and discussions, market research, workshops

Module Contents:

- Selection of materials, Eco building materials and construction
- Low impact construction – bio mimicry, zero energy buildings, nano technology and smart materials
- Understanding various parameters for Sustainable Building Materials and evaluate using LCA (ISO 14000)

Module 5: Waste Management

Learning Strategies:

- Lectures and workshops, case studies

Module Contents:

- Types of waste, solid waste management
- Methods and techniques for waste management in buildings
- New technologies in waste management to make net zero.

Reference:

- 'A Water Harvesting Manual; for Urban Areas; Case Studies from Delhi', Centre for Science and Environment, New Delhi, 2003.
- Baker Nick and Steemers Koen, "Energy and Environment in Architecture", E& FN, Spon. London, 1999.
- Goulding, John, R, Lewis, Owen J and Steemers, Theo C., "Energy in Architecture", Bastford Ltd., London, 1986.
- Bansal Naveendra K., Hauser Gerd and Minke Gernot, "Passive Buildings Designs: Handbook of Natural Climatic Control", Elsevier Science, Amsterdam 1997.
- Energy Conservation Building Code, Government of India.
- Websites of TERI, LEED India, ECBC, etc.
- Manuals of GRIHA, IGBC

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam		Total
									Jury	Written	
IX	II	19AR09008(B)	Elective Theory 5: Architecture Pedagogy	2			2	50	100		150

Course Overview:

To expose the students to education methods in architecture

Course Outcomes:

Upon completion of the course, the student should:

- Be acquainted with the history of development of education methods in architecture.
- Be introduced the students with the prevailing models of teaching-learning methods and their application in architectural design education.
- Familiarize students with the skills to evaluate architectural design and other art forms.
- Be introduced research methodology, paper writing and presentation as tools to transmit knowledge

Module 1: History and development of Architectural Education

Learning Strategies:

- Lectures, discussions, seminars

Module Contents:

- Traditional teaching methods of India – Gurukul, Universities of Nalanda & Takshashila;
- Transmission of knowledge in architecture through temple architecture in ancient India;
- History of formal architecture education in West and in India.
- Peculiar requirements of Architecture Education, Requirements of generation of creative thinking

Module 2: Introduction to learning methods

Learning Strategies:

- Lectures, discussions, seminars

Module Contents:

- Aims and objectives of architecture education in India,
- Blooms Taxonomy, Levin's field theory, Carl Roger's theory of experiential learning,
- Peculiar requirements of Architecture Education;
- Models of Teaching: Advanced Organizer, Concept Attainment Model,
- Simulations – Use of advanced softwares to shape and visualize ideas,
- Synectics, Concept Mapping for organizing & communicating ideas,
- Basic aspects of classroom management

Module 3: Design Process pedagogy

Learning Strategies:

- Lectures, discussions, seminars

Module Contents:

- Various thinking skills, tools and techniques adopted by architects for deriving design ideas,
- Development of Design Thoughts, Experiential learning (case study methods) as guide in Design process,
- Use of synectics in the design studio, the essence of creativity in synectics, various forms of metaphoric thinking to activate "generative thinking"
- Arts, skill and technique of visual perception and form analysis,
- Communication of the aesthetics of architecture and other associated art forms in a journalistic manner.

Reference:

- S. K. Mangal (2009) "Essential of educational technology", PHI Learning Pvt. Ltd., 2009.
- Bruce Joyce and Marsha Weils, "Models of Teaching", Pearson; 9 edition (April 14, 2014)
- Klausmier and Ripple (1971) "Learning and Human Abilities" Harper &Row, New York.
- Eames Charles & Ray, „An Eames Anthology", Yale University Press, Edited by Ostroff Denial.
- George Kneller (1971), "Philosophy of Education" John Wiley & Sons Inc; 2nd Revised edition
- J. S. Chauhan, "Advanced Education Psychology" Sumit Prakashan
- J. C. Agrawala (2009), "Essential of educational technology" Vikas Publishing House Pvt Ltd, 01-Nov-2009
- Bruce Joyce (2014), "Models of Teaching" Pearson; 9 edition (April 14, 2014)
- Rizzoli (March 18, 2008); "How to Read A Building "Rizzoli (March 18, 2008);
- Bruce Joyce, "Models of Teaching", Pearson; 9 edition (April 14, 2014)
- New Trends in Architecture Education, By- Ashraf Salama

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IX	II	19AR09008(C)	Elective Theory 5: Building Performance and Compliance	2			2	50	100		150

Course Overview:

- To provide fundamental knowledge of building sciences for the development of high-performance buildings utilizing building modeling and simulation technology as a building performance analysis.
- To impart requisite knowledge for taking effective managerial decisions to ensure desirable performance conforming to good practices and national / international codes / standards.
- The purpose is to equip students with skills and techniques to calculate the energy consumption of heating, cooling, lighting, and other equipment by hand to understand the energy & thermal behavior of buildings, then compare and analyses these calculations with others calculated using energy modeling and simulation programs.
- To develop competence to understand the environmental compliances and management systems for buildings and infrastructure projects.

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding the use of IT applications and software packages related to functional performance of buildings like thermal and lighting analysis, environmental quality analysis.
- Get knowledge on policies, standards, procedures, and various formats relating to environmental compliance requirements practically applicable for projects, and develops competence in their application.
- Develop the necessary skills and sensitivity towards sustainability of built-environment.

