SRM UNIVERSITY
(Under section 3 of UGC Act 1956)

B.ARCH REGULATIONS – 2016

(For students admitted from the academic year 2016-2017)

PREAMBLE

As per the recommendation of National Knowledge Commission and UGC institutions of higher education need to carry out academic reforms in all arena including admission policy, uniform academic calendar, introduction of Choice Based Credit System, continuous assessment and grading system. In keeping with the recommendation, SRM University has introduced Choice Based Credit System (CBCS) from the academic year 2016-17 in the School of Architecture and Interior Design.

Faculty of Engineering &Technology

SRM University

SRM Nagar, Kattankulathur, India – 603 203

B.ARCH REGULATIONS - 2016

INDEX TO REGULATIONS

Preamble

R.1.0 Admission

R.2.0 Structure of the B. Arch Programme

R.3.0 Registration and Enrolment

R.4.0 Classification and Numbering of Courses

R.5.0 Adding and Dropping of course

R.6.0 Registration/Enrolment Requirement

R.7.0 Re-registering for course

R.8.0 Re-appearing in examination

R.9.0 Maximum Duration of the Programme

R.10.0 Temporary withdrawal from the programme

R.11.0 Academic Advising

R.12.0 Discipline

R.13.0 Attendance

R.14.0 Assessment Procedure

R.15.0 Course Wise Grading of Students

R.16.0 Method of Awarding Letter Grades.

R.17.0 Declaration of Results

R.18.0 Re-view of answer scripts

R.19.0 Grade Card

R.20.0 Academic Dishonesty

R.21.0 Eligibility for Award of the B. Arch Degree

R.22.0 Change of Regulations

B. Arch. REGULATIONS- 2016

(For students admitted from the academic year 2016-17)

REGULATIONS

R.1.0 Admission

R.1.1 The number of seats in the B.Arch. programme for which admission is to be made in the Faculty of
Engineering and Technology will be decided by the Board of Management of SRM University and approved by the Council of Architecture, New Delhi.

R.1.2 Admission to the B.Arch. programme in any year will be based on the aggregate of marks obtained in the qualifying examinations and the score secured in the National Aptitude Test in Architecture (NATA) conducted by the Council of Architecture. **(R.1.5)**

R.1.3 The eligibility criteria in the qualifying examination and the minimum pass mark required for NATA
is stipulated by the Council of Architecture from time to time and in accordance with **R.1.5.**

R.1.4 The Admission Committee will prepare a merit list, giving 50% weight age to the marks secured in the qualifying examination and another 50% weight age to NATA score, as stipulated by the Council of Architecture. According to the merit list the Committee will offer admissions through Counselling, taking into account the number of available seats.

R.1.5 The minimum qualification for admission to B.Arch degree programme should be a pass in the (10+2) Higher Secondary examination or any other equivalent examination of any authority, recognized by this University, with minimum total aggregate of 50% marks and Mathematics as a subject of study.

R.1.6 Diploma holders in Civil Engineering / Architecture with minimum marks, as stipulated by the Admission Committee, are eligible for admission only to the first semester of the B.Arch. programme as their 10 +3 scheme of study is considered equal only to the 10+2 scheme of study of higher secondary level by the Council of Architecture, New Delhi. Hence there is **no lateral entry** to the3rd semester of the B.Arch. programme.

R.1.7 Notwithstanding the above, the actual admissions will be based on the rules and regulations of the UGC/ competent authorities.

R.1.8 Candidates have to fulfil the medical standards required for admission as set out by the Admission Committee.

R.1.9 The selected candidate will be admitted to the B.Arch. programme after he/ she fulfils all the admission requirements as indicated in the letter of admission after payment of the prescribed fees.

R.1.10 In the matter of admissions to the B.Arch. programme the decision of the Admission Committee is final.

R.1.11 If, at any time after admission, it is found that a candidate has not fulfilled all the requirements stipulated in the offer of admission, the Director (Engineering and Technology) may revoke the admission of the candidate and report the matter to the Vice Chancellor.

R.2.0 Structure of the B. Arch Programme

R.2.1 The complete programme of study will consist of 7 categories of courses distributed over 10 semesters with two semesters per year as listed below:

1. ***BS- BASIC SCIENCES***
2. ***EEC- EMPLOYMENT ENHANCEMENT COURSES***
3. ***AH - ART AND HUMANITIES***
4. ***ES- ENGINEERING SCIENCES***
5. ***PC- PROFESSIONNAL CORE***
6. ***PE- PROFESSIONAL ELECTIVE***
7. ***OE- OPEN ELECTIVE***

R.2.2 Every branch of the B. Arch programme will have a curriculum and course contents (syllabi) proposed by the Boards of Studies in Architecture and approved by the Academic Council.

R.2.2.1 Professional Training
Students have to undergo practical training for duration of one semester with minimum of 80 working days, during the IX semester of the course in an approved Architectural firm under an Architect. This firm should be an established one of at least five years of existence or the training can be undertaken in registered government / private organizations such as CMDA, PWD and INTACH etc. The portfolio of the drawings and work diary done during the training period will be assessed at the end of the semester by faculty members (internal). Moreover it has to be certified by the concerned Architect /organization for the successful completion of the practical training. The students should arrange to send monthly progress reports from the respective offices imparting training.

R.2.2.2 Documentation
Students are required to study and document heritage buildings or contemporary buildings of architectural
merit for a duration of one month. This study will be undertaken by student groups of maximum four members and they will be required to prepare detailed plans, elevations and sections etc. of the building
under study. This documentation work will be evaluated at the end of the month by a panel of internal and
external examiners.

R.2.2.3 Architectural Design Exam
Design examination will be conducted to test the design skills of the student to the extent of fulfilment of the problem. This examination will be of 6 hrs. / 12 hrs. / 18 hrs. duration at the end of 2nd, 4th& 6th semester respectively. Students will be required to be enlodge during the first day and should submit the conceptual scheme drawings at the end, which will not be returned to them. They will be required to do the presentation drawings which will not deviate substantially from the conceptual scheme drawings and submit the same after the duration of the examination. Lunch break will be allowed during the second and third day of the examination.

R.2.2.4 Educational Tour
Every student is required to undertake an educational tour approved by the department to various places
of Architectural interest in South India within the first two years and another educational trip to North India
during third or fourth year of the B.Arch. programme.

R.2.2.5 Site / Field Visit
Every student is required to undergo site or field visits each semester for courses like Architectural Design Studio, Building Materials and construction etc. starting from the first semester of the programme.

R.2.3 Credits are assigned to the courses based on the following general pattern:
One credit for each lecture (L) period;
One credit for two or less tutorial (T) periods;

One credit for two or less laboratory/practical/project/seminar (P) periods
Theory based courses are those with 'L' & 'T' or 'L' alone.
A course with only "T" is NOT permissible.
Courses with theory and practical components are those with 'L', 'T' & 'P' or 'T' & 'P' or 'L' & 'P'.
Courses with only practical component are those with 'P' alone.

R.2.4 The curriculum of any branch of the B. Arch programme is designed to have 210 credits for the award of the B. Arch degree.

R.2.5 The medium of instruction, examination and project reports will be in English.

R.3.0 Registration / enrolment for courses
The process of signing-up for courses is called registration. Students are enrolled after they pay the prescribed fees. For a student to attend classes he/she has to necessarily complete both registration and enrolment. All students shall formally register for the courses every semester to undergo course work.

R.3.1 Registration of any course will be controlled by the concerned Head of the department.
Except for the first semester the registration for a semester will be done during a **specified week immediately after the end semester examination of the previous semester**. For the first semester registration shall be completed within a week prior to the commencement of classes. Late enrolment will be permitted with a fine, decided from time to time, up to two weeks from the last date specified for enrolment.

R.3.2 The registration sheet contains the course number, course name, number of credits earned till date, number of credits opted for the current semester, and the remaining number of credits to earn for the award of the degree.

R.3.3 A student will be eligible for enrolment only if he/she satisfies the enrolment requirement specified in R.6.0 and will be permitted to enrol only if he/she has cleared all dues to the University, Hostel, Library, NCC etc. up to the end of the previous semester, provided he/ she is not debarred for enrolment as a result of any disciplinary action of the University.

R. 3.4 It is mandatory for a student to register for all courses prescribed in the given semester.The curriculum for any semester, except for the IX & X semester will normally carry credits between 22 and 23.

R 3.5 Compensatory courses
Compensatory courses may be offered by a School/Department, by the Deans/HODs, with the approval of the Director (E&T). The course will be conducted during the regular academic session either during the weekends or in the evenings after the regular classes as decided by the Director (E&T) and the number of hours that will be conducted will be 75% of the hours specified in the curriculum for a course. Maximum two courses will be permitted to a student during the semester. The evaluation process will be the same as that of regular semester. Courses will be offered by departments only to students detained for lack of attendance in those subjects .

R 3.6. .No student should register for more than two compensatory courses offered during a semester.

R 3.7 Compensatory courses will be announced by the Director (E&T) after the publication of results of
end semester examinations of odd/even semester and the conduct of these courses will not go beyond the last working day of the semester. A student will have to register within the time stipulated in the announcement by paying the prescribed fees. Withdrawal from Compensatory courses is not permitted

R 4.0 Classification and numbering of courses:

R 4.1 The first digit of the course number indicates the year level of the course: 100 — first undergraduate year, 200 — second undergraduate year, 300 — third undergraduate years, 400 —fourth undergraduate years, 500 — fifth undergraduate year, Upper division courses (300- and 400-level courses) are generally more sophisticated and demanding. They may have prerequisites or other limitations on enrolment and are usually intended for students who have some preparation, either in the specific discipline or more generally in academic study. They tend to concentrate more narrowly and intensively in scope than lower division courses in the same discipline.

R 4.2 8-character alphanumeric coding of courses:

Year of Regulations	**Offering Department**	**Course code**
2 digits	2 digits	3 digits
16	AR	100 – First undergraduate year 200 – Second undergraduate year 300 – Third undergraduate year 400 – Fourth undergraduate year 500 – Fifth undergraduate year

R 4.3 Category of courses

Pre-requisite courses: Prerequisites are courses that must be taken up prior to advancing to the next course in a prescribed sequence of courses. The pre-requisite courses have to be registered by the student, earned a minimum of 75% attendance prior to advancing to the next course in a prescribed sequence of courses.

Core Courses:
There will be a Core Course in every semester. This is the course which should compulsorily be studied by a candidate as a core requirement to complete the requirement of a degree in a said discipline of study.

Elective Courses:-
Elective course is a course which can be chosen from a pool of papers. It may be:

- Supportive to the discipline of study
- Providing an extended scope
- Enabling an exposure to some other discipline/domain
- Nurturing candidate's proficiency/skill.

An elective may be "Discipline centric" called "Professional Elective." (or) may be chosen from an unrelated discipline called an "Open Elective."

R 5.00 Adding and dropping courses:

R 5.1 After registering, a student may withdraw from a course without academic penalty during the first 2 weeks of the semester. If the course is dropped within the first two weeks of the commencement of classes, it does not appear on the academic transcript; if the course is dropped any time after 2 weeks unilaterally by the student, for reasons whatsoever, it will be recorded with a mark of "Ab" or "I" (Refer R15.1) depending on whether the student has earned the minimum prescribed attendance for the course or otherwise. After registering, it is the student's responsibility to withdraw officially from a course if he or she decides not to continue in a course. Courses may be added only during the first two weeks of the semester.

R.5.2 When a course is added within the permissible timeframe, the attendance will be calculated from the date of registering the newly added course. No make-up classes need be conducted for the individual student to compensate for the missed lectures.

R.6.0 Enrolment Requirement

R.6.1 The enrolment requirement is as stipulated below:

For a student to become eligible for enrolment to the next academic year he / she should have earned at least **22 credits** in the immediate preceding academic year.

R.6.2 In case the student does not meet the above requirements he/she shall discontinue the studies temporarily (No advancement in studies will be permitted), earn the requisite credits and re-join the programme from where he/she has left. The student has to pay a re-admission fee as stipulated by the university in addition to the regular tuition fee, provided the enrolment status is maintained in "Active" condition. Further at the time of readmission no disciplinary action shall be in force against the student and the student has to pay the prescribed fee at the time of readmission.

R.6.3 A student has to appear, for a minimum of one course in the end semester examination in order to enrol into the next semester.

R.7.0 Re-registering for courses

R 7.1 Re-registering for courses are mandatory under the following two situations:
(1) A student who, due to whatever reasons, has not earned **75% attendance** during the normal course of study (I grade) are NOT permitted to appear in the end-semester examination. In such a situation the student has to re-register for the course in the subsequent session when the course is offered.

(2)A student has earned 75% attendance during normal course of study and has **not applied** for the end semester examination, is **not eligible** for enrolment to the next semester (No advancement in studies will be permitted), and then in such a situation the student has to re-register for the **same** semester,and re-join the programme from where he/she has left as in **R6.2**

(3) If the course is an elective or not a mandatory course then the student will have an option to either register for the same course or may elect another course of his/her choice, subject to satisfying the pre-requisites and approval of the academic advisor.

(4) Similarly a student who has not secured at least a pass grade (P-grade point NOT less than 4.0) in a course, whether it is a theory course, or theory cum studio, or studio course (except Architectural design exam, Professional Training & Documentation) for three appearances (Regular + TWO Re-appearances), either consecutively or otherwise, has to re-register for the course during the subsequent session when the course is offered in order to continue his studies in that course. The re-registering of courses will be in accordance with R7.1 (3)

(5) A student who, due to whatsoever reasons**, has not earned 75% attendance** during the normal course of study in **all** individual courses, is **not eligible** for enrolment to the next semester. In such a situation he/she shall discontinue the course temporarily has to re-register for all courses during the subsequent session when the course is offered in order to continue the programme.

(6) A student who has not secured at least a pass grade (P-grade point NOT less than 4.0) in a course, whether it is whether it is a theory course, or theory cum studio, or studio course (except Architectural design exam, Professional Training & Documentation), will have an option to re-register for the same course (if the course is a core course) or another course of his /her choice (if the course is an elective course). Alternatively he /she can opt for re-appearing for the end –semester examination/viva voce, without violating R7.1 (4) to secure a minimum of pass grade.

(7) All marks / grades – including internal and external will become null and void if a course is re-registered.

(8) After obtaining grade "Ab" or "F" or "I" in a course, if the same course is re-registered, then it will be considered as second appearance in that course. But if a new course is registered then it will be considered as first appearance in that course. In both the cases the student will NOT be considered for rank, medal or distinction.

R.8.0 Re-appearing for examination

(1) A student who has not secured at least a pass grade (P- grade point NOT less than 4.0) in a course, after appearing in an end semester examination in that course, whether it is a theory course or theory cum studio course or studio course will have an option to just appear directly for the end semester examinations, as and when conducted or re-register for that course.
(2) A student will be allowed to re-appear for the examination in a course for a maximum of two times only, after which he/she must re-register.
(3) If a student opts for re-appearing for an examination in a course after securing less than pass grade, he/she will retain all the internal marks acquired during the first appearance. The student need not attend the regular classes for that course.
(4) All applicable fees charged for the purpose of examination will apply for re-appearance courses as well.
(5) If the student fails to pass (P- grade point NOT less than 4.0) **in Architectural Design Exam** in the Design exam he/she will be required to appear for the same in the subsequent examination.
(6) If the student fails to pass(P- grade point NOT less than 4.0) in the **Documentation** work he/she will be required to improve the same and submit the work for evaluation in the subsequent examination.
(7) If the student fails to pass (P- grade point NOT less than 4.0) in the **Professional Training** he/she will be required to improve the same and submit the work for evaluation in the subsequent examination.

R.9.0 Maximum and Minimum Duration of the Programme

R.9.1 Each semester shall normally consist of 90 working days or 450 hours. A student is ordinarily expected to complete the B.Arch. programme in ten semesters for regular programme. However a student may complete the programme at a slower pace by taking more time but in any case not more than 14 semesters under regular programme excluding semester withdrawn on medical grounds as per R.10.1.

R 9.2 In compliance with the rules and norms of COA, no student will be allowed to complete the B.Arch. degree in less than 10 full-semesters.

R.10.0 Temporary withdrawal from the programme

R.10.1 A student may be permitted by the Director (Engg&Tech) to withdraw from the programme for a semester or longer for reasons of ill health or other valid reasons. Normally a student will be permitted to discontinue from the programme only for a maximum continuous period of two semesters or the aggregate of individual discontinuation not exceeding two semesters.

R. 11.0 Academic Advising: In order to provide academic assistance and individualized attention different levels of advising/attention will be provided to the students by three types of officers.(1) Academic Advisors (2) Faculty Advisor (3) Student Counsellor.

R 11.1 Academic advisors help the student to evaluate and realize educational and career options.
The Academic Advisor must be a senior faculty, preferably at the Professor level, who has good knowledge of the academic requirements, aspects of curricula and regulations. There can be one Academic Advisor for each degree programme (for small student strength) or 5 Academic Advisors - one for each year of the 5-year B.Arch. degree programme.
The basic responsibilities of the Academic Advisor are:
a. To either assist the student in career planning or to refer student to campus resources for such assistance.
b. To be knowledgeable about the programme(s) for which he/she is advising and be familiar with published academic rules and regulations of the University
c. To inform the student of degree requirements.

R 11.2. Faculty Adviser and Student Counsellor

R.11.2.1 To monitor student academic performance and its implications on planning their courses of study and for providing general advice on the academic programme, the concerned School/Department will assign for every 40 students a faculty member who will be called the Faculty Adviser.

R.11.2.2 In order to motivate the students personally and provide counselling on academic and non-academic matters, a faculty member called Student Counsellor shall be assigned for every 20 students.

R.12.0 Discipline

R.12.1 Every student is required to maintain discipline and decorous behaviour both inside and outside the University campus and not to indulge in any activity that will tend to bring down the prestige of the University.

R.12.2 Any act of indiscipline of a student is first to be considered by the Discipline and Welfare Committee of the Department/School for necessary action. If the issue demands more serious consideration, the act of indiscipline will be reported to the Director (E&T), and he will refer it to the Discipline and Welfare Committee of the University, constituted by the Vice Chancellor. The Committee will enquire into the charges and recommend suitable action if the charges are substantiated. The Director (E&T) will take appropriate action on the recommendation of the Discipline and Welfare Committee of the University.

R.12.3 Director (E&T) may suspend a student pending inquiry depending upon the prima facie evidence.

R.12.4 Appeal: The aggrieved student may appeal to the Vice Chancellor whose decision will be final and binding.

R.13.0 Attendance

R. 13.1*Attendance is the physical presence of the student in the class / laboratory / field work*.
It is a well-observed fact that the students who score good grades are those who attend the class / laboratory / field work, regularly. Therefore, the students must strive to attend all the classes without fail.

R.13.2 Every faculty member handling a course will take attendance till the last instruction day in the semester. The percentage of attendance, calculated up to this point, will be indicated by a code number/letter as follows:

Attendance rounded to	**Code**
95% and above	H
85 to 94%	9
75 to 84%	8
Below 75%	L

R.13.3 A student must maintain an attendance record of at least 75% in individual courses, *exclusive of leave of absence due to medical reasons, on-duty, extra-curricular / extramural activities, permitted assignments such as job interviews, unforeseen emergencies etc.* Without the minimum attendance of 75%, in any course, students become ineligible to appear for the end semester examination in that course. His / Her registration for that course will be treated as cancelled, and he/she shall be awarded 'I' grade (I stands for Incomplete or registration cancelled for want of minimum attendance) in that course. This grade shall appear in the grade card until the course is successfully completed. The student should register for and repeat the entire course when it is offered next.

R.13.4 A student must strive to attend all the classes without fail. However, the minimum attendance requirement of 75% allows a student the facility to use the balance 25% to account for illnesses, permitted assignments such as job interviews, inter university sports meets, inter-collegiate/inter-university competitions, accidents, unforeseen emergencies etc. An attendance of 75% in a course (except in cases governed by R.13.6) is considered to be the minimum required for a student to get just enough input on the course syllabus through class room contact hours to make him / her eligible to appear in the end semester examination for that course. It is the responsibility of each and every student to keep track / monitor his / her percentage of attendance for each course and ensure that he / she satisfies the attendance norms prescribed by the university. If the student finds any discrepancy / error in the attendance status, he /she should immediately bring it to the attention of the concerned faculty member and seek redressal.

R.13.5 The teacher shall prepare the particulars of all students who have attendance less than 75% in his / her course. Copies of the same should also be sent to the Director (E&T), and Heads of Schools/ Departments concerned. ***The students who have less than 75% attendance will not be permitted to appear in end semester examination.***

R.13.6Condonation of Attendance: In rare and genuine cases, a committee consisting of Director and Head of the Department of the concerned department will examine the case, based on the documents submitted by the student, facts and circumstances. Assessment will be done, by the committee, on the merit of the case and spell out their recommendation to the Vice Chancellor. The Vice Chancellor, based on the recommendation of the committee may then give condonation of attendance, only if the Vice Chancellor deems it fit and deserving but in any case the condonation cannot exceed 10%.

R.14.0 Assessment Procedure

R.14.1 The complete academic performance of a student is evaluated in-house by the concerned teacher / department except in the case of studio based courses work where an external examiner shall be nominated for the viva voce. The student's performance in each course, in general, is evaluated based on *in-semester continuous assessment* (internal assessment) and *end-semester examination*.
An *in-semester continuous assessment* (also known as internal assessment / comprehensive assessment) is spread through the duration of course and is done by the teacher teaching the course. The assessment is done through various means including:

1. Written tests
2. Seminars
3. Assignments

The end-semester examination shall have assessment from the following perspective with respect to all courses:

1. Evaluation with respect to knowledge.
2. Evaluation with respect to Understanding.
3. Evaluation with respect to skill.
4. Evaluation with respect to Applications
5. Higher Order Thinking Skills

R.14.3 The assessment method is further detailed below:

Theory based courses (Course without any Practical/Studio component)

R.14.3.1 In theory courses for all semesters, the first assessment will be mid-term test and the second assessment will be seminar / Model exam. Both the assessments will be conducted for 25 marks each (Total 50).

Assessment tool	**Weight age**	**Remarks**
Midterm exam	25 marks	Duration – 120 minutes
Model exam/Seminar/ Assignment.	25 marks	In case of model exam duration of exam will be 3 hrs.
Total in-semester assessment	**50%**	
End semester Examination	**50%**	**Duration – 3 hours**

Theory cum studio based courses (Course with Theory and Studio component)
R.14.3.2 For theory cum studio courses, the first assessment will be mid-term test and the second assessment will be a seminar / portfolio/test. Both the assessments will be conducted for 25 marks each (total 50).

Assessment tool	**Weight age**	**Remarks**
Midterm exam	25 marks	Duration – 120 minutes
Model Exam/Seminar/Portfolio.	25 marks	In case of model exam duration of exam will be 3 hrs.
Total in-semester assessment	**50%**	
End semester Examination	**50%**	**Duration – 3 hours**

R.14.3.3For studio based courses(except Architectural Design Exam) the portfolio of work will be evaluated individually for the total sessional marks of 50. End semester assessment will be done by an external examiner through Viva –voce exam for the remaining 50marks.

(A) BASIC DESIGN & ART STUDIO

Assessment tool	Weight age	Split up of marks		
Continuous assessment of plates	50 Marks	Concept	Design Development	Presentation
		15	20	15
Total in-semester assessment	**50%**			
End semester viva/voce	**50%**	Concept	Design Development	Presentation
		15	20	15

(B) ARCHITECTURAL DESIGN STUDIO I,II,III,IV,V,VI,VII

Assessment tool	Weight age	Split up of marks		
Project 1(Major project)	30 marks	Concept	Design Development	Presentation
		10	10	10
Project 2 (Minor Project)	20 marks	Concept	Design Development	Presentation
		7	6	7
Total in-semester assessment	**50%**			
Project 1(Major project)	30 marks	Concept	Design Development	Presentation
		10	10	10
Project 2 (Minor Project)	20 marks	Concept	Design Development	Presentation
		7	6	7
End semester viva/voce	**50%**			

(C) BUILDING MATERIALS AND CONSTRUCTION –I,II,III,IV
ARCHITECTURAL DRAWING I&II
COMPUTER STUDIO I,II,III

ARCHITECTURAL DELINEATION & MODEL MAKING

Assessment tool	Weight age	Remarks	
Midterm exam	20 marks	Duration – 120 minutes	
Continuous assessment of plates	30 marks	No.of plates done during the session will be evaluated.	
Total in-semester assessment	**50%**		
End semester Viva/Voce	**50%**	Plates	Viva/Voce
		25marks	25 marks

R.14.3.4.The student's performance in **Professional training** will be through a viva-voce examination conducted at the end of the training period for 100 marks by a panel of internal examiners.

Assessment tool	Weight age	Split up of marks		
Total in-semester assessment	**100%**	Work diary	Plates	Viva/voce
		20	40	40

R.14.3.5.The student's performance in **Documentation** will be evaluated through a viva-voce examination conducted at the end of the documentation period for 100 marks. The viva voce will be by a panel consisting of an internal examiner and an external examiner appointed by the University.

Assessment tool	Weight age	Split up of marks		
End semester viva/voce	**100%**	Choice of project	Plates	Viva/voce
		20	40	40

R.14.3.6. The student's performance in **Architectural Design Exam** of duration varying from 6 to18 hours for various semesters will be through a panel consisting of an internal examiner and an external examiner appointed by the University for 100 marks.

Assessment tool	Weight age	Split up of marks			
End Semester exam	**100%**	Concept	Plan	Section	Elevation & Views
		30	20	20	30

14.4 Project evaluation (Thesis)

R.14.4.1 B.Arch projects as for as possible should be socially relevant and attempt to improve existing Design standards in buildings. B.Arch. thesis project work will be carried out individually by the students. The internal assessment for 50% of the marks will be done by a thesis review committee, comprising of a renowned practicing architect, the head of department and the guide at least once in a month to monitor the progress. At the completion of a project the student will submit a project report, the presentation drawings and models, which will be evaluated by duly appointed examiner(s). The evaluation will be based on a viva voce examination of the project at the end of the semester for the remaining 50% of the marks. The grade will be awarded to the student on the basis of the total marks obtained by him/her out of 100.

Assessment tool	**Weight age**	**Remarks**		
Review 1	10 marks			
Review 2	10 marks			
Review 3	10 marks			
Review 4	10 marks			
Internal Review	10 marks			
Total in-semester assessment	**50%**			
End semester viva/voce	**50%**	**Split up of marks**		
		Concept	Design Development	Presentation
		15	20	15

R.14.4.2. If the candidate fails to secure a pass in thesis project, he/she will be required to improve the
project work based on the suggestions given by head of the department and the thesis guide and appear for the viva-voce examination during the end of the subsequent semester.

R14.5 The assessment process for courses like **NCC/NSS/NSO/YOGA**, and Personality Development courses which form part of the curriculum, shall be decided by the Course Coordinator at the commencement of the semester and communicated to all concerned.

R 14.6 Whenever there is a deviation from procedures stated under 14.3, as warranted by the unique nature of the course; the same will be specified by the concerned Course Coordinator and approved by the Director (Engg&Tech).

R.15.0 Course Wise Grading of Students

R.15.1 Letter Grades and Grade Points (GP)

Based on the aggregate of marks obtained through internal assessment and external assessment, each student is awarded a final letter grade at the end of the semester, in each Course. The letter grades and the corresponding grade points, as recommended by UGC, are as follows:

Letter Grade	**Grade Points**	**Normalised Mark range**
O (Outstanding)	10	95-100
A+ (Excellent)	9	90-94
A (Very Good)	8	85-89
B+ (Good)	7	75-84
B(Above Average)	6	65-74
C (Average)	5	55-64
P (Pass)	4	50-54
F (Fail)	0	<50 Failure due to insufficient marks in the course
Ab(Absent)	0	Failure due to non-appearance in examination
I (Incomplete)	0	Failure due to insufficient attendance in the course.

R.15.2 A student is considered to have successfully completed a course and earned the credits if he / she secured a letter grade other than **F or Ab or I** in that course. ***A letter grade F or Ab or I in any course implies a failure in that course.***

R.15.3 A course successfully completed cannot be repeated.

R.16.0 Method of Awarding Letter Grades.

R.16.1 The internal marks awarded to the students are first normalized and combined with the normalized marks of end semester examination. Subsequently letter grades are awarded for the normalized marks as indicated in the table under section R15.1:
The detailed methodology of normalization of internal marks as well as marks in the end-semester examinations shall be formulated by the Controller of Examinations.

R.16.2 To pass in a course with earnable credits a student has to score a minimum of 50% of the total normalized marks secured in both the internal and end semester examination. Grades Ab and I will be as per R.15.1.

R.17.0 Declaration of Results
R.17.1 Normalized marks are referred to the Result Passing Board for the finalization of results. Controller of Examinations assigns letter grades and announces the results.

R.17.2*The Ab / I grade once awarded stays in the record of the student and is deleted when he/she completes the course successfully later* The grade acquired by the student will be indicated in the grade card of the appropriate academic year with an indication of the month and the year of passing of that course.

R.17.3*'F' grade obtained by a student will be deleted in the grade card once that course is successfully completed*. The pass grade acquired by the student will be indicated in the grade card of the appropriate year with an indication of the month and the year of passing. The CGPA will be accordingly revised.

R.18.0 Re-view of answer scripts
In case any student feels aggrieved on the final outcome of the assessment in any course, the student shall apply to the Controller of Examinations, along with the prescribed fee, for the review of end semester examination answer script, within the stipulated time after the announcement of the results of the examinations. The Controller of Examinations shall facilitate the review of the answer script jointly to be carried out by the student and the faculty detailed for this purpose. If any discrepancy is noticed during review the same shall be rectified and the originally awarded grade accordingly amended.

R.19.0 Grade Card
R.19.1 The grade card issued by the Controller of Examinations to each student, after the announcement of the results will contain the following:
a. The credits for each course registered for that semester,
b. The letter grade obtained in each course
c. The attendance code in each course
d. The total number of credits earned by the student up to the end of that semester in each of the course categories
e. The Cumulative Grade Point Average (CGPA) of all the courses taken from the I semester onwards.
f. The COA student enrolment number to be printed in the following documents.
1. Grade Card.
2. Consolidated Mark sheet.
3. Provincial degree certificate
4. Degree certificate.

R.19.2 Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)
(i) The SGPA will be calculated according to the formula

SGPA= $\frac{\sum_1^n C_i \times (GP)_i}{\sum_1^n C_i}$

Where Ci = credit for the ith course, (GP)i = the grade point obtained for the ith course (refer R.15.1) , n = total number of courses and the sum is over all the courses taken in that semester, including those in which the student has secured F grades.

(ii) For the cumulative grade point average (CGPA) following formula is used:

CGPA= $\frac{\sum_1^r S_i \times (SGPA)_i}{\sum_1^r S_i}$

where Si = Sum of credits in ith semester, (SGPA)i = Semester Grade Point Average earned in ith semester and r = number of semesters and the sum is over all the semesters under consideration.

(iii). The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

R.19.3 Class/Distinction will be awarded to the students after they successfully complete the B.Arch. programme as per the norms stipulated in the following table:

Category	**CGPA (From I-X semesters)**	**Class / Distinction**
Students who successfully complete the B.Arch. programme within the time duration of 10 semesters	≥ 4 & < 5.5	Pass
	≥ 5.5 &< 6	Second Class
	≥ 6 & < 8.5	First Class
	≥ 8.5 (without F or I or temporary withdrawal-R.11.0in any Semester)	First Class with Distinction
	≥ 8.5 (with F or I in any Semester but obtained pass grade (O to P) subsequently)	First Class
Students who cannot complete the B.Arch. programme in 10 semesters but complete it successfully within the time duration of 11 semesters.	≥ 4 &< 5.5	Pass
	≥ 5.5 &< 6	Second Class
	≥ 6	First Class
Students who cannot complete the B.Arch. programme in 11 semesters but complete it successfully within the time duration of 14 semesters.	≥ 4 &< 5.5	Pass
	≥ 5.5	Second Class

R 20.0 Academic dishonesty

When a student is found responsible for a violation of the SRM code of conduct pertaining to academic dishonesty (Malpractice in Examinations), the Office of Controller of Examinations will initiate action based on the pre-approved procedures. Appropriate penalty or punishment will be awarded to the student and communication sent to the concerned Head of the Department.

R.21.1 A student shall be declared to be eligible for the award of the B.Arch. degree if he/she has

a. Registered and successfully completed all the courses and Thesis, Professional Training, Documentation as per the curriculum.

b. Successfully acquired the minimum required credits as specified in the curriculum.

c. No disciplinary action pending against him/her.

d. Two Compulsory Educational Tours apart from the site / field visit.

R.22.0 Change of Regulations

R.22.1 Any regulation can be modified by the Academic Council of SRM University.

SCHEME OF EXAMINATION

Course	Duration of End Semester Examinations (In Hours)	Internal Assessment Marks	End Semester Exam marks	Total	Attendance Code
All Theory Courses	3 hrs.	50	50	100	Applicable
All Theory cum Studio Based courses	3 hrs.	50	50	100	Applicable
All Studio Based courses (Except Architectural design exam and NCC/NSS/NSO/Yoga)	Not Applicable	50	50	100	Applicable
Studio Based courses (Architectural design exam)	6-18 hrs.	-	100	100	Not Applicable
Studio Based courses (NCC/NSS/NSO/Yoga)	Not Applicable	100	-	100	Applicable
Professional Training	Not Applicable	100	-	100	Not Applicable
Documentation	Not Applicable	-	100	100	Not Applicable
Thesis	Not Applicable	50	50	100	Not Applicable

QUESTION PAPER PATTERN (END SEMESTER EXAMINATION)

1. All Theory Courses
   - Part- A (10X2= 20 Marks)
   - Answer all questions
   - Part- B (5X16=80 Marks)
   - (Either or type)

2. All Theory cum studio based courses
   - Part- A (5X4= 20 MARKS)
   - Answer all questions
   - Part- B (4X20=80 Marks)
   - (Either or type)

3. Studio based courses (Architectural Design Exam) - 1x100=100 Marks (Either or type)

----------End----------

B.ARCH. REGULATIONS

Curriculum & Syllabus – 2016

(For Students admitted from the Academic year 2016-17)

Faculty of Engineering & Technology

SRM UNIVERSITY
SRM NAGAR, KATTANKULATHUR

SRM UNIVERSITY

B.ARCH. REGULATIONS – 2016

CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

Bachelor of Architecture curriculum is designed to prepare the graduates having attitude and knowledge

1. To enable a successful professional and technical career.
2. To enable a strong foundation in Humanities and Sciences, Engineering Sciences and Architectural Design Skills.
3. To impart knowledge of the theories and practices in the field of Architecture.
4. Engage in life-long learning to keep themselves abreast of new developments.
5. To put into practice and inspire high ethical values and technical standards.