Module 1: Environmental Policies, Codes & Standards

Learning Strategies:

- Lecture notes, Journals, e-journals, ASHRAE standards, ECBC

Module Contents:

- Definition, Environmental Policies and Laws- Environment protection act, Water act, Kyoto protocol, ISO standards, CDM etc. Case studies in India under CDM; COPs / United Nations Climate Change Conferences; Government incentives and Schemes, Financial aid, subsidies
- ASHRAE standards – 90.1-2010 Appendix-G; ASHRAE standards – 55- 2010; ASHRAE standards – 62.1- 2013
- IESNA standards for lighting
- Energy Conservation Building Codes, BEE Star rated equipment's.

Module 2: Thermal Environment

Learning Strategies:

- A combination of Guest lectures, Field visits, debates and study of latest trends in green buildings, locally and globally, simulation tools.

Module Contents:

- Introduction to Thermal behaviour of buildings
- Introduction to Thermal behaviour of buildings- Building physics; Latent, specific heat gains in the building; Psychometric analysis; Weather analysis, building envelope.
- Introduction to energy efficient buildings; Energy use in buildings; Energy Supply in Buildings: Heating, Ventilating, and Air-Conditioning (HVAC) Systems; Heating and cooling loads; Energy conservation consideration.
- Energy Performance Analysis: Energy Codes, Guidelines, and Standards; Constructing energy simulation models: Thermal modelling, Models for ventilation, Steady state and dynamic heat flow analysis; Evaluating models: Measurements, Comparisons and verifications
- Approaches to Thermal Simulation –
    - Prescriptive Approach – Codes & Standards
    - Performance building simulation – Energy plus, e-Quest 6.3

Module 3: Luminous Environment

Learning Strategies:

- A combination of Guest lectures, Field visits, material study, debates and study of latest trends in green buildings, locally and globally, simulation tools

Module Contents:

- Introduction to Luminous environment- Parameters – openings and sizing, shape & configuration, skylights, U value, SHGC, VLT, light shelves, study on sky conditions
- Lighting Performance Analysis: Lighting Codes, Guidelines, and Standards; Constructing lighting simulation models: Lighting modelling; Evaluating models: Measurements, Comparisons and verifications
- Approaches to Luminous Simulation –
    - Prescriptive Approach – Glazing calculation, IESNA
    - Performance building simulation – ECOTECT v 5.20

Reference:

- Givoni, B., 1969. Man, Climate and Architecture, Elsevier Publishing Company Limited.
- Energy Conservation Building Codes- BEE star rating system.
- Manual on Mechanical and Electrical Equipment for Buildings
- Manual on Sustainable Building Design Software
- American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc - www.ashrae.org
- Environment and forestry- http://www.envfor.nic.in/

43. TENTH SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
X	III	19AR10001	Architectural Design Thesis		26		26	650	650		1300

Course Overview:

- To prepare the student for profession and practice by encouraging comprehensive and detailed approach to design based on a holistic and comprehensive learning from the previous semesters.
- To evaluate the potential and capability of the student to synthesize architectural, technical and social systems through a capstone project and represent the outcome using sufficient number of architectural drawings/ 3D models and other visual representation techniques
- The students are expected to demonstrate their creative and critical thinking through a choice-based studio in their area of interest.
- To provide guidance in the area of interest of the student to help them further their career in the direction of their choice within the scope of the B.Arch. program.

Learning outcome and project deliverables

- A design project of suitable scale to be identified, designed and documented as a part of the architectural design thesis. For the purpose of uniformity, it is recommended that the project cover an area between 8000- 10,000 sq.m. approximately. It is expected that the project selected must be of benefit to the society. The feasibility of design proposal shall be verified so that students are able to demonstrate the practical possibility of their design thesis. A special topic of study relevant to the thesis has to be identified and researched along with the design proposal.
- The students are expected to produce a holistic and comprehensive outcome involving the area of Site Planning, Structural feasibility, functional efficiency and space planning, Form development, Environmental planning considerations, Building Services, Climate responsive architecture, Sustainable approaches and energy efficient architecture, Projects contextual response, fundamental project economics and Architectural design Detailing
- The final deliverables of the project shall include research documentation sheets including all studies relevant to the proposed project, Design evolution drawings and detailed architectural drawings, physical model, rendered perspective views and comprehensive report of the project. An interactive 3D model may be made available to the jurors to visualize the project quickly and effectively. All scheme drawings of various stages showing the evolution of design should be made available for jurors' reference in all stages of evaluation.

Reference:

- All books relevant to the topic of the architectural project, Guides / Jurors to make recommendations as suitable.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
X	I (c)	19AR10002	Elective Workshop 4: Architectural Design Thesis Special Topics	1		2	2	50	50		100

Course Overview:

- The workshop enables students for taking up in depth study on any Architectural Design related areas intended at application in Architectural Planning, Building Materials, Construction Technology, Structural System, Building Science, Building Services, etc. of a single building block or group of buildings.
- A special topic of study relevant to the thesis has to be identified and researched arriving at design application.
- Any Architectural Design related topic, approved by the Teaching Institution recommended by the respective Architectural Design Thesis guide, appropriate for the Thesis project shall be selected by the students.
- The students are expected to analyze and synthesize information collected.
  The students are to be guided in the area of interest and to be equipped better for their Architectural Design Thesis project.

Deliverables:

- The work should include an intensive study of the topography of the site selected for Architectural Design Project, the climatic features concerned, problems related to design of spaces and structures etc,. The solution of the problem may be approached from the professional view point of the Architect, Engineer, Urban Designer, Planner or Landscape Architect and the detailed nature of study shall be reflected in the preparation of seminars at various levels and in the final report.
- The students are expected to present seminars at study and analysis level as well as application level.
- The final deliverables of the project shall include two copies of bound volume in A4 size format and shall be submitted on the date and time announced by the Teaching Institution.