PROGRAMME OUTCOME (PO):

a. Ability to gain knowledge of Humanities, Sciences and Architecture.

b. Ability to understand elements of Architecture and apply basic principles in Architectural Design.

c. Ability to identify social, economical and cultural issues in Architectural Design.

d. Ability to analyze and apply theoretical knowledge to achieve Architectural Design solutions.

e. Ability to understand ethical and professional responsibilities.

f. Ability to review, comprehend and report technological developments.

g. Ability to understand real life situation of Architectural Practice.

h. Ability to communicate effectively and work in interdisciplinary groups.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOME:

A broad relation between the programme objectives and the outcome is given in the following
Table

PEO/PO	a	b	c	d	e	f	g	h
1						√	√	√
2	√	√	√	√				
3		√	√	√	√			
4						√	√	√
5					√		√	√

S.R.M UNIVERSITY
SCHOOL OF ARCHITECTURE & INTERIOR DESIGN

CURRICULUM FOR BACHELOR OF ARCHITECTURE (B.Arch) - 2016

I SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
THEORY								
16MA 141		Mathematics for Architects	BS	4	2	0	2	3
16LE 141		Communication in English	EEC	4	2	0	2	3
16AR 101		History of Indian Architecture & Culture	AH	3	3	0	0	3
STUDIO								
16AR 103		Art Studio	AH	5	0	0	5	3
16AR 105		Architectural Drawing - I	PC	5	0	0	5	3
16AR 107		Basic Design	PC	12	0	0	12	6
16NC101 / 16NS101 16SP101 / 16YG101		NCC/NSS/NSO/Yoga	EEC	2	0	0	2	1
		TOTAL		**35**	**7**	**0**	**28**	**22**

II SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
THEORY								
16AR 102		Structural basics in Architecture	ES	3	3	0	0	3
16AR 104		History of Western Architecture & Culture	AH	3	3	0	0	3
16AR 106		Theory of Architecture	PC	3	3	0	0	3
STUDIO								
16AR 108		Building Materials & Construction - I	ES	5	0	0	5	3
16AR 110		Architectural Drawing - II	PC	5	0	0	5	3
16AR 112		Architectural Design Studio - I	PC	14	0	0	14	7
16AR 114		Architectural Design Exam - 1st year	EEC	0	0	0	0	1
		TOTAL		**33**	**9**	**0**	**24**	**23**

III SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
THEORY								
16AR 201		Mechanical & Electrical services	ES	3	3	0	0	3
16AR 203		Climate and Built Environment	BS	3	3	0	0	3
16AR 205		Vernacular Architecture & Settlements	PC	3	3	0	0	3
STUDIO								
16AR 207		Building Materials & Construction - II	ES	5	0	0	5	3
16AR 209		Architectural delineation & Model making	PC	6	0	0	6	3
16AR 211		Architectural Design studio - II	PC	14	0	0	14	7
		TOTAL		**34**	**9**	**0**	**25**	**22**

IV SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
THEORY								
16AR 202		Reinforced Concrete Structures	ES	3	3	0	0	3
16AR 204		Contemporary Western Architecture	PC	3	3	0	0	3
16AR 206		Environmental Science	BS	2	2	0	0	2
THEORY CUM STUDIO								
16AR 208		Water Supply, Sanitation & fire fighting in buildings	ES	4	2	0	2	3
STUDIO								
16AR 210		Building Materials & Construction - III	ES	5	0	0	5	3
16AR 212		Architectural Design Studio - III	PC	14	0	0	14	7
16AR 214		Architectural Design Exam - 2nd year	EEC	0	0	0	0	1
		TOTAL		**31**	**10**	**0**	**21**	**22**

V SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
THEORY								
16AR 301		Steel Structural Systems	ES	3	3	0	0	3
16AR 303		Contemporary Indian Architecture	PC	3	3	0	0	3
		Professional Elective - I	PE	3	3	0	0	3
STUDIO								
16AR 305		Building Materials & Construction- IV	ES	5	0	0	5	3
16AR 307		Computer Studio - I	EEC	4	0	0	4	2
16AR 309		Architectural Design Studio - IV	PC	16	0	0	16	8
		TOTAL		**34**	**9**	**0**	**25**	**22**

VI SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
THEORY								
16AR 302		Sustainable Architecture and Green Building	PC	3	3	0	0	3
16AR 304		Architectural Acoustics	PC	3	3	0	0	3
		Professional Elective - II	PE	3	3	0	0	3
THEORY CUM STUDIO								
16AR 306		Interior Design & Detailing	PC	5	1	0	4	3
STUDIO								
16AR 308		Computer studio - II	EEC	4	0	0	4	2
16AR 310		Architectural Design Studio - V	PC	16	0	0	16	8
16AR 312		Architectural Design Exam - 3rd year	EEC	0	0	0	0	1
		TOTAL		**34**	**10**	**0**	**24**	**23**

VII SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
THEORY								
16AR 401		Estimation & Specification	PC	3	3	0	0	3
		Professional Elective - III	PE	3	3	0	0	3
		Open Elective - I	OE	3	3	0	0	3
STUDIO								
16AR 403		Working Drawing	PC	5	0	0	5	3
16AR 405		Computer Studio - III	EEC	4	0	0	4	2
16AR 407		Architectural Design Studio - VI	PC	16	0	0	16	8
		TOTAL		**34**	**9**	**0**	**25**	**22**

VIII SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
THEORY								
16AR 402		Town Planning	PC	3	3	0	0	3
16AR 404		Professional Practice	PC	3	3	0	0	3
		Professional Elective - IV	PE	3	3	0	0	3
		Professional Elective - V	PE	3	3	0	0	3
THEORY CUM STUDIO								
16AR 406		Urban Design & Renewal	PC	4	2	0	2	3
STUDIO								
16AR 408		Architectural Design Studio - VII	PC	16	0	0	16	8
		TOTAL		**32**	**14**	**0**	**18**	**23**

IX SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
16AR 501		**Professional Training**	EEC	X	X	X	X	8
16AR 503		**Documentation** (Heritage Buildings)	PC	X	X	X	X	3
		TOTAL		**X**	**X**	**X**	**X**	**11**

Note :

1. The work diary and drawings done by the candidate in a registered Architectural Office for professional training will be evaluated for 100 marks (internal).
2. Documentation of any Heritage Building / Architectural landmark will be done as group work for a period of 1 month and will be evaluated for 100 marks (external).

X SEMESTER

S.NO	CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
THEORY								
16AR 502		Landscape Architecture	PC	3	3	0	0	3
		Open Elective - II	OE	3	3	0	0	3
16AR 504		**Thesis**	EEC	-	-	-	-	14
		TOTAL		**6**	**6**	**0**	**0**	**20**

Total no. of credits : 210

PC - Professional Core
BS - Basic Science
ES - Engineering Science
AH - Arts & Humanities
EEC - Employability Enhancement Course
PE - Professional Elective
OE - Open Elective

LIST OF PROFESSIONAL ELECTIVES

Electives	Code	Subject Title	L	T	P	C
Professional Elective - I	16AR 351	Biomimetics	3	0	0	3
	16AR 353	Energy efficient Architecture	3	0	0	3
	16AR 355	Site planning	3	0	0	3
Professional Elective - II	16AR 352	Architectural Photography & journalism	3	0	0	3
	16AR 354	Industrial Building Systems	3	0	0	3
	16AR 356	Fine Arts	3	0	0	3
Professional Elective - III	16AR 451	Environmental Planning	3	0	0	3
	16AR 453	Earthquake Resistant Architecture & Disaster Resistant Buildings	3	0	0	3
	16AR 455	Ergonomics & Furniture Design	3	0	0	3
Professional Elective - IV	16AR 452	Architectural Conservation	3	0	0	3
	16AR 454	Housing	3	0	0	3
	16AR 456	Kinetic Architecture	3	0	0	3
Professional Elective - V	16AR 458	Advanced Structural Systems	3	0	0	3
	16AR 460	Project Management & Construction	3	0	0	3
	16AR 462	Real estate development	3	0	0	3

SCHEME OF EXAMINATION

Course	Duration of End Semester Examinations (In Hours)	Internal Assessment Marks	End Semester Exam marks	Total	Attendance Code
All Theory Courses	3 hrs.	50	50	100	Applicable
All Theory cum Studio Based courses	3 hrs.	50	50	100	Applicable
All Studio Based courses (Except Architectural design exam and NCC/NSS/NSO/Yoga)	Not Applicable	50	50	100	Applicable
Studio Based courses (Architectural design exam)	6-18 hrs.	-	100	100	Not Applicable
Studio Based courses (NCC/NSS/NSO/Yoga)	Not Applicable	100	-	100	Applicable
Professional Training	Not Applicable	100	-	100	Not Applicable
Documentation	Not Applicable	-	100	100	Not Applicable
Thesis	Not Applicable	50	50	100	Not Applicable

QUESTION PAPER PATTERN (END SEMESTER EXAMINATION)

4.	All Theory Courses	-	Part- A (10X2= 20 Marks)
		-	Answer all questions
		-	Part- B (5X16=80 Marks)
		-	(Either or type)
5.	All Theory cum studio based courses	-	Part- A (5X4= 20 MARKS)
		-	Answer all questions
		-	Part- B (4X20=80 Marks)
		-	(Either or type)
6.	Studio based courses (Architectural Design Exam)	-	1x100=100 Marks (Either or type)

----------End----------

B.ARCH SYLLABUS – 2016

Course structure:

Architectural Design is the most important subject in the B.Arch curriculum, where students are involved in studio work to design all types of buildings. Hence all the semesters have this subject as the prime component, with the theory subjects intended as an input to Architectural Design Studio. After completion of the program students are employed by various architectural practices based on their Design portfolio, in which the students' design projects are highlighted.

General procedure for Architectural Design Studio:

The approach to the design solutions start with study of anthropometrics and space standards related to each problem, doing case studies and book studies of similar typology of buildings and presenting the data as a study report in a class seminar. Various methods of spatial analysis such as the Bubble diagram based on activities, Proximity matrix and Circulation diagrams & Site analysis are essential to formulate conceptual ideas. The transformation of the concept to a pragmatic design solution will largely depend on the exploration of various geometrical alter natives and a study of their feasibility. The design solution for each problem will be presented through conceptual sketches, presentation drawings and models.

General procedure for Building materials & Construction, interior design & other theory cum studio subjects:

Each session comprises of 5 hours duration, of which the first 1 hour will be dedicated to lectures where the theoretical aspects are discussed. The remaining hours will be drawing classes where the students are expected to do the detail drawings for building construction or interior design. The drawing plates done by the students have to be submitted for scrutiny & correction, latest by the afternoon of the following day. All Building materials & construction courses have been structured so that the students get to know the construction methods & techniques in the earlier semester for the Design projects that they would be doing in the following semester. Moreover, these sessions will be augmented by undertaking visits to construction sites whenever required, which will help the student to get firsthand knowledge about materials & construction.

SYLLABUS - 2016

I SEMESTER

		L	T	P	C
16MA 141	**MATHEMATICS FOR ARCHITECTS**	2	0	2	3
	Prerequisite - Nil				

OBJECTIVES

- Identifying practical problems to obtain solutions involving trigonometric and exponential functions.
- Studying the properties of lines and planes in space, along with sphere
- Understand functions of more than one variable, along with differentiation under integral sign.
- Analyzing collection of data and interpretation of results using statistical tools.

UNIT-1 TRIGONOMETRY AND MENSURATION **9**

Review of Trigonometric (sine, cosine and tan functions) and exponential functions - De-Moiver's theorem - Expansion of $\sin^n\theta$, $\cos^n\theta$ in terms of $\sin n\theta \& \cos n\theta$ and $\tan^n\theta$ in terms of $\tan n\theta$ - Real and Imaginary parts of Circular and Hyperbolic Functions - Area of plane figures, computation of volume of solid figures (cone, cylinder, prism, pyramid, sphere etc).

.

UNIT-2 THREE DIMENSIONAL ANALYTICAL GEOMETRY **9**

Direction cosines and ratio's – Angle between two lines – Equations of a plane – Equations of a straight line – Coplanar lines – Shortest distance between skew lines – Equation of Sphere – Tangent Plane to a Sphere.

UNIT-3 INTEGRATION AND FUNCTIONS OF TWO VARIABLES **9**

Review of Integration of rational, trigonometric and irrational functions - properties of definite integrals - Reduction formulae for trigonometric functions ($\sin^n\theta$, $\cos^n\theta$ & $\tan^n\theta$) - Taylor's Theorem - Maxima and Minima (Simple Problems).

UNIT-4 ORDINARY DIFFERENTIAL EQUATIONS **9**

Linear equations of second order with constant coefficients – Homogeneous equation of Euler type .

UNIT-5 BASIC STATISTICS AND PROBABILITY **9**

Review of arithmetic mean, median, mode, standard deviation and variance - Regression and correlation - Elementary probability - Laws of addition and multiplication of probabilities - Conditional probability – Independent events – Baye's theorem (problems only).

TOTAL: 45 Hours

OUTCOME:

The students will understand the topics in mathematics necessary for effective understanding of architecture subjects. At the end of the course, the students would have knowledge of the appropriate role of the mathematical concepts learnt.

REFERENCES:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 41st Edition,2011.
2. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics",Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
4. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.

	`	L	T	P	C
16LE 141	**COMMUNICATION IN ENGLISH**	2	0	2	3
	Prerequisite - Nil				

OBJECTIVES

- The English Language Course for students of architecture would enhance their communication skills in English by developing their listening, speaking, reading and writing skills.
- It aims to develop their speaking skills with specific reference to prospective/actual clients, suppliers, business partners and colleagues.
- Enhance their reading ability of journals, research articles etc & develop their writing skills especially writing project proposals and reports.

UNIT-1 VOCABULARY & GRAMMAR **8**

Listening- short talks, interviews and discussions from various media Speaking-negotiating meaning, convincing people- describing places- Reading- texts on architecture-Writing-process descriptions -Vocabulary Development-Abbreviations and Acronyms. Grammar- Suitable tenses to write descriptions and describe.

UNIT-2 LISTENING & WRITING **8**

Listening –listen to talks for specific information- Speaking- Speaking- preparing a presentation using the computer, participating in small group discussion- Reading- lengthy articles related to architecture and construction, Writing- writing formal emails **,** vocabulary- appropriate words to describe topics in architecture, Grammar- suitable grammar for writing a report.

UNIT-3 SPEAKING & PRESENTATION **10**

Listening- Descriptions of place, conversations and answering questions, Speaking- making a power point presentation on a given topic, Reading- architecture manuals, Writing- writing a report, writing essays-descriptive essays, Vocabulary- adjectives of comparison, Grammar collocations.

UNIT-4 REASONING & INTERPRETATION **10**

Listening- TED talks, Speaking- participating in group discussions, Reading- reading and interpreting visual information, Writing- writing analytical essays and argumentative**,** Vocabulary suitable words to be used in analytical and argumentative essays, Grammar- subject-verb agreement.

UNIT-5 CRITICISM & ENQUIRY **9**

Review Listening- ink talks and longer talks, Speaking- talking about one's project proposal, Reading- reading essays on construction, buildings, different schools of architecture, Writing- writing proposals, Vocabulary- related vocabulary, Grammar- Cohesive devices.

TOTAL: 45 Hours

OUTCOME:

Learners will be able to speak convincingly, express their opinions clearly, initiate a discussion, negotiate, and argue using appropriate communicative strategies; Read different genres of texts, infer implied meanings and critically analyze and evaluate them for ideas as well as for method of presentation; Listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings; Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.

REFERENCES:

1. English for Architects and civil Engineers- Sharon Hendenreich Springer, 2014 ISBN 978-3-658-030-63- (e-book)
2. www.cambridgescholars.com
3. www.robertdwatkins.com/Englishworkbook.pdf
4. Chris Mounsey: Essays and Dissertation (Oxford University Press) February 2005.
5. Sidney Greenbaum: The Oxford English Grammar (Oxford University Press) March 2005

6. Krishna Mohan and Meera Banerji: Developing Communication Skills (Mac Millan india Ltd)[2000]
7. Krishna Mohan and Meenakshi Raman: Effective English Communication (Tata Mc-Graw Hill)[2000]

		L	T	P	C
16AR 101	**HISTORY OF INDIAN ARCHITECTURE & CULTURE**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES

- To impart knowledge of evolution with regarding to Indian architecture, in India as this is an integrated expression of art, culture, vernacular material and techniques of the place.
- To influence the architecture students to develop designs that are rooted in this country and suitable to the lifestyle of its people.
- To develop an appreciation of our varied culture and the resulting architectural productions which are unique in time and place.

UNIT-1 BUDDHIST ARCHITECTURE & EVOLUTION OF THE HINDU TEMPLE 8

Evolution of Ashoka's School of art and architecture - Examples - Ashokan Pillar at Sarnath and Sanchi stupa. Chaitya hall and Vihara - Buddhist rock cut architecture Examples - Chaitya hall at Karli, Viharas at Nasik.

Evolution of Hindu Temple - Early shrines of the Gupta and Chalukyan periods - Tigawa temple and Ladh Khan temple - Development of the Indo-Aryan & Dravidian style - Examples - Papanatha and Virupaksha temple at Pattadakal .

UNIT-2 DRAVIDIAN STYLE TEMPLES 10

Dravidian style – Definition / explanation of Mandapas & Rathas. Masonry temples & Rock cut architecture of Pallavas - Shore temple and five rathas at Mahabalipuram and Kailasanathar temple at Kanchipuram - Dravidian Orders –evolution of Dravidian orders under pallavas, chola's and pandya's. Example of Chola style - Brihadeeswara temple at Tanjore - Evolution of Gopuram & temple complexes – Example of Pandyan style - Meenakshi amman temple, Madurai.

UNIT-3 INDO-ARYAN STYLE OF TEMPLES 8

Classification of Indo-aryan temples, Salient features of an Indo Aryan Temple - Examples of Orissa style - Lingaraja temple at Bhuvaneshwar & Sun temple at Konarak - Example of Madhya style - Khandarya Mahadev temple at Khajuraho - Example of Gujarat style - Surya Temple at Modhera.

UNIT-4 ISLAMIC ARCHITECTURE 10

Classification of Islamic architecture in Indian, religious and secular typologies of Islamic architecture Features of an Indian mosque, concept of squinch arches,and its variation. Examples under imperial style - Qutb Complex, qutb minar and Alai Darwaza at Delhi - Tomb of Ghiasuddin Tughlaq, Lodi garden at Delhi. Characteristics of the provincial styles in different regions through examples - Punjab style - Tomb of shah Rukni Alam - Bengal style - Chota sona masjid at Gaur - Gujarat style - Jami masjid at Ahmadabad - Deccan style – Golgumbaz at Bijapur and Charminar at Hyderabad.

UNIT-5 MUGHAL ARCHITECTURE 9

Characteristics of Mughul architecture, planning, dome construction, materials. Development of the Mughal style under different rulers - Humayun- Humayuns Tomb at Delhi, Akbar- examples -Fatehpur Sikhri (planning, Buland darwaza, Diwani Khas, Tomb of Salim Chisti) and Akbars Tomb at Sikandara. Shahjahan - examples - The Taj Mahal, at Agra - Red Fort at Delhi (Diwan-i- Aam, Diwani khas, Mumtaz mahal and Rang mahal).

TOTAL: 45 Hours

OUTCOME:

The students will develop the ability to sketch plans, sections, elevations and other architectural details of heritage buildings in India. He will also know about the design variables, construction techniques materials and craftsmanship used in the historical buildings of this great country.

REFERENCES:

1. Percy Brown, Indian Architecture (Islamic Period) - Taraporevala and Sons, Bombay, 1983
2. Satish Grover, The Architecture of India (Buddhist and Hindu period*)*, Vikas Publishing House, New Delhi, 1981

3. Satish Grover, The Architecture of India (Islamic*)* Vikas Publishing House Pvt. Ltd., New Delhi, 1981.
4. Christopher Tadgell, The History of Architecture in India, Longman Group, U.K. Ltd., London, 1990
5. A.Volwahsen, Living Architecture - India (Buddhist and Hindu), Oxford and IBM, London, 1969.
6. George Mitchell, Monuments of India, Vol I, Buddhist, Jain, Hindu; Penguin books, 1990
7. Gateway to Indian Architecture, Guruswamy Vaidyanathan, Edifice Publication, 2003
8. Architecture of the Islamic World - George Michell - (its history and social meaning), Thames and Hudson, London, 1978.
9. Islamic Architecture, Form, Function and Meaning, Robert Hillenbrand, Edinburgh University Press, 1994

		L	T	P	C
16AR 103	**ART STUDIO**	0	0	5	3
	Prerequisite - Nil				

OBJECTIVES:

- To develop presentation skills, visual expression and representation, imaginative thinking and creativity through a hands on working with various mediums and materials.
- To familiarize the students with the various mediums and techniques of art through which artistic expression can be achieved.
- To familiarize students with the grammar of art by involving them in a series of free hand exercises both indoor and outdoor to understand form, proportion, scale, etc.
- To involve students in a series of exercises which look at graphic and abstract representations of art.
- To involve them in a series of exercises which will help them experiment with form and volume.

UNIT-1 DRAWING **25**

Introduction to art – Elements and principles of drawing – Types of drawing – Visual effects of drawing – Scale drawing – Composition – Approach to sketching – Study of light, shade and shadow. Exercise involving Indoor and outdoor sketching – Spot sketching - Drawing from imagination – Study of 3 D effects through light and shade from nature – Tools and materials – Illustration – Study of human being and mobiles.

UNIT-2 PAINTING - I **15**

Introduction of painting – Colour – Properties of colour – Colour schemes – Types of colours - Application and visual effects of colour. Exercise involving Study of colour – Properties of paper, brush and other tools – Basic washes – 3D effects from still-life, nature and built environment using mono chromatic and multi colour.

UNIT-3 PAINTING - II **15**

Indoor and out door painting – Rendering techniques Exercise involving Water colour – Water soluble colour pencil – Tempra – Acarali – Water soluble oil colour – Oil colour – Pen and ink – Brush – Air brush – Mixed mediums – Study of multi colour and 3D effects from nature and built environment.

UNIT-4 SCULPTURE **10**

Introduction of sculpture –Sculpture using various materials such as clay, plaster of Paris, paper mache, and wire.

UNIT-5 APPLIED ART **10**

Graphic representations – Visual composition and Abstraction- Exercises involving Logo design, collage, calligraphy and printing. `

TOTAL: 75 Hours

OUTCOME:

Getting students to mastery in sketching and expression through forms. They are exposed to various mediums and techniques. The skill and knowledge gained through the subject is most useful to their profession

REFERENCES:

1. Webb, Frank, “The Artist guide to Composition”, David & Charles, U.K., 1994.
2. Drawing a Creative Process”, Ching Francis, Van Nostrand Reinhold, New York, 1990.
3. Alan Swann, Graphic Design School, Harper Collins, 1991.
4. Moivahuntly, “The artist drawing book”, David & Charles, U.K., 1994.
5. Arundell (Jan) Exploring sculpture, Mills and Boon, London/Charles, T. Brand Ford Company, U.S.A.

6. The art of drawing trees, heads, colours, mixing, drawing, landscape and painting, water colour,oil colour, etc. – The Grumbacher Library Books, New York –1996.
7. Caldwell Peter, “Pen and Ink Sketching”, B.T. Bats ford Ltd., London, 1995.

		L	T	P	C
16AR 105	**ARCHITECTURAL DRAWING - I**	0	0	5	3
	Prerequisite - Nil				

OBJECTIVES:

- To Introduce the concepts and fundamentals of Architectural Drawing.
- To familiarize the students with the language of architecture & buildings as two dimensional and three dimensional representations.

UNIT-1 INTRODUCTION TO DRAWING **15**

Introduction to drawing instruments and their use

Lettering and Dimensioning: Introduction to architectural lettering, styles, proportion and scale, Methods of dimensioning

Lines: different types of lines, their thickness and applications in architectural drawing.

Scale: Architectural Metric scale, necessity of scaled drawing, selection of scale while preparing architectural drawing.

UNIT-2 GEOMETRICAL DRAWING **15**

Introduction to plane geometry: Construction and development of planar surface – square, rectangle, polygon etc.

Construction of conic sections: Ellipse, parabola and hyperbola

Introduction to orthographic projection: Representation of geometric solids in terms of plan, elevation and side elevation in first angle projection – exercise on simple solids.

UNIT-3 ISOMETRIC VIEW / AXONOMETRIC VIEW **15**

Isometric view: Isometric view of solids, Isometric application in building – buildings with different shape and different types of roofs to include pitched roof, hipped roof, flat roof, vault, cone, dome etc. Conversion of solids to orthographic projection and vice versa.

UNIT-4 BUILDING ELEMENTS AND BUILDING COMPONENTS **20**

Building Elements: Techniques of representing building elements such as doors, windows, steps, chajja, porch, canopy, balcony, parapet, foundation, walls, roofs, column, staircase, difference of levels, furniture fittings such as hand wash basins, WC pans, traps etc. on drawings in plan, elevation and section.

Material Indications: Symbolic representation of building materials as specified by Indian Standard Code of practice.

Building components: Components of a simple residential building through plan, elevation and section.

UNIT-5 ISOMETRIC VIEW / AXONOMETRIC VIEW OF BUILDINGS **10**

Isometric view: Exterior view of a simple residential building showing all building components.

Axonometric view: Axonometric view of a room interior showing all interior components.

TOTAL: 75 Hours

OUTCOME:

Students will understand the concepts of architectural drawing as well as representation skills; Will develop an understanding on the building representation in 2D and 3D.

REFERENCES:

1. K. Venugopal et al., “Engineering Drawing + AutoCAD”, New Age International Publishers, 2010.

2. Francis D.K Ching, “Architectural Graphics- Fifth Edition”, John Wiley and Sons, New Jersey, 2009.
3. N.D. Bhatt et al., “Engineering Drawing” (53rd Edition), Charotar Publishing House, Anand, India, 2014.
4. Morris et al., “Geometrical Drawing for Art Students”, Universities press, 2012.
5. Leslie Martin C., “Architectural Graphics”, The Macmillan Company, New York, 1978.

		L	T	P	C
16AR 107	**BASIC DESIGN**	0	0	12	6
	Prerequisite - Nil				

OBJECTIVES

- To learn the fundamentals of design – elements and principles that govern the aesthetic aspects of design.
- Experimental understanding on graphic elements and compositions in 2D / 3D.
- Experimental understanding of colours, textures and compositions
- Experimental understanding of form building
- Experimental understanding of design

UNIT-1 GRAPHIC ELEMENTS, COMPOSITIONS & COLOURS – 2D **36**

Impart elements and principles of design theory with sample exercises supported by illustrative ppt presentations.

Exercises:

1. Dots, lines, shapes & forms
2. Hatching patterns
3. 2D compositions with geometric & organic shapes
4. Impart colour theory with sample exercises supported by illustrative ppt presentations.
5. Colour compositions on 2d compositions.
6. Textures replacing colours.

UNIT-2 3DCOMPOSITIONS / COLOUR & TEXTURE APPLICATIONS **36**

Make a vivid ppt presentation on various materials with varying textures

Exercises:

1. Texture portfolio
2. 3D compositions with geometric & organic forms (model)
3. Color compositions on 3D compositions (model)
4. Texture applications& material compositions (model)

UNIT-3 2D & 3D ABSTRACTIONS **36**

Make a vivid ppt presentation on abstraction process with ample samples

Exercises:

1. 2D image abstraction (colour, black/white, grey tone/mono colour, texturise)
2. 3D image abstraction (colour, black/white, grey tone/mono colour, texturise)
3. 3D model abstraction (colour)

UNIT-4 FORM BUILDING(MODELS) **36**

Make a vivid ppt / video presentation on form building models with ample samples

Exercises:

1. 3D sculpture exercises (additive & subtractive forms – solids & voids)
2. Space frame model using a linear module (space creation)
3. Origami models (space creation + solids & voids)
4. Life scale models (group)

UNIT-5 PRODUCT DESIGN **36**

Make a vivid ppt presentation on product design with emphasis on user, purpose, material & form.
Exercises:

1. Small scale product design
2. Life scale furniture design (group)
3. 3D model abstraction (colour)

TOTAL: 180 Hours

OUTCOME:
Students will Understand the characteristics of various graphic elements, shape and form.
Learning the art of 2D & 3D compositions with the use of elements and applying principles of design. Learn the art of colour compositions applying colour theory principles; Learn the art of texture compositions; Learn the art of abstraction - 2D & 3D; Learn the art of sculpture – by additive & subtractive forms; Learn the art of form building – geometric & organic forms.
Learn Product Design.

REFERENCES:

1. Charles Wallschlacgerm& Cynthia Busic-Snyder, Basic Visual Concepts and Principles for Artists, Architects and Designers, McGraw Hill, New York 1992.
2. V.S. Pramar, Design fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Delhi, 1973.
3. Francis D. K. Ching - Architecture - Form Space and Order Van Nostrand Reinhold, Co., (Canada), 1979.
4. Elda Fezei, Henry Moore, Hamlyn, London, New York, Sydney, Toronto, 1972.
5. Exner. V, Pressel. D, Basics Spatial Design, Birkhanser, 2009.

II SEMESTER

		L	T	P	C
16AR 102	**STRUCTURAL BASICS IN ARCHITECTURE**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- This course provides students with a basic knowledge & overview of structural systems used in buildings.
- The course emphasizes the historical development of structural form and the evolution of structural design knowledge, from Gothic cathedrals to long span structural systems.
- It also delivers the basic principles of structural mechanics & how bending moment and shear force diagrams are used to analyze simple structural behaviour.

UNIT-1 OVERVIEW OF VARIOUS TYPES OF STRUCTURAL SYSTEMS IN ARCHITECTURE **9**

Simple RCC frame system used for small span buildings –vaults & domes of various spans – types of trusses & their application for industrial buildings – various configurations in rcc roof slab – RCC folded plate roofing systems – Various types of shell structures – Space frames in steel used for large spans – Tensile structural systems – Suitable examples for all these structural systems.

UNIT-2 BASIC STRUCTURAL CONCEPTS **9**

Various types of loads in buildings – compression and tension in structures – Effect of temperature & settlement on buildings – properties of structural materials such as steel, concrete, rcc, wood, brick & stone – Evolution of the concept of span from architectural history: Temples in Egypt, Greece, South India, Indo-aryan etc – Vaults & domes in historical buildings: Domes in Pantheon& Hagia Sophia, Vaults duriing Romanesque, Gothic & Mughal period .

UNIT-3 REINFORCED CEMENT CONCRETE STRUCTURES **9**

Simply spanned rcc slabs & load bearing walls – one way & two way rcc slabs – coffer slab, grid beam slab in rcc – vault, dome, pitched roof, hipped roof in rcc -simple rcc frame structural system up to 5 floors – their application with suitable examples. Concept &various configurations of the folded slab roof – Concept of thin shells – simply curved & doubly curved shells, interpenetrating cylindrical shells, hyperbolic paraboloids, hypars etc.

UNIT-4 STEEL STRUCTURAL SYSTEMS **9**

Simple steel truss - members in tension & compression – various types of trusses – Warren, Pratt, Fink, Howe, Bowstring, mansard etc – girders & trusses in saw tooth roof configuration, Steel frame domes – Fuller, Geodesic, schwedler dome configurations - Concept of Space frames: various types, single, double & triple layered tubular steel space frames & their use as long span structural system – Concept of tensile roofing system – saddle roof, mast supported, Arch supported, Point supported & their combinations – tensegrity roof structures.

UNIT-5 STRUCTURAL MECHANICS **9**

Composition and Resolution of Forces – concept of stress / strain, young's modulus, typical stress strain curve for ductile & rigid materials, Hooke; law – Theory of Bending Moment & Shear force – their application in buildings for various loads & support conditions (Simply supported, Cantilevered, continuous etc). Simple problems on the above mentioned.

TOTAL: 45 Hours

OUTCOME:

Development of the basic understanding of the forces & its effects in simple building structural systems in Steel and rcc and the ability to choose a suitable system for a particular architectural design. Knowledge about the structural behaviour of various roof configurations & built form is also gathered.

REFERENCES:

1. Henry .J.Cowan, Forrest Wilson, *Structural Systems*, Van Nostrand Reinhold Company, New York.
2. Bjorn N Sandekar et al, The structural basics of Architecture – 2nd edition, Routledge, Newyork, 2011.
3. Mario Salvadori, Robert Heller, *Structure in Architecture*, Prentice International Series in Architecture, New Jersey, 1963.
4. Wayne Place, Architectural structures, John wiley & sons, Canada, 2007.
5. Curt Siegel, Structure and Form in Modern architecture, Reinhold publishing corporation, Newyork, 1962.
6. Rowland J. Mainstone, Developments in Structural form, Architectural press, Oxford, 1975.

		L	T	P	C
16AR 104	**HISTORY OF WESTERN ARCHITECTURE AND CULTURE**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To impart Knowledge about the development of architecture in the ancient Europe and the culture and context which produced it such as climate, religion, social practices & the politics.
- To gain information about the evolution of architectural form & space with reference to Technology, Style and Character using sketches as the principal method of learning - about the prehistoric world, Ancient Egypt, West Asia, Greece ,Rome, Medieval times and Renaissance period.

UNIT-1 PRIMITIVE SHELTER & RIVER VALLEY CIVILIZATIONS 7

Study of shelter in the Neolithic period, Study of the influences & architectural character of ancient Egypt with relevant examples of Tomb (Pyramid of Cheops) & Temple structures (Temple of Ammon), Study of Mesopotamian architecture with examples of Ziggurat, Sargon palace & Palace of Persepolis.

UNIT-2 CLASSICAL GREECE & ROMAN ARCHITECTURE 10

Evolution of City states in Greece, the Hellenic & Hellenistic art & architecture, Evolution of the classical orders & the features of the Greek temple, the building of the Acropolis with one outstanding example of Doric (Parthenon), Ionic (Erechtheon) & Corinthian. Public architecture: Theatre of Epidaurus and Agora, Optical illusions in Greek architecture.

Formation of Roman republic & Empire & influence of geology, culture & lifestyle. Roman architectural character using concrete, marble, travertine etc & masonry types used for walls. Tuscan & Composite orders, Roman forums and basilicas – methods of Vault & Dome construction with examples of Pantheon, Thermae of Caracalla, Colloseum, & Basilica of Constantine.

UNIT-3 EARLY CHRISTIAN, BYZANTINE & ROMANESQUE ARCHITECTURE 10

Spread of Christianity, the evolution of early Christian Church form from the Roman basilica (St.Clemente), Centralized plan concept (St.San Vitale, Ravenna). The creation of eastern & western roman empire, the development of domes & pendentive, Byzantine architectural character with study of St.Sophia (Hagia Sophia) at Istanbul.

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)- Development of vaulting.

UNIT-4 GOTHIC ARCHITECTURE IN FRANCE, ITALY & ENGLAND 8

Development of Gothic architecture in France, evolution of Gothic Cathedral & structural system using vaulting & flying buttress, the example of Notre dame cathedral at Paris. Gothic architecture in Italy & the example of Milan cathedral. Development of English gothic vaulting & the example of Westminster Abbey at London.

UNIT-5 RENAISSANCE ARCHITECTURE IN EUROPE 10

Idea of rebirth and revival of classical architecture & the development of art & science. Italian renaissance character: Early renaissance & the example of Palazzo Ricardi, Brunelleschi & urban renaissance style exemplified at the Florence cathedral and High renaissance period. Michelangelo & St.Peters cathedral at Rome. The villa architecture of Palladio exemplified at Villa Capra, Vicenza. French renaissance during classical & rococo period – examples of Chateau de Chambord & Louvre Palace.

English Renaissance – works Sir Christopher Wren (St.Pauls Cathedral, London) & Inigo Jones (Banqueting House at Whitehall)- Domestic architecture during Elizabethan, Jacobean & Georgian period.

TOTAL: 45 Hours

OUTCOME:

An understanding about the spatial and stylistic qualities associated with European architecture, and the various factors that produced it such as planning for activities, use of materials & technology and principles of composition such as massing, proportion and detailing.

REFERENCES:

1. Sir Banister Fletcher, A History of Architecture, CBS Publications (Indian Edition), 1999.
2. Spiro Kostof – A History of Architecture – Setting and Rituals, Oxford University Press, London, 1985.
3. Leland M Roth; Understanding Architecture: Its elements, history and meaning; Craftsman House; 1994.
4. Pier Luigi Nervi, General Editor – History of World Architecture – Series, Harry N. Abrams, Inc.Pub., New York, 1972.
5. S.Lloyd and H.W. Muller, History of World Architecture – Series, Faber and Faber Ltd., London, 1986.
6. Gosta, E. Samdstrp, Man the Builder, Mc.Graw Hill Book Company, New York, 1970.
7. Webb and Schaeffer; Western Civilisation Volume I; VNR: NY: 1962.
8. Vincent Scully: Architecture; Architecture – The Natural and the Man Made : Harper Collins Pub: 1991.

		L	T	P	C
16AR 106	**THEORY OF ARCHITECTURE**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To make the students learn the theoretical aspects of design and understand how it could be manifested in architectural design.
- To understand the ideologies from works of architects and planners.
- To learn the design communication skills to enable to put forth the design ideas in graphics and literature.

UNIT-1 PRIMARY ELEMENTS IN ARCHITECTURE 8

Geometry in Architecture - points, lines and shapes.-Linear elements -planar elements and volumetric elements. Patterns in nature and building design.Order to chaos.Regularity and irregularity.

UNIT-2 FORM AND SPACE 8

Elements of spatial definition – form defining space - elevated base plane, depressed base plane-vertical and horizontal elements defining space -depth and density of space - spatial juxtaposition and interpenetration – spatial characteristics of elementary shapes - qualities of architectural space - degree of enclosure. Analysis of works of F.L Wright and Le Corbusier.

UNIT-3 ORDERING PRINCIPLES AND MEANING IN ARCHITECTURE 10

Ordering Principles-Axis -Symmetry -Hierarchy - Datum -Rhythm -Repetition -Transformation - Measure and balance – spaces on human scale - proportion -- Golden Section, Le modular, Fibonacci series – Renaissance Theories - anthromorphism and architecture - Figure and ground, positive and negative spaces.

UNIT-4 CONCEPTS IN ARCHITECTURAL DESIGN 10

Concept – types- Ideas and Intent in design - Intuitive, contextual, Iconic, Experiential, Symbolic, Modular. Ideologies and philosophies of architects'. Case Studies. Importance of graphics in architectural design. Study of site plans, city plans, conceptual drawings. Interpretation of architects' conceptual sketches and the respective buildings.

UNIT-5 RESPONSIVE AND RESPONSIBLE ARCHITECTURE 9

Phenomena of perception – looking, listening, feeling and moving through architecture –light and shade – Architecture as Making Frames -, Environmental-Energy based design.

TOTAL: 45 Hours

OUTCOME:

An objective awareness of the natural and built environments (past and present) through critical observation. An understanding of the basic nature and vocabulary of the design process. An understanding of their own power of analysis and the ability to derive ideas from abstract thinking. An ability to develop a critical approach to architectural thinking and the ability for students to criticize their own work.

REFERENCES:

1. Francis D.K.Ching, Architecture-Form, Space and Order, Van Nostrand Reinhold Company, New York, 2007.
2. Simon Unwin, Analysing Architecture, Rouledge, London, 2003.

3. V.S.Pramar, Design Fundamentals in Architecture, Somaiya Publications Private Ltd., New Delhi, 1973.
4. Peter von Meiss -Elements of architecture - from form to place, Spon Press 1992.
5. Steen Eiler Rasmussen - Experiencing architecture, MIT Press, 1964.

		L	T	P	C
16AR 108	**BUILDING MATERIALS & CONSTRUCTION - I**	0	0	5	3
	Prerequisite - Nil				

OBJECTIVES:

- The primary focus is on materials and systems, their properties and applications, and their intrinsic relationship to structural systems and environmental performance.
- Students will develop a fundamental understanding of: the relationship of materiality to construction systems and techniques.

UNIT-1 BUILDING MATERIALS –I **5**

Stones, Wood, Bricks & Clay products

Basic knowledge of different building materials available, Contextual relevance- what are buildings made of- Natural and artificial materials- where they are used. Materials shall be studied by understanding their properties & applications.

UNIT-2 BASIC BUILDING COMPONENTS **22**

Cross section of a G+1 building to understand foundation, plinth beam ,flooring, sill, lintel, roof beam and slabs, parapet & weathering course

Foundation: typical types of foundation in stone, brick & RCC.

Walls: Brick masonry- types of bond: English, Flemish & rat trap bond for one brick and half thick wall for corners and T- Junctions, Garden wall bond & ornamental bond.

Arches: arches in brick and stone (flat, segmental, semi circular and pointed)

UNIT-3 DOORS, WINDOWS & VENTILATORS-I **18**

Doors: Braced, panel flush doors, carved entrance doors and partially glazed doors. Windows: casement window (without mullion), bay window, & French window. Ventilator: louvered & top hung ventilator.

UNIT-4 ROOFS **16**

Simple configurations and details of various forms of roofs in RCC

Details of madras terrace roof, pitched roof and hipped roof with pan tiles and Mangalore tiles.

UNIT-5 TOILET & FURNITURE DETAILS **14**

Toilet: Planning consideration for different toilet layouts, cross section of a toilet to understand the details. Alternate approaches to toilet details in relation to fittings & fixtures. Special consideration for children & differently abled.

Furniture details: TV shelf, showcase & room divider, dressing ward robe, kitchen cupboard & wall cabinets.

TOTAL: 75 Hours

OUTCOME:

Students will examine the critical role of materials and methods for the design and construction of buildings. Understanding the basic components of a building with its construction details such as Foundation Footing (stone, brick & RCC), Wall section (plinth, floor, sill, lentil, roof & parapet), Roofs (flat, sloped, Pyramid & dome), Fenestration (Different types of doors, windows & ventilators) and Interior details (wardrobe, kitchen cabinet, and TV shelf& show case).

REFERENCES:

1. W.B. Mckay – Building construction Vol. 1 (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition).
2. S.C.Rangwala – Engineering materials (Fortieth edition, 2013) – Charotar Publishing pvt.ltd.
3. Harold B.Olin, John L. Schmidt – Construction principles, Materials and Methods – John Wiley & Sons, Inc.
4. Dr. B.C Punmia – Building construction (10th edition) - Laxmi Publications.
5. Roy Chudley (Author), Roger Greeno (Author) -construction Technology, 4th Edition.
6. S.K. Duggal- Building materials (4th edition) – New age international publishers.
7. Bureau of Indian standards - Handbook on Masonry Design and Construction (First Revision).
8. Hans Bans –Building construction details practical drawing, 2001.

		L	T	P	C
16AR 110	**ARCHITECTURAL DRAWING - II**	0	0	5	3
	Prerequisite - Architectural Drawing - I				

OBJECTIVES:

- To involve students in a number of exercises that will help them develop the skill of representation in advance drawing techniques involving perspective, sciography and Measured Drawing.

UNIT-1 ELEMENTS AND PRINCIPLES OF PERSPECTIVE DRAWING 10

Principles of perspective drawings and understanding of all relevant terms like Picture Plane, Centre line of vision, Eye Level, Height Line, Vanishing Points, Cone of Vision, Station Point, Horizon line, Ground line etc.Basic principles of perspective drawing , Various types of perspectives - One point perspective, Two point perspective and three point perspective

Exercise on two point exterior perspectives of simple objects and their combination by changing positions of picture plane and stand point in form of Worms eye view, Normal eye view and Birds eye view.

UNIT-2 TWO POINT PERSPECTIVE VIEW OF BUILDINGS 20

Construction of Two point perspective grid.

Exercise on Two point Perspective of building Interior by Direct projection Method / Approximate Method. Exercise on Two point Perspective of building exterior by Direct projection Method / Approximate Method. Exercise on Sectional perspective

UNIT-3 ONE POINT INTERIOR PERSPECTIVE 10

Construction of One point perspective grid

Exercise on One point Interior view of any room viz Bed Room, Kitchen, Drawing room etc. by Direct projection Method / Approximate Method

UNIT-4 SCIOGRAPHY 15

(a) Principles of Shades and shadows - Techniques of drawing shades and shadows of lines, planes, solids and Architectural Building Elements.

(b) Exercise on Shade and shadow of typical building on Elevation and Site Plan

(c) Exercise on Shades and Shadows in perspective.

UNIT-5 MEASURED DRAWING 20

Measured drawing of single storied building(s) : To measure and draw the Ground Floor Plan along with plot boundaries, four side elevations, two sections, block plan, site plan of existing single storied building (maximum of 100.0 sq. mtrs. Plinth area). In addition to this drawings shall be prepared based on examples of buildings by giving a sketch design (maximum of 100.0 sq. mtrs. Plinth area). Exercises to include application of shade and shadow in site plan, elevation and exterior perspective.

TOTAL: 75 Hours

OUTCOME:

Students will learn design representation skills through perspective drawing and sciography

They will learn to effectively visualize their design ideas from various angles and present on paper. They will also acquire knowledge of the various drawings which effectively communicate their ideas as designers in addition to preparation of measured drawing.

REFERENCES:

1. Robert W.Gill, "Perspective From Basic To Creative", Thames and Hudson, London, 2006
2. Francis D.K Ching, "Architectural Graphics- Fifth Edition", John Wiley and Sons, New Jersey, 2009.
3. John Montague, "Basic perspective Drawing A Visual Approach", John Wiley and Sons, New Jersey, 2009.
4. Milind Mulick, "Perspective", Jyotsna prakashan, 2006
5. Ernest Norling, "Perspective Made Easy", Dover publications, 1999
6. M.G. Shah & C.M. Kale, "Principles of Perspective Drawing", Asia publishing House, 1965

		L	T	P	C
16AR 112	**ARCHITECTURAL DESIGN STUDIO - I**	0	0	14	7
	Prerequisite - Nil				

PURPOSE: Learning the basic principles of space making and form building through intensive design studio practice.

PROJECTS:

1) A single space interior design project - 35%
2) A small scale project with a site - 65%

LEARNING OBJECTIVES:

- Learning architectural design fundamentals (Relationship between people to built forms & built forms to environment)
- Experimental learning of analytical study, pre-design process, design process & conceptualization stages in design.
- Experimental learning of design communication skills – verbal, script & graphics

PROCESS:

- Fragment the pre design process and help students build formats/templates for analysis.
- Guide to derive architectural design data through various studies
- Guide to program and to understand the causes for architectural spaces
- Guide to understand context & its influences
- Guide to learn and experiment the design process
- Guide to conceptualize the design/evolution of architecture
- Guide to document the design project

PROJECT 1: SINGLE SPACE DESIGN **90**

Enlighten the student on the design project overview & the design process to be followed through relevant presentations.

Present an analytical discourse on an identical architectural design project covering

a) Architectural elements & relevant architectural terms
b) Space planning (response to user & purpose with logic & application of standards)
c) Material, form & structure
d) Aesthetics & visual perceptions

PROJECT 2: SMALL SCALE MULTI-SPACE DESIGN **120**

Enlighten the student on the design project overview & the design process to be followed through relevant presentations.

Present an analytical discourse on an identical architectural design project covering

a) Architectural, elements, spaces & terms
b) Noted projects & architects
c) Space planning (response to user & purpose with logic & application of standards)
d) Site planning (contextual response, response to the natural environment, response to views + general site planning guidelines)
e) Material, form & structure

f) Aesthetics & visual perceptions.

TOTAL: 210 Hours

REFERENCES:

1. Mike W.Lin, Drawing & Designing with confidence – A step by step guide, John Wiley &sons,USA,1998
2. Criss B.Mills, Designing with models : A Studio guide to making & using architectural models, Thomson & Wadsworth, USA,2000.
3. DeChiara and Callender, Time saver standards for building types, Mc Graw hill company
4. Bousmaha Baiche & Nicholas Walliman, Neufert Architect's data, Blackwell science ltd.
5. Ramsey / Sleeper,National Architectural graphic standards, The American Institute of Architects
6. Space Planning Basics - Mark Karlen

III SEMESTER

		L	T	P	C
16AR 201	**MECHANICAL AND ELECTRICAL SERVICES**	3	0	0	3
	Prerequisite – Nil				

OBJECTIVES:

- To study the electrical systems and their applications in various building typology
- To understand the basic lighting concepts and their application for various spaces.
- To impart knowledge about the HVAC systems and their application in various building typology.

UNIT-1 ELECTRICAL SERVICES **9**

Electrical systems – Basic of electricity – single/Three phase supply , Electrical installations in buildings – Types of wires, Wiring systems and their choice, planning electrical wiring for building – Main and distribution boards, HT transformers, electrical panel rooms, cable trenches, controls, Circuits, fuses, main switch box, meter box, circuit breakers. uninterrupted power supply, inverters, protective devices in electrical installation – Earthing for safety – Types of earthing – ISI Specifications, Lighting protection Electrical installations in various building types, Residential bungalow, apartments, commercial recreational buildings and factory buildings etc. Market survey of Electrical materials and electrical appliances.

UNIT-2 ILLUMINATION AND LIGHTING DESIGN **7**

Principles of Illumination: Basics of Lighting Technology and Terminology, Classification of lighting –Artificial light sources. Systems of lighting such as direct, indirect, diffused etc.,

Design of modern lighting : Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types. Seeing light: learn about vision and perception, color, and - understanding shade and shadow

Light fixture :Controlling light, luminaire optics and distributions - introduction to light fixture materials and construction, and components Light in Architecture and the Psychology of Light, Lighting Design Concepts, Lighting in terms of energy efficiency, ergonomic aspects and aesthetic aspects.

Light a surface: Horizontal and vertical - present various approaches and techniques - finding light fixtures. For a Task - present various approaches and techniques, simple lighting effects.

Calculating Light: learn light metrics and calculation methods - review energy and the environment Lighting calculations

Lighting Design :Residential lighting, Office and Corporate Lighting, Hospitality Lighting Design, Health Care/Institutional Lighting Design, Lighting for Stores, Lighting Common Spaces

UNIT-3 AIR CONDITIONING **11**

Components of an air-conditioning system & their function-.Refrigeration cycle, different systems of AC, window, split, small stand alone unit, air cooled direct expansion system used for auditorium spaces, chill water systems with air handling units, estimating the cooling load of different spaces in a building, duct lay out for both types of systems. Intelligent building systems in air conditioning, Sick building syndrome, effect of pollutants, improving air quality in air conditioned buildings.

UNIT-4 PUMPS AND MACHINERIES **9**

Pumps: Different types of Pumps, working, applications. Water pumps, sewage pumps, Centrifugal, Reciprocating pump, turbine (diagrams & functioning only)
Compressors:Different types of Compressors and their applications.
Lifts And Escalators : Elevators (Lifts) and escalators – Brief history-types of Elevators like traction, Hydraulic etc., Double-decker, sky lobby, lift lobby, lift interiors etc., Definition and components Elevatoring a building: environmental considerations i.e., location in building, serving floors, grouping, size, shape of passenger car, door arrangement etc., Service requirements: Quality of service, quantity of service, time, passenger handling capacity, space and physical requirements, machine room spaces and its typical layout Escalators – Definition, Application. Location and arrangement in buildings. Space requirement, Conveyor belts-movement of passengers and goods

UNIT-5 ELECTRICAL AND AC DUCT LAYOUT OF SIMPLE BUILDINGS 9

Fixtures and accessories used in electrical installation –Preparing an electrical layout for part of design project, with load calculations. Design consideration for AC plant location and size. Ac ducting layout for an office building, shopping complex.

TOTAL : 45 Hours

OUTCOME:

The student understand the importance, installation and working of essential services in buildings, and a way building services help in generating a cleaner and healthier built environment.

REFERENCES:

1. Heating, Cooling, Lighting: Sustainable Design Methods for Architects Oct 13, 2014 by Norbert Lechner DEWALT Plumbing Code Reference: Based on the 2015 International Plumbing and Residential Codes (DEWALT Series)
2. Electrical Wiring Residential Jan 1, 2011by Ray C. Mullin and Phil Simmons
3. Architectural Lighting: Designing with Light and Space (Architecture Briefs),May 4, 2011 by Hervé Descottes and Cecilia Ramos.
4. HVAC Design Sourcebook Oct 26, 2011, by W. Larsen Angel

		L	T	P	C
16AR 203	**CLIMATE AND BUILT ENVIRONMENT**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To study human heat balance and comfort.
- To understand the air pattern around buildings and the effect of wind on design and siting of buildings.
- To explore the students to the various design strategies for building in different types of climatic zones.

UNIT-1 CLIMATE &THERMAL COMFORT **9**

Global climatic factors, elements of climate, classification & characteristics of tropical climates, site climate and Urban climate - Thermal balance of the human body, Thermal comfort indices – Effective temperature, CET, calculation of comfort zone & determination of overheated& under heated periods.

UNIT-2 SOLAR GEOMETRY &DESIGN OF SUNSHADING DEVICES **9**

Apparent movement of the sun, sun path diagrams (solar chart) - Solar angles, Shadow angles, solar shading masks. etc - Exercises on plotting isopleths, transfer of isopleths to solar chart, fitting a shading mask over the overheated period & design of sun shading devices for different orientations.

UNIT-3 PRINCIPLES OF THERMAL DESIGN IN BUILDINGS **9**

Thermal quantities – heat flow rate, conductivity (k–value) & resistivity, conductance through a multilayered body, surface conductance, transmittance – calculation of U value – convection , radiation , concept of sol-air temperature & solar gain factor - exercises in heat loss & heat gain under steady state 39 conditions -.Periodic heat flow in building – time lag & decrement factor & its application in selection of appropriate materials for walls & roof. Effect of Insulation & cavity on time-lag.

UNIT-4 VENTILATION & DAY LIGHTING **9**

Functions of ventilation – stack effect due to the thermal forces, wind velocity – wind rose diagram, wind pressure - Air movement through building & around buildings – factors affecting indoor air flow , wind shadow etc. - The nature of light , its transmission , reflection – colored light, the Munsell system – photometric quantities – illumination, day lighting prediction – the daylight design graph.

UNIT-5 DESIGN FOR CLIMATIC TYPES **9**

Building design & layout planning consideration for warm humid, hot dry, composite & tropical upland climates, climatic data sets – analysis – climate graph – the Mahoney tables & its recommended specification - Exercises on design of small Buildings. for various climates.

TOTAL: 45 Hours

OUTCOME:

The students will understand the thermal balance in human beings, designing climate responsive structure and conceptual understanding of air flow in buildings.

REFERENCES:

1. O.H. Koenigsberger, Manual of Tropical housing and building – Climatic Design, Orient Longman, Chennai, 1975.
2. M .Evans – Housing, Climate &Comfort , Architectural Press, London ,1980.
3. E.Schild&M.Finbow – Environmental Physics in construction & its application in Architectural Design ,Granadar , London, 1981.
4. B.Givoni - Man, Climate & Architecture, Applied Science, Essex 1982.
5. Donald Watson & Kenneth labs – Climatic Design – Mcgraw hill NewYork 1983.
6. A.Konya- Design Primer for Hot Climates, Architectural Press, London, 1980.

		L	T	P	C
16AR 205	**VERNACULAR ARCHITECTURE AND SETTLEMENTS**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- The students will have knowledge of the planning aspects, materials used in construction, constructional details and settlement planning of the settlements in various parts of the country.

UNIT- 1 INTRODUCTION TO VERNACULAR ARCHITECTURE **9**

Definition and classification of Vernacular architecture – Vernacular architecture as a process-differentiating vernacular architecture from contemporary architecture – Survey and study of vernacular architecture: methodology- Cultural and contextual responsiveness of vernacular architecture: an overview

UNIT-2 APPROACHES AND CONCEPTS **9**

Approaches and concepts to the study of Vernacular architecture – Introduction to Kutcha architecture and Pucca architecture- Regional topography, local climate, settlement pattern and architecture in different part of the region., TOQ construction, Dhajji Diwari Construction, local material.

UNIT-3 DRAVIDIAN SOUTH **9**

Planning aspects, materials of construction, Constructional details & Settlement Planning of Kerala – Nair houses(Tarawads), Kerala Muslim houses(Mappilah houses), Temples, Palaces and theaters – Thattchushastra. TamilNadu – Toda Huts, Chettinad Houses (Chettiars) & Palaces Karnataka – Gutthu houses (land owning community), Kodava ancestral home (Aynmane) Andhra Pradesh –Kaccha buildings Religious practices, beliefs, culture & climatic factors influencing the planning of the above.

UNIT-4 WESTERN REGION **9**

Planning aspects, Materials used, Constructional details, Climatic factors influencing the planning of Jat houses for farming caste, Bhungas(Circular Huts) - Brahmin Caste and their Havelis- Hindu Merchants and their Havelis from Rajasthan, Shekawati Haveli of Rajasthan Rathva Tribe of Gujarat , Chodri Tribe, Sociology and Planning of North Gujarat Sciology and Planning of Rural South Gujarat , Sociology and Planning of Saurashtra , Sociology and Planning of Muslim Community in Gujarat, Woodwork Details of Gujarat- Pol houses of Ahmedabad - Primitive forms, Symbolism, Colour, Folk art etc in the architecture of the deserts of Kutch. Vernacular architecture of Goa.

UNIT-5: NORTHERN AND EASTERN INDIA **9**

Kashmir – Typical Kutcha houses, mosque, Dhoongas(Boathouses), Ladakhi houses, bridges Himachal Pradesh – Kinnaur houses . Arunachal and their settlement pattern , Thadou Kukis Community of Manipur Uttar Pradesh – Domestic housing of Uttar Pradesh Bengal – Bangla (Rural house form), Aat Chala houses – change from Bangla to Bungalow, Kutcha & Pucca architecture of Bengal. Nagaland – Naga houses & Naga village, Khasi houses Factors influencing the planning aspects, materials of construction & constructional details of the above.

TOTAL: 45 Hours

OUTCOME:

The students will able to identify and conserve the untapped values and principles in the evolution of new theories for architectural creations. Highlight needs and various ways of vernacular building research, analysis, presentation of finding and its application to contemporary building.

REFERENCES:

1. Traditional buildings of India, Ilay Cooper, Thames and Hudson Ltd., London
2. Architecture of the Indian desert, Kulbushan Jain & Meenakshi Jain, Aadi Centre, Ahmedabad
3. The Royal Palaces of India, George Michell, Thames and Hudson Ltd., London
4. Chettiar Heritage, S.Muthiah, Meenakshi Meyappan, Visalakshmi Ramaswamy, Lokavani-Hallmark Press Pvt. Ltd., Chennai
5. Encyclopaedia of Vernacular architecture of the World, Cambridge University Press
6. Haveli – Wooden houses & mansions of Gujarat, V.S.Pramar, Mapin Publishing Pvt. Ltd., Ahmedabad
7. The Tradition of Indian architecture – Continuity & Controversy – Change since 1850, G.H.R.Tillotsum, Oxford University Press, Delhi
8. VISTARA – The architecture of India, Carmen Kagal. Pub : The Festival of India, 1986.
9. House, Form & Culture, Amos Rappoport, Prentice Hall Inc, 1969.

		L	T	P	C
16AR 207	**BUILDING MATERIALS & CONSTRUCTION - II**	0	0	5	3
	Prerequisite - Nil				

OBJECTIVES:

- To study more about doors, windows, different types of materials and their use in construction.
- They also focus on the different water proofing, damp proofing materials& technology available & their application.
- Also to expose the students to the vertical transportation -designing& detailing.

UNIT-1 BUILDING MATERIALS – II **5**

Non-Ferrous metals & Plastics

Properties and uses of aluminum, zinc, lead, copper etc., Thermoplastics and thermosetting plastics – properties and architectural uses of plastics. Structural plastics – Reinforced plastics and Decorative laminates-plastic coatings, Adhesives and sealants – Modifiers and Plasticizers – Fabrications of plastics.Primary plastic building products for walls, roof and partitions.Secondary building products for rooms, windows, roof lights, domes, gutters and handrails.

UNIT-2 RURAL AND TRADITIONAL MATERIALS **16**

Foundation and walls: foundation and wall in stone masonry (Random rubble, SR & Ashlar) foundation and walls in stabilized mud Rammed earth and Compact earth blocks. Various types of details for walls with bamboo and casuarinas

Roofs: Details of thatched roof with casuarinas/ bamboo / CEB frame work. Details of palm and hay roof with casuarinas / bamboo/ CEB

UNIT-3 DOORS, WINDOWS & VENTILATORS-II **18**

Aluminum &UPVC: Aluminum windows and doors -Horizontal sliding, louvered & casement windows and ventilators Aluminum in interiors: aluminum frames, partitions glazing & panels – hinged and pivoted aluminum doors.

UNIT-4 VERTICAL TRANSPORTATION- I **20**

Rcc Staircases: Brick Types according to profile – straight flight, doglegged, quarter turn half turn, bifurcated, spiral & Helical. Structural system for the above types sloped slab, cranked slab, cantilevered slab, continuous slab& folded plate, foundation for RCC stair case. Vertical transportation, Designing and detailing for physical and handicapped.

UNIT-5 DAMP PROOFING AND WATER PROOFING **16**

Damp proofing: Hot applied and cold applied – Emulsified asphalt, Bentonite clay. Butyl rubber, silicones, Vinyls, Epoxy resins and metallic water proofing materials, their properties and uses. Water proofing: water proofing membranes such as rag, asbestos, glass felt, plastic and synthetic rubber vinyl, butyl rubber, neoprene, polyvinyl chilnide – prefabricated membranes sheet lead, asphalt their properties and uses. Application: application of the above in basement floor, swimming pool, and terraces.

TOTAL: 75 Hours

OUTCOME:
Students will get exposed to rural and traditional materials and their construction techniques**.** They learn to represent the different building components, Staircases, damp proofing & water proofing in various applications through relevant drawings.

REFERENCES:
1 .W.B. Mckay – Building construction Vol. 1 (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition)
2. R.Chudley&R.Greeno – Building Construction Handbook, ninth edition
3. S.C.Rangwala – Engineering materials (Fortieth edition) – Charotar Publishing pvt.ltd
4. P.C Varghese, "Building Materials", Prentice Hall of India Pvt. Ltd., New Delhi, 2005
5. Use of Bamboo and Reeds in building Construction – UNO Publications

		L	T	P	C
16AR 209	**ARCHITECTURAL DELINEATION & MODEL MAKING**	0	0	6	3
	Prerequisite - Nil				

OBJECTIVES:
- To develop the ability to appreciate the three dimensional implications of design and to introduce the students to the techniques of model making.
- To introduce the students to basics of rendering , presentation skills &model making with various materials.

UNIT-1 DIAGRAMMING **10**
Types of diagrams – graphic metaphors, are diagram, matrix diagram, network diagram, bubble diagram, circulation diagram, analytical diagram, schematic etc. – symbol, sign, arrows, parti – concept diagrams.

UNIT-2 PRESENTATION TECHNIQUES **25**
Techniques of rendering with pen &ink- graphical representation of buildings & entourage such as Trees, Lawns, Shrubs, Paving, Pathways, Flower Bed, Water Pools, Human Figures, Vehicles etc. 33 Exposure to other medium of presentation - Pencil, Pastel Colors, and water Colors, Color Theory and Use of Colors in Presentation.

UNIT-3 INTRODUCTION TO MODEL MAKING AND BLOCK MODELLING **25**
Introduction to concepts of model making and various materials used for model making Preparation of base for models using wood or boards . Introduction to block models of buildings (or 3D Compositions) involving the usage of various materials like Thermocol, Soap/Wax, Boards, Clay etc.

UNIT-4 DETAILED MODELLING **20**
Making detailed models which includes the representation of various building elements like Walls, Columns, Steps, Windows/glazing, Sunshades, Handrails using materials like Mountboard, Snowwhite board, acrylic sheets. Representing various surface finishes like brick/stone representation, stucco finish etc. Various site elements – Contour representation, Roads/Pavements, Trees/Shrubs, Lawn, Water bodies, Street furniture, Fencing etc.

UNIT-5 MODELS OF STRUCTURAL SYSTEMS **10**
Making models of the various structural systems used in buildings like Space frames – using Match sticks, wires . Different forms of shell roofs using POP, Clay, Soap Tensile structures using fabric.

TOTAL :90 Hours

OUTCOME:
The students will understand the three dimensional forms such as cubes, pyramids, cones etc., Using different types of materials such as paper, card board, mount board, balsa wood, wax, plaster of Paris etc.

REFERENCES:

1. BENN, the book of the house ,Errnest Benn limited London
2.Jannsen, Constructional Drawings & Architectural models, Kari Kramer Verlag Stuttgart, 1973.
3. Harry W.Smith, The art of making furniture in miniature, E.P.Duttor Inc., New York, 1982.
4. Thames and Hudson Manual of Rendering with Pen and Ink-Robert W Gill.

		L	T	P	C
16AR211	**ARCHITECTURAL DESIGN STUDIO - II**	0	0	14	7
	Prerequisite - Nil				

PURPOSE: Design exercises that explore Architecture as responding to site conditions & personal issues such as occupation, life style, religion etc.

OBJECTIVES:

- Students are encouraged to develop an understanding of how design responds to site conditions such as size, shape, access, view, topography, landscape features etc.
- The aim is also to explore light quantity &quality in spaces for study and interaction.
- Sketching, model making and photography for analysis and design is essential.

PROJECT 1: TOWN HOUSE / VILLA **90**

Study of contemporary practices & design for town houses and villas in urban areas, to sensitize the students towards life style, individual preferences, space – activity relationship and exploration of how material, color, texture and light affect the quality of spaces is the main focus. It is also intended as an exercise in massing & configuration of façade elements such as the balancing of solids & voids, adoption of a system of proportioning and elements of contemporary detailing. This design exercise will also attempt to involve the student in the built form / open space relationship & explore the connectivity between indoor & outdoor spaces.

PROJECT 2: NUSERY / PRIMARY / SECONDARY SCHOOL **120**

Case studies on contemporary trends in school design to know how various architects have responded to the design program, site conditions, student age group etc. The project aims to enlighten the student on how the school design responds to various education philosophy and grooming methods. The analysis of important functional aspects such as space adequacy, circulation in the built form and play areas, locating the various spaces according to functional adjacency and careful design of toilet areas is intended. The objective is to also optimize the variables of the physical environment such as thermal comfort, daylighting and noise control in design.

TOTAL: 210 hours

OUTCOME:

The student develops the ability to successfully design independent residential buildings in urban areas with concepts that respond to personal preference & taste, family lifestyle, culture & site conditions. Moreover, in the second project the scholar develops the capacity to design school buildings that respond to a particular educational philosophy, to generate concepts for various activities and explore the integration of classroom spaces with outdoor play areas.

REFERENCES:

1. Time saver standards for building types, DeChiara and Callender, McGrawhill company.
2. Neufert Architect’s data, BousmahaBaiche& Nicholas Walliman, Blackwell science ltd.

3. National Building Code – ISI.
4. Time saver standards for landscape architecture – Charles W Harris – McGraw Hill.
5. New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press.

IV SEMESTER

		L	T	P	C
16AR 202	**REINFORCED CONCRETE STRUCTURES**	3	0	0	3
	Prerequisite - Structural basics in Architecture				

OBJECTIVES:

- The objective is to foster understanding of the basic principles of limit state design in reinforced concrete structural systems and the interpretation of detail structural drawings for the purpose of construction.
- The scope of the course is limited to understanding the structural behaviour of RCC buildings from an architect's perspective and hence does not delve into the process of detailed structural analysis & design which is the forte of the structural engineer.

UNIT I: FOUNDATIONS IN BUILDINGS **9**

Soil load bearing capacity – concept of RCC spread footing - Types of R.C.C. foundation – Individual, Combined, Strip footings – Raft foundation (Theory only) – Eccentric footings with projection on one side only- the situations in which the various footings are used – friction pile foundation used in clayey soil (section & understanding of the principle)- pile foundation used in sandy soil & the pile foundation used in multi-storeyed buildings (section & principle only).Interpretation of typical structural details in foundation drawings .Site visits necessary for understanding the above.

UNIT II: ROOF SLABS & STAIRCASE **9**

Exposure to the basic design concepts of Limit state method of design – recommendations in the code book -Classification of slabs – Estimation of loads – Design of one way, two way, circular and continuous slabs using SP – 16(Theory only). Interpretation of reinforcement details in a typical structural drawing for one way, two way slab & continuous slab. Understanding the reinforcement details for a RCC waist slab in dog legged staircase and for a folded slab staircase using typical structural drawings.

UNIT III: BEAMS & LINTELS **9**

Exposure to the basic design concepts - Estimation of loads on beams – Transfer of load from slab to beam – Understanding the design of simply supported beams, cantilevered &continuous beams using code coefficients & detailing using SP-16 for the design(Theory only). Steel detailing of beams for earthquake proofing (section only) – the function of plinth beam belt & continuous lintel belt –ring beam for RCC dome roof, typical reinforcement detail for waffle (coffer) slab (section only).Site visits to understand typical details in RCC slabs & beams.

UNIT IV: COLUMNS **9**

Understanding the estimation of loads on columns – Load transfer from slab and beam to columns. Structural behaviour of Long and short columns –Distinction between rectangular and circular columns – Difference between columns subjected to uni-axial and those subjected to bi-axial bending. Knowledge about the design of columns using column interaction diagrams (Theory only) – Use of SP-16 for reinforcement detailing. Interpretation of typical structural drawing for columns& footings.

UNITV: FLAT SLABS **9**

Understanding the situations in which flat slabs are used - advantages of flat slab construction. Components of flat slab – Configuration of columns – Design of flat slab by direct design method as per BIS codes (Theory only). Site visit to understand flat slab construction.

TOTAL:45 Hours

OUTCOME:
The architecture student should understand the process of limit state method of structural design off RCC structures and should develop the ability to interpret structural drawings to the contractor in the building site.

REFERENCES:

1. Victor E. Sauoma, Structural Engineering- analysis & design, University o Colorado,2011.
2. Simha .N.C and Roy .S.K, Fundamentals of Reinforced Concrete, S.Chand & Co. Ltd, Delhi,2001

		L	T	P	C
16AR 204	**CONTEMPORARY WESTERN ARCHITECTURE**	3	0	0	3
	Prerequisite - History of Western Architecture & Culture				

OBJECTIVES:
- To provide the student an in-depth knowledge of modern design philosophies in the evolution of innovative architectural forms and designs.

UNIT -1 MODERNISM **9**
Context of Origin; Characteristics; Key Movements – Arts and Crafts, Constructivism, Bauhaus, Expressionism, International Style, Minimalism, Brutalism. Works of notable conforming Architects: Frank Lloyd Wright, Ludwig Mies van der Rohe, Le Corbusier, Walter Gropius, Erich Mendelsohn, Oscar Niemeyer and Alvar Aalto.

UNIT -2 PHENOMENOLOGY AND POST MODERNISM **9**
History of Origin; Aims and characteristics; Key themes – Place, Movement, Super graphics, Regionalism, Building materials in their sensory aspects, Dwelling; Influence on Architectural practice;Metaphoric architecture. Works of notable conforming Architects: Charles Moore, Peter Zumthor, Steven Holl, Philip Johnson, Michael Graves.

UNIT-3 ANTI-ARCHITECTUREANDDECONSTRUCTIVISM **9**
Origin and influences breaking away from Modernism and Postmodernism, Influences of Analytical Cubism, Constructivism and futurism; Deconstructivist philosophy– metaphysics of presence, trace and erasure; Influence on Architectural practice; Criticisms ; Works of notable conforming Architects: Frank Gehry, Daniel Libeskind, Rem Koolhaas, Peter Eisenman, Coop Himmelb(l)au, and Bernard Tschumi.

UNIT-4 NEO-MODERNISM AND OTHER POST-POST MODERN REACTIONS **9**
Origin and prevalence, Characteristics, Other associated movements: Metamodernism, Remodernism, Neo-futurism, Neo-Historism. Works of Richard Meier, Charles Gwathmey, I.M. Pei, Tadao Ando, Arata Isozaki, ZahaHadid, and Santiago Calatrava.

UNIT-5 DIGITALMORPHOGENESIS **9**
Topological Space, Isomorphic Surfaces, Motion-Kinematics and Dynamics, Key-Shape Animation, Parametric Design, and Genetic Algorithms.Implications - Mass customization, unpredictability, uncertainty, and indeterminacy. Works of Greg Lynn, Bernhard Franken, Marcos Novak, Bernard Cache, John Frazer.

TOTAL :45 Hours

OUTCOME:
The student acquires general understanding of the basic terminology of the subject and know the chronology and typology of western architecture in the 20th/21st century. Identify the stylistic

characteristics of different epochs in different western countries and relate them to structural/tectonic systems, architectural theories and socio-economic and cultural conditions of their emergence. The student know the life and masterpieces of the most renowned western architects.

REFERENCES:

1. Kenneth Frampton, Modern Architecture: A Critical History, Thames and Hudson, London.
2. Sigfried giedion, .Space time and Architecture: The Grwoth of a New tradition, Harvard University Press.
3. Tzonis Alexander, Santiago calatrova , International Publications, January 2005, New York.
4. Steele James, Hassan fathy - The complete works , London : Thames and Hudson.

		L	T	P	C
16AR 206	**ENVIRONMENTAL SCIENCE**	2	0	0	2
	Prerequisite - Nil				

OBJECTIVES:

- To gain knowledge on the importance of environmental education and ecosystem.
- To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution.
- To understand the treatment of wastewater and solid waste management.
- To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence.
- To be aware of the national and international concern for environment for protecting the environment

UNIT -1 ENVIRONMENTAL EDUCATION AND ECOSYSTEMS 6

Environmental education: Definition and objective. Structure and function of an ecosystem – ecological succession –primary and secondary succession - ecological pyramids – pyramid of number, pyramid of energy and pyramid of biomass.

UNIT-2 ENVIRONMENTAL POLLUTION 6

Environmental segments – structure and composition of atmosphere - Pollution – Air, water, soil , thermal and radiation – Effects – acid rain, ozone layer depletion and green house effect – control measures – determination of BOD, COD, TDS and trace metals.

UNIT-3 WASTEMANAGEMENT 6

Waste water treatment (general) – primary, secondary and tertiary stages. Solid waste management: sources and effects of municipal waste, bio medical waste - process of waste management.

UNIT-4 BIODIVERSITY ANDITS CONSERVATION 6

Introduction: definition - genetic, species and ecosystem diversity – bio diversity hot spots - values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - threats to biodiversity: habitat loss, poaching of wildlife – endangered and endemic species of India, Conservation of biodiversity: in-situ and ex-situ conservations.

UNIT-5 ENVIRONMENTAL PROTECTION 6

National concern for environment: Important environmental protection acts in India – water, air (prevention and control of pollution) act, wild life conservation and forest act – functions of central and state pollution control boards - international effort – key initiatives of Rio declaration, Vienna convention, Kyoto protocol and Johannesburg summit.

TOTAL: 30 Hours

OUTCOME:

		L	T	P	C
16AR 208	**WATER SUPPLY, SANITATION & FIRE FIGHTING IN BUILDINGS**	2	0	2	3
	Prerequisite - Nil				

The student develops a comprehensive knowledge in environmental science, environmental issues and the management.

REFERENCES:

1. Kamaraj.P & Arthanareeswari.M, "Environmental Science – Challenges and Changes", 4th Edition, Sudhandhira Publications, 2010.
2. Sharma.B.K. and Kaur, "Environmental Chemistry", Goel Publishing House, Meerut, 1994.
3. De.A.K, "Environmental Chemistry", New Age International, New Delhi, 1996.
4. Helen P Kavitha, "Principles of Environmental Science", Sci tech Publications, 2nd Edition, 2008.
5. Eugene P Odum, Fundamentals of Ecology, Cengage learning, 2004.

OBJECTIVES:

- To Study Water supply, treatments and plumbing system for all type of buildings.
- To Study Waste water management systems and the drainage for various building typology.
- To understand solid waste management systems with respect to urban and rural set up.
- Applications of all the above systems to a Buildings, Small Campus and a Residential
- neighborhood.

UNIT-1 WATER SUPPLY **10**

Sources of water supply – Water Quality - Water requirements for different types of buildings and for town, simple method of removal of impurities, Rainwater harvesting to include roof top harvesting, type of spouts, sizes of rainwater pipes and typical detail of a water harvesting pit. System of supply - continuous and intermittent supply, sump, overhead tanks, pumps, distribution pipes, cold water and hot water supply for single and multi-storeyed buildings. Pipes sizes, types – GI , CPVC, Copper, Cast Iron (CI) Pipes, Steel Pipes, Asbestos Cement (AC) Pipe, Concrete Pipes fittings, valves, types of taps.

UNIT-2 DRAINAGE AND SEWAGE DISPOSAL **12**

Recycling/Reuse of Wastewater, Systems of drainage – separate, combined and partially separate system, surface drainage, sizes and construction, system of plumbing - single stack , one pipe system, one pipe partially ventilating system and two pipe system.

House drainage – principles, traps-floor trap, multi-trap, gully trap, grease and oil trap,: Anti siphonage pipe, Types of fixtures and materials, Arrangements of fixtures in a bathroom. Design of Septic tank, Treatment and disposal of septic tank effluents – Design of soak pit and dispersion trench, Biological filter, up flow anaerobic reactors

Sewage treatment technologies : Activated sludge process, Membrane bioreactors, Packaged treatment plants, Root zone treatment system, Decentralized Wastewater Treatment Systems (DEWATS), Soil Bio technology

UNIT-3 SOLID WASTE DISPOSAL **10**

Solid waste management : Generation of Solid waste, Collection & Transportation of solid waste to the secondary/ locality storage/community bins, Storage of solid waste at locality level, Transport of solid waste to dumping sites and treatment plants, Treatment and Dumping of Solid Waste, Methods of Disposal of solid waste

Approaches to Solid Waste Management : Waste minimization / reduction at source, recycling, waste processing (with recovery of resources and energy), waste transformation(without recovery of resources) and disposal on land.

Emerging processing technologies : Vermicomposting, Biogas from MSW, Pyrolysis (including plasma arc technology), refuse derived fuel, Bio reactor landfill - Biomethanation plant at koyambedu

wholesale vegetable market Chennai, Door-to-door collection, transportation and waste processing services by Exnora Green pammal.

UNIT-4 FIRE FIGHTING SERVICES **12**

Fire extinction / suppression technology : constituents of fire, methods of fire extinguishment, Extinguishing agents / media Fire suppression equipment & installations (active fire protection measures) : fire detection and alarm systems (automatic fire alarm systems), Heat Detectors, Smoke detectors, flame detectors, Choice / Selection of Fire Detectors

Hydrant systems / installations- stand post and Underground type of hydrants (Sluice Valve Type). Internal Hydrant Systems - Dry-riser system, Wet-riser system, Wet-riser-cum -down-comer system and Down-comer-system. Sprinkler system types. Early Suppression Fast Response Sprinklers (ESFR), water spray systems, automatic drencher systems.

Other Extinguishing Systems - Foam, CO_2 and Halon Fire System, first aid firefighting equipment : portable fire extinguishers and its types, graphic symbols for fire protection plans, fire protection - safety signs

Building fire hazards : Relationship of Building Fire Hazards with Life Safety, Hazards from Building Contents, Fire Load and Fire Effects, Exposure Hazard, Hazards from Interior Finish and services. Hazards in Buildings from Collapse, Explosion. Life hazards in buildings and means of escape / egress / exit : Factors affecting Life Safety of Occupants, Growth and Spread of Fire and Smoke, Design Considerations of Means of Exit, Exit Requirements, Lifts and Escalators as Means of Exit, Occupant load, capacities of exits, internal staircases, fire lifts, Fire fighting Shafts, external stairs, horizontal exit, illumination of exits ,fire compartmentation, fire tower, refuge areas and ramps.

UNIT-5 PLUMBING AND FIRE FIGHTING LAYOUT OF SIMPLE BUIDINGS **16**

Designing of toilet blocks in residential and public buildings, showing complete details of fittings and plumbing required for water supply and drainage.

Designing and preparing a complete water supply and drainage layout of an academic Architectural design project, with all required calculations.

Analyse a Fire fighting layout for a commercial building, Reflected ceiling plan of smoke detectors / sprinklers, etc. for a multi-storeyed building.

TOTAL: 60 Hours

OUTCOME:

1. Students have thorough understanding on water supply and waste water management, in residential unit, small campus, commercial buildings.
2. Students are able to produce plumbing and fire fighting layouts for various building typology.
3. Students are aware of best practices for Solid waste management.

REFERENCES:

1. Birdie G. S and Birdie J. S Water Supply & Sanitary Engineering, Dhanpat Rai Publishing Company (p) Ltd (2010)
2. Sanitary Engineering by R S Deshpande
3. S. K. Garg , Water Supply Engineering: Environmental Engineering v. khanna publishers 2010
4. Charangith shah, Water supply and sanitary engineering, Galgotia publishers.
5. Kamala & DL Kanth Rao, Environmental Engineering, Tata McGraw – Hill publishing company Limited.
6. Technical teachers Training Institute (Madras), Environmental Engineering, Tata McGraw Hill publishing Company Limited.
7. M.David Egan, Concepts in Building Fire Safety.
8. V.K.Jain, Fire Safety in Building 43
9. National Building Code 2005.
10. Toolkit for Solid Waste Management, Jawaharlal Nehru National Urban Renewal Mission, November 2012, Ministry of Urban Development Government of India.

		L	T	P	C
16AR 210	**BUILDING MATERIALS & CONSTRUCTION - III**	0	0	5	3
	Prerequisite - Nil				

OBJECTIVES:

- To expose the students to the preparation of concrete, construction methods, special concrete and concreting methods, the properties and use of architectural glass
- To develop knowledge of the various exterior finishes and advanced structural systems

UNIT-1 BUILDING MATERIALS – III **5**

Cement, Concrete & Glass

Cement: Composition of cement, properties & various types of cement and their uses. Concrete: proportioning of concrete, grading of aggregates, water cement ratio, and workability of concrete Estimating yield concreting. **Concreting**: form work for concreting, mixing, transporting and placing, consolidating and curing of concrete. Various types of cement concrete, the properties and uses. **Types of Special concrete and concreting method. Glass**: - Classification of glass, types of glass, physical properties and uses of glass, special varieties of glass and Architectural glass.

UNIT -2 CONCRETE **20**

Introduction to RCC framed structures, concrete in foundation: types of footing – Isolated, combined, continuous, strip raft & piles. Concrete slabs: One-way, two ways, continuous & cantilever. Concrete beams: singly reinforced, doubly reinforced, cantilever & continuous beams. Detailing of walls, roofs and flooring, foundations using RCC in simple framed buildings including detailing of RCC beams, columns, slabs (one way slabs, 2-way slab, continuous, flat slab etc.,), detailing of apertures (lintels, sunshades, arches etc.,) Exercises of the above through case studies and drawings of selected building types.

UNIT-3 DOORS, WINDOWS & VENTILATORS-II **18**

Aluminum &UPVC: Aluminum windows and doors -Horizontal sliding, louvered & casement windows and ventilators Aluminum in interiors: aluminum frames, partitions glazing & panels – hinged and pivoted aluminum doors.

UNIT-4 CLADDING SYSTEMS & FINISHES **18**

Types of Cladding systems – Stone, timber, weatherboard, Fiber cement, Brick, Vinyl, Metal (aluminum composite panels (ACP), Precast concrete cladding panel, Curtain wall, Rain screen wall system. Exterior insulation& Finishes, Wall Finishes – Paints, Varnishing, distemper, plastering, wall dadoing, wall paper, veneer, stucco, whitewashing and color washing for walls. Floor finishes – Ceramic Tiles & Wood.

UNIT-5 ADVANCED CONSTRUCTION SYSTEMS **14**

Advancded construction systems and techniques developed by research organizations in India - Design and detailing of building materials and components developed by research organizations like CBRI, SERC, NBO, and BMTPC.

TOTAL: 75 Hours

OUTCOME:
The students will gain knowledge of material properties and construction techniques of Glass, concrete, RCC and special concreting methods and appropriate material and technology. They get exposed to the advanced construction systems developed by research organizations in India.

REFERENCES:

1. Dr. B.C Punmia – Building construction (10th edition) - Laxmi Publications
2. Roy Chudley (Author), Roger Greeno (Author) -construction Technology, 4th Edition
3. Francis D.K.Ching – Building Construction illustrated, 4th edition, 2015
4. M.S Shetty, concrete Technology, S.Chand publishing

		L	T	P	C
16AR 212	**ARCHITECTURAL DESIGN STUDIO - III**	0	0	14	7
	Prerequisite - Nil				

PURPOSE: Design exercises that explore Architecture as responding to Social issues such as community, culture, religion, politics etc. Students familiarize themselves with designing for special groups such as the villagers, elderly, and the handicapped.

OBJECTIVES:
- Students are encouraged to develop an understanding of the settlement lay out in villages, the rural occupations & life style, the housing typology, the locally available materials & craftsmanship and the integration of landscape with the built environment.
- Workshops on building with rammed earth, adobe, compressed stabilized earth blocks, bamboo and other cost effective technologies help the student to explore rural housing solutions.

PROJECT 1: VILLAGE SURVEY & RURAL HOUSING **120**

Study of the physical, socio economic and cultural aspects of a selected village by conducting various surveys to understand the settlement pattern, housing stock and amenities that are existing or required – To understand the linkages between Occupation, Social structure and Religious beliefs and its physical manifestation in the form of the settlement – Identification of a suitable Design intervention that would improve the quality of life – Ex. Design of housing prototypes for a particular community / occupation using rural building materials & cost effective technology. Design exercise may include the design of any facility required such as Primary health center / Community hall / Farm training center etc.

PROJECT 2: DESIGN OF COMMUNITY FACILITIES **90**

Community facilities – Design of Community hall, Nursing home, Youth hostel, Old age home etc encourage the student to explore concepts an agglomeration of simple spaces with particular emphasis on the special needs of elderly, handicapped etc. It also focuses on the bioclimatic approach to the design of the building envelope i.e articulation of openings, choice of materials for roof & walls of different orientations etc. Concepts integrating the use of passive, active & hybrid solar technologies with the design proposals are encouraged.

TOTAL: 210 Hours

OUTCOME:
Scholars are encouraged to understand the various aspects of the built environment in rural areas and strive for housing solutions that suit their occupation, society & economy. They also develop the capacity to design barrier free environments to address the needs of special groups. Experiments with the bio climatic approach to design will develop the ability to design buildings in response to climate.

REFERENCES:

1. Time saver standards for building types, DeChiara and Callender, McGrawhill company.
2. Neufert Architect's data, BousmahaBaiche& Nicholas Walliman, Blackwell science ltd.
3. National Building Code – ISI.
4. Time saver standards for landscape architecture – Charles W Harris – McGraw Hill.
5. New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press.

V SEMESTER

		L	T	P	C
16AR 301	**STEEL STRUCTURAL SYSTEMS**	3	0	0	3
	Prerequisite - Structural basics in Architecture				

OBJECTIVES:

- 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.

UNIT- 1 PROPERTIES OF STEEL SECTIONS & TYPES OF CONNECTIONS 9

Introduction Properties of Indian standard rolled steel section – Use of IS 800 and steel tables – Permissible and stresses in tension, compression and shear. Connections: Welded and bolted connections – Types of failure – Design of welded and bolted connections for members subjected to axial forces. Site visit to a steelfabrication unit.

UNIT-2 TENSION AND COMPRESSION MEMBERS 9

Steel structures – Identification of tension and compression members in trusses & girders– Understanding the process of design of single angle and double angle sections in tension– understanding the method to design compression members – significance of Slenderness ratio– Design of simple and compound sections (Theory only) – Design of lacings and battens.

UNIT -3 STEEL BEAMS 9

Identification of principal & secondary beams in a structural system - Allowable stresses in Principal beams, General specifications for steel beams, Understanding the design process for simply supported & cantilevered beams – Comprehending the design of laterally supported beams.(Simple problems).

UNIT-4 STEEL TRUSSES & GIRDERS 9

Study of the various types of roof trusses & where a particular truss can be used – Selection of trusses according to the span – Estimation of gravity loads and wind loads on roof – Use of BIS and book SP-38 in analyzing and design of trusses – gusseted plate connections (Theory Only).

UNIT-5 INTRODUCTION TO LONG SPAN STEEL STRUCTURAL SYSTEMS 9

Space frame structural system in tubular steel – various types of connectors – single / double & triple grid space frames and the span for which they can be employed – various types of space frame configurations. Tensile structural systems using steel cables – Examples of space frame & tensile structural systems.

TOTAL: 45 Hours

OUTCOME:
The scholar gets familiar with the various methods used to design the different types of structural systems in steel. He also gathers knowledge about the famous buildings in which these systems are employed.

REFERENCES:

1. Ramachandra .S Design of steel structures Vol. I, Standard publication, New Delhi, 1992
2. Vazirani V.N, and RatwaniM.M,Steel structures, Khanna Publications, New Delhi, 1995
3. Handbook of Typified Designs for Structures with steel roof trusses, SP 38 (S&T) – 1987, BIS, NewDelhi, 1987
4. Code of practice for Earthquake Resistant Design and Construction of Buildings IS4326-1976, BIS,New Delhi.

		L	T	P	C
16AR 303	**CONTEMPORARY INDIAN ARCHITECTURE**	3	0	0	3
	Prerequisite - History of Indian Architecture & Culture				

OBJECTIVES:
- Introducing the students to various Design philosophies of colonial, post independent and contemporary architecture in Indian context.
- To provide the student an in-depth knowledge of modern design philosophies in the evolution of innovative architectural forms and designs.

UNIT-1 ARCHITECTURE IN COLONIAL INDIA & AFTER INDEPENDENCE 10
Early colonial period – Examples – St.Pauls Cathedral, Calcutta .–Architectural character of Indo-Sarcenic and Classical revival –University of Madras Senate House & Rippon Building, Central railway station Chennai.– Later Colonial period – Contribution of Edwin Lutyens & Herbert Baker to the Architecture of New Delhi – Rashtrapathi Bhavan & Parliament House.
. Criticisms on the modern movement in India, countering the stigma of colonialism, the neo-vernacular, the community architectural movement, integrating the new and the old, revivalism and post-modernism.

UNIT-2 MODERNISM 8
Modernism, utilitarian modernism and neo-modernism - Corbusier' works in India – Chandigarh Capital Complex and Town Planning - their influence on the modern rationalists; Louis Kahn's works in India- IIM Ahmedabad - their influence on architects. Philosophy and works of B.V.Doshi, Raj Rewal etc.

UNIT-3 POST INDEPENDENT ARCHITECTURE 12
Philosophy and works of Charles Correa, Achuyut Kanvinde, Anant Raje, H C Patel- Urban design projects –Walled city revitalisation and Sabarmathi river front development, Ahmedabad, Town planning of Gandhinagar.

UNIT-4 WORKS OF CONTEMPORARY ARCHITECTS 8
Architects and their ideologies and philosophies towards architecture - Sanjay Mohe, Sanjay Puri, CnT, Manit Rastogi, Jaisim, B.S.Bhooshan etc.

UNIT-5 CRITICAL REGIONALISM 7
Philosophy and works of Laurie Baker, Hassan Fathy, Geoffrey Bawa – Architectural response to regional climate, culture, local materials, crafts and technology.

TOTAL: 45 Hours

OUTCOME:
Student will get in-depth knowledge of modern design philosophies in the evolution of innovative architectural forms and designs.

REFERENCES:

1. Miki Desai, Architecture and independence, Oxford University Press, 2000.
2. Vikram Bhatt & Peter Scriver,Contemporary Indian Architecture: After the Masters, Mapin.
3. Lang, Desai, Desai – Architecture & Independence, Oxford University Press, New Delhi.
4. SarbjitBahgaet all, Modern Architecture in India, Galgotia Publishing Co., New Delhi.

		L	T	P	C
16AR 305	**BUILDING MATERIALS & CONSTRUCTION - IV**	0	0	5	3
	Prerequisite- Nil				

OBJECTIVES:

- To expose the students to different materials of construction & interior finishes, progressively and thereby enabling them to represent the different building components through relevant drawings.

UNIT-1 BUILDING MATERIALS –IV **5**

Steel: Properties and uses of cast iron, wrought iron, pig iron and steel. Market forms of steel: structural steel, stainless steel, steel alloys – properties and uses.

UNIT -2 STEEL **20**

Steel trusses – saw tooth roof truss with north light glazing, simple trusses in steel, and types of connections – to foundations, steel stanchion, and beams etc. Space frames:- single, double & triple layered tubular space frames with globe connections, Gates: collapsible gate, entrance gate, rolling shutter. Steel components: Steel doors, (hinged, sliding) steel windows (casement window & sliding window) Steel stairs (dog legged, spiral stair) steel hand rails and balustrade grill designs for windows

UNIT-3 WALL & FLOOR **16**

Wall : Modern masonry units - Fly ash brick, Aerated concrete blocks, Hollow concrete blocks & Hollow clay blocks **Floor finishes –** Indian patent stone (IPS), Terrazzo flooring , Granolithic flooring stone flooring, Resilient flooring & Carpeting.

UNIT-4 PARTITIONS & FALSE CEILING **18**

Partitions: simple paneled and glazed partitions – fixed sliding, folding, sliding & folding**. False-celing:** false ceiling of interior spaces using wood panels, glass, thermacol, gypboard, plaster of Paris, aluminum strips & perforated metal sheets.

UNIT-5 THERMAL INSULATION AND ACOUSTICS INSULATION **16**

Thermal insulation: vapor barriers and rigid insulations, blanket, poured and reflective insulation – properties and uses of spun glass foamed glass, cork, vegetable fibres Gypsum plaster of Paris, hydride gypsum properties and uses.

Acoustics insulation: porous, baffle and perforated materials such as Acoustic plastic, Acoustic tiles, wood, partition board, fibre board, cook, quilts and mats – their properties and uses – current developments. Applications of the above insulations in seminar hall, theatre and cold storage.

TOTAL :75 Hours

OUTCOME:

Students develop understanding of material properties and construction techniques of industrial buildings. Students gain knowledge on different interior finishes, progressively and to enable them to represent the different building components through relevant drawings.

REFERENCES:

1. W.B. Mckay – Building construction Vol. 1 (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition)
2. R.Chudley&R.Greeno – Building Construction Handbook, ninth edition
3. Francis D.K.Ching – Building Construction illustrated, 4th edition, 2015
4. R.Chudley&R.Greeno – Building Construction Handbook, ninth edition
5. Arthur Lyons, Materials for Architects and Builders – Oxfordshire, England,New York : Routledge, 2014
6. Don A.Watson, construction materials and process, McGraw Hill Co, 1972
7. Stephen Emmitt, Christopher A. Gorse - Barry's Advanced Construction of Buildings, 3rd Edition
8. The American Institute of Architects - Architectural Graphics standards – 11th edition

		L	T	P	C
16AR 307	**COMPUTER STUDIO I**	0	0	4	2

OBJECTIVES:

- The prime objective of this course is to introduce the fundamental concepts of computer systems; hardware and software and to develop basic skills in programming, Application of Information Technology tools and technical in Architecture.

Computer as a drafting tool: Productivity tools in CAD, organization of layers for working drawings, use of blocks and symbols hatch patterns. Dimensioning systems extracting of areas from drawings, concept of paper space plotting the drawings

Computer as a design tool: Repetition of forms mirroring, coping, and array etc. calculation of areas, volumes. Creating and using templates, blocks, and symbols and using them in architectural drawings. - Managements of large drawing files. - Working in a network environment-Security systems-converting drawing files into Internet compatible files.

Photoshop: Creating and saving images, basic image editing, Photoshop tool box and tools, using layers, special effects.

TOTAL: 60 Hours

OUTCOME:

Exposure to CAD and Photoshop will help students to produce their operation and critical parameters. Presentations for large gatherings, corporate clients-using CAD drawings, pictures, 3D images, text etc.

REFERENCES:

1. User manual & tutorials of Google Sketch Up software.
2. Auto CAD reference manual – Autodesk UNC, 1998
3. Auto CAD architectural users guide – Autodesk Inc. 1998
4. Sham Tickoo, Advance Technique in Auto CAD Re.14 – 1977 6. Sham Tickoo, Understanding Auto CAD – 14 (windows) – 1977
5. Photoshop CS Bible – Deke McClelland.
6. Adobe Photoshop 7.0 classroom in a book – Adobe creative team.

		L	T	P	C
16AR 309	**ARCHITECTURAL DESIGN STUDIO IV**	0	0	16	8
	Prerequisite - Architectural Design Studio - I				

OBJECTIVES:

Architecture as a design response to the culture of a place – building types such as the cultural center comprising of spaces such as the art gallery, auditorium for performing arts, library etc challenge the students to find artistic expressions with common building materials such as brick, concrete, steel & glass. The Material studio further encourages the scholar to find varied types of building components using the same building material. The design of commercial buildings integrating entertainment spaces is also intended, where the student is given exposure to the finer aspects of auditorium design

PROJECT I: MATERIAL STUDIO **120**

Studio project: Cultural Center / Multiplex with mall. The cultural center project exposes the student to the design issues such as effects by manipulating day light in the art gallery space, designing for clear sight lines and sound in the auditorium space & optimizing day light for reading in the library space. The additional challenge is to create spaces for fine arts & performing arts by creating artistic expressions with building materials such as brick, concrete etc. The multiplex project expects the student to the design issues involved in entertainment spaces such as cinema halls and the challenges in creating commercial spaces such as food courts, shops, gaming parlours etc. Moreover it exposes the student to contemporary materials such as steel, aluminum & glass.

PROJECT II: **HEALTHCARE BUILDINGS** **120**

Hospitals and Nursing homes are a special category of buildings where functional aspects such as planning, building services & the creation of a sterile environment become important design issues. This project aims to familiarize the student with the design of critical health care spaces such as operation theatres, diagnostic facilities, outpatient department and inpatient rooms. The modern trends in hospital design challenge the architect to create world class ambience.

TOTAL: 240 Hours

OUTCOME:

Experimenting with materials to find suitable artistic & commercial expressions and the learning of design methods for healthcare buildings will be two outcomes of this studio.

REFERENCES:

1. Richard Weston, Plan sections & elevations of key buildings of the 20th century, Lawrence king publishing, London,2004.
2. Time saver standards for building types, DeChiara and Callender, Mc Graw hill company
3. Neufert Architect's data, Bousmaha Baiche & Nicholas Walliman, Blackwell science ltd.
4. National Building Code – ISI

5. Time saver standards for landscape architecture – Charles W Harris – Mc Graw Hill
6. New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press

VI SEMESTER

		L	T	P	C
16AR 302	**SUSTAINABLE ARCHITECTURE & GREEN BUILDINGS**	3	0	0	3
	Prerequisite - Climate and Built Environment				

OBJECTIVES:

- To understand the concept of sustainability and sustainable development
- To familiarize the student with some of the acclaimed sustainable buildings designed within the past decade.
- To familiarize the students with the various rating systems for building practices with case studies.

UNIT -1 INTRODUCTION AND GLOBAL SCENARIO 9

Concept of Sustainability, sustainable development – Bruntland report – Ethics and Visions of sustainability.

UNIT-2 ECO SYSTEM 9

Eco system and food chain, natural cycles – Ecological foot print – Climate change and Sustainability.

UNIT-3 PLANNING AND DESIGN FOR SUSTAINABILITY 9

Selection of materials Eco building materials and construction – Bio mimicry, Low impact construction and recyclable products and embodied energy. Life cycle analysis. Energy sources – Renewable and non-renewable energy.

UNIT-4 CERTIFICATION & AUTHORITIES 9

Green building design – Rating system – LEED, GRIHA, BREEAM etc., case studies.
India: Gurgaon Development Centre-Wipro Ltd. Gurgaon; Technopolis, Kolkata; Grundfos Pumps India Pvt Ltd, Chennai; Olympia Technology Park, Chennai; World Bank Chennai Building Chennai; Bpo Park At Chennai. Others: the Chicago Center for Green Technology Chicago, USA; Green Operations Building White Rock, Canada; U.S.Courthouse, Orlando, USA.

UNIT-5 URBAN SCENARIO 9

Urban ecology, social and economic dimensions of sustainability, urban heat Island effects, sustainable communities – Case studies.

TOTAL: 45 Hours

OUTCOME:

The students are oriented about the concepts of ecosystem carrying capacity, ecological footprint, sustainability and sustainable development. The students are familiar with the various approaches to

achieving sustainable buildings and communities. The students understand the various incentives and evaluation systems for green buildings.

REFERENCES:

1. Dominique Gauzin – Muller "Sustainable Architecture and Urbanism: Concepts, Technologies and examples", Birkhauser, 2002.
2. Ken Yeang, "Ecodesign: A manual for Ecological Design", Wiley Academy, 2006.
3. Arian Mostaedi, "Sustainable Architecture : Low tech houses", CarlesBroto, 2002.
4. Sandra F.Mendler&Willian Odell, "HOK Guidebook to Sustainable Design", John willey and sons, 2000.
5. Richard Hyder, "Environmental brief: Pathways for green design", Taylor and Francis, 2007.
6. Brenda Vale and Robert Vale, "Green Architecture: Design for a sustainable future", Thames and Hudson 1996.
7. N.D. Kaushika, Energy, Ecology and Environment, Capital Publishing Company, New Delhi.

		L	T	P	C
16AR 304	**ARCHITECTURAL ACOUSTICS**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- Exposure to the basic principles of building acoustics in buildings and their integration with architectural design.
- The application of suitable materials in the design of auditoria and the method to achieve noise control in built spaces.

UNIT-1 INTRODUCTION TO THE STUDY OF ACOUSTICS 9

Acoustics-Definition, terms related to acoustics. Theory of sound: generation, propagation, transmission, reception of sound, sound waves, frequency, intensity wavelength, sound pressure, measurement of sound scales-decibel scale. Calculation of reverberation time using Sabine's formula, Recommended RT/Volume for different spaces. Acoustical defects-echoes, focusing of sound, dead spots, flutter echo. Room resonances, small enclosures, standing waves, proportioning of room dimensions.

UNIT- 2 SOUND TRANSMISSION, ABSORPTION, INSULATION 9

Room acoustic phenomena: Reflection (plane, concave and convex surfaces), diffusion, reverberation, absorption. Acoustical requirements of different types of building ,sound absorption, absorption co-efficient and their measurements, Sound insulation, materials, STC ratings, sound isolation. Sound absorptive materials and their choices, absorption coefficients and their measurements, NRC value.

UNIT-3 NOISE CONTROL AND SOUND REINFORCEMENT 9

Sources and types of noise, characteristics and effect of noise impact on human beings/behaviour, noise curves, transmission of noise – airborne and structure borne, transmission loss, Means of noise control-source (enclosures), path (Barriers and insulations) and receiver (personal controls). Measure of noise control for different constructions – construction details of cavity walls, composite walls, floating floor, wood-joist floors, plenum barriers.

UNIT-4 ACOUSTICS IN BUILDING DESIGN AND CONSTRUCTION 9

Design: Site selection, shape, volume, treatment for interior surface, basic principles in designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls, theatres – Auditorium. **Construction**: Constructional detailing, relation to walls/ partition, floor / ceiling/ opening/ windows/ doors. Acoustical requirement of different types of buildings.

UNIT-5 DESIGN AND DETAILING FOR ACOUSTICS OF MULTIPURPOSE HALLS 9

Case studies of acoustically designed and treated multipurpose halls. Onsite measurement with Sound measurement equipments. Design of a multipurpose hall for optimum acoustics - drawings and construction details of acoustical treatment on walls, ceilings and floors.

TOTAL: 45 Hours

OUTCOME:
Students will get exposure in the field of architectural acoustics & treatments.

REFERENCES:

1. Architectural Acoustics- David Egan,J. Ross Publishing Classics
2. Acoustical Designing in Architecture- Vern.O.Knudsen and Cyril M. Harris,Wiley Publisher
3. Acoustics, noise and buildings- Peter.H.Parkins and H.R.Humphreys, Pitman *publishing* corporation, New York, Chicago
4. Master Handbook of Acoustics–F. Alton Everest and Ken.C.PohlmannPaperback *Publisher*

		L	T	P	C
16AR 306	**INTERIOR DESIGN & DETAILING**	1	0	4	3
	Prerequisite - Nil				

OBJECTIVES:
- To introduce the vocabulary of interior design.
- To familiar the student with an overview of interior and furniture design and design movements through history.
- To inform the various components of interior space and treatment and finishes for the same.
- To familiarize the student with the various components of interior design like lighting, landscaping and furniture.

UNIT-1 INTRODUCTION TO INTERIOR DESIGN 15
Introduction to interior design, Design process, style, Behaviour psychology, perception. Basic elements of evolution of creativity, dot line, plane, volume,2D, 3D. Basic principles of design Axis, Symmetry, Balance, Focus, Rhythm, Harmony, Unity,Variety Contrast, Hierarchy, Scale& Proportion, Movement, Emphasis, Dominance, Fluidity, etc.

UNIT-2 HISTORY OF INTERIOR AND FURNITURE DESIGN 15
Brief study of the history of interior design context to western through the ages, Relating to historical context and design movement.Brief study of Indian folk arts and crafts with reference to interior design and decoration.

UNIT-3 ELEMENTS OF INTERIOR DESIGN INTERIOR TREATMENT AND FINISHES 15
Introduction to various elements of interior like floor, ceiling, walls, staircase, opening, interior services elements, incidental elements etc. And various methods of their treatment involving use of modern building materials and methods of construction in order to obtain certain specific functional aesthetic and psychological effects.

UNIT-4 ELEMENTS OF INTERIOR DESIGN-LIGHTING &INTERIOR LANDSCAPING 15
Study of interior lighting –different types of lighting ,types of lighting fixtures their effects and suitability in different context, And accessories used for enhancement of interior .Interior Landscaping-elements like rocks, plants, water ,flower, fountains, paving, artifacts etc. Their physical properties and effects on interior space.

UNIT-5 ELEMENTS OF INTERIOR DESIGN- FURNITURE & SPACE PLANNING 15

Study of human relationship between furniture and spaces, furniture design as related to human comfort and function. Material of furniture types of interior: office furniture, children's furniture, residential furniture, display systems etc. construction, changing trends and lifestyles innovations and design ideas. Study on furniture.

TOTAL: 75 Hours

OUTCOME:

An understanding of interior design as an interdisciplinary as well as allied field related to architecture.

REFERENCES:

1. Francis D.K.Ching, " interior design illustated" U.N.R publication.NY1987
2. PremavathySeetharaman, ParveenPannv " Interior Design and Decoration" CBS publication, 2015
3. Julius Penero and Martin Zelnik, 'Human Dimensions and Interior Space' Whitney library of design, NY 1979
4. SyanneSlesinAnd Stafford Ceiff 'Indian Style,Clarkson N.Potter', New York 1990.
5. Gary Gordon 'Interior Lighting For Designers' John Willey&Sons-2003.
6. Kathryn.B.HiesingerAnd George H.Marcus,Landmarks Of Twentieth Century Design; Appey Ville Press,1993.
7. Inca/Interior Design Register,Inca Publications, Chennai,1989.
8. Steprt-DevanKness, Logan And Szebely,'Introduction To Interior Design' Macmillan Publication Co, Newyork 1980.

		L	T	P	C
16AR 308	**COMPUTER STUDIO II**	0	0	4	2
	Prerequisite - Nil				

OBJECTIVES:

- To equip the students with skills required in using computer as a digital media for design and preparation of 3D images of Architectural drawings and structures. However, the software may change over time & hence training would be imparted in their use.

MODELING

Introduction to 3D Modelling and integrating Architectural design with 3D model and generating 2D drawings using SKETCHUP.Concepts –Principal tools for drawing, modification, construction, camera, walkthrough, sandbox etc – breaking edges, Google toolbar**.** Model setting and managers – colors and materials – entities – making input & output **–** technical information **–** common tasks – applications

RENDERING

Lumion - architectural visualization tool - creation of 3D models -CAD drawing into videos, images and 360 panoramas, applying materials ,effects, lighting and reflections.

TOTAL: 60 Hours

OUTCOME:

Exposure to Sketch up and Lumion will help students to produce 3D models with walkthroughs.

REFERENCES:

1. User manual & tutorials of Google Sketch Up software.
2. User manual & tutorials of Lumion software

		L	T	P	C
16AR 310	**ARCHITECTURAL DESIGN STUDIO V**	0	0	16	8
	Prerequisite – Architectural Design Studio -II				

Designing for sustainability – Sustainable architecture and planning has become vital factor in the design of all buildings because the building activity is considered as one of the major pollutants of the natural environment. Study of the various techniques of Energy-efficient design and recycling technologies for water & wastes is mandatory as these have to be incorporated in the design proposals. Awareness about LEED rating in IGBC & USGBC and best practices is expected.

PROJECT I: INSTITUTIONAL BUILDINGS 120

These are buildings with complex spatial organizations, multifunctional spaces, large spans and variable circulation patterns. Environmental issues are emphasized and the Design studio aims to inculcate the techniques of designing for sustainability. As they are buildings designed for social interaction the project challenges the architect to generate new concepts for teaching learning environment. Campus design demands that the architect has to do master planning with zoning as a preliminary exercise. The project requires the architect to explore built form / open space relationship, to distinguish between student activities & service functions and the various aspects of campus design such as the pedestrian precinct, roads, play areas for various games and sport etc. Students are expected to do the landscape layout in detail to develop appreciation of a holistic environmental design. Ex. College for architecture, medicine, engineering etc.

PROJECT II: OFFICE BUILDINGS 120

Office spaces have undergone very many changes over the years from closeted cubicles to open plan office planning. Architects have tried to attain ideal working conditions with optimization of day lighting using light shelves for light penetration, experimenting with modular furniture and work stations and with integration of play & recreational areas such as googleplex, Microsoft etc.Students get exposed to the various services, structural systems and vertical access systems such as elevators, escalators etc in multi-storeyed buildings. Knowledge about various types of cores, fire fighting systems and special building rules applicable to multi-storeyed buildings are implied. Scholars will be required to do the Interior design scheme in detail. Ex. Multi-storeyed office buildings that do not exceed G+9 floors.

TOTAL: 240 Hours

OUTCOME:

This studio makes the student to learn campus planning, concepts in institutional architecture & the design of spaces for interaction such as cafeteria, hostels etc. It also envisages the development of ability to design multi storeyed office buildings that respond to corporate culture & ethos.

REFERENCES:

1. Time saver standards for building types,DeChiara and Callender, Mc Graw hill company
2. Neufert Architect's data, Bousmaha Baiche & Nicholas Walliman, Blackwell science ltd 3. National Building Code - ISI 4. New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press

VII SEMESTER

		L	T	P	C
16AR 401	**ESTIMATION & SPECIFICATION**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To enable the student to write specifications for various items of civil works with a view of controlling quality of work executed at site.
- To provide the student sufficient knowledge of estimation in order that he can advice prospective clients on project viability and also monitor/ control project cost.

UNIT- 1 INTRODUCTION TO SPECIFICATION **6**

Specification - Definition, purpose, procedure for writing specifications for the purpose of calling tenders, types of specification. General specifications for 1St, 2nd, 3rd and 4th Class buildings**.** Data base for writing specification.

UNIT- 2 SPECIFICATION FOR DIFFERENT ITEMS **8**

Specifications for the following items – Bricks; sand; cement; coarse aggregate; water; reinforcement; storing and handling of materials; Earth work in foundation; PCC; RCC; First class brick work in cement mortar; half brick thick partition in cement mortar; reinforced brick work; DPC; glazed tiles in skirting and dado; cement plaster; joinery in wood, steel & aluminium; painting to walls –emulsion, enamel paint ; painting to joinery ; varnishing ; French polishing ; based on surveys and Current trends.

UNIT- 3 INTRODUCTION TO ESTIMATION **6**

Estimation – definition; purpose; types of estimate; various methods of approximate estimate of buildings with Introduction of computer applications in estimation.

UNIT- 4 DETAILED ESTIMATE **16**

Detailed estimate – data required, factors to be considered, methodology of preparation, abstract of estimate, contingencies, work-charged establishment, bill of quantities, different methods for estimating building works, methods of measurement of works. – With case studies.

UNIT- 5 RATE ANALYSIS **9**

Rate analysis – definition; method of preparation; quantity and labour estimate for unit work; task or outturn work; rate analysis for: earth work, concrete works, first class brick work, reinforced brick work, cement plastering, DPC with cement mortar/ concrete, finishing (cement paint, distemper, acrylic emulsion, enamel paint) to walls & ceiling. Using the current market rates for the materials, labour, tools and equipments

TOTAL: 45 Hours

OUTCOME:

Students learn the art of building construction through specification writing. Students learn to work out the approximate estimate, detailed estimate for small scale building projects and low cost housing.

REFERENCES:

1. M.Chakraborti, .Estimation, Costing, Specification and Valuation in Civil engineering.
2. Dutta, Estimating and Costing, S. Dutta and Co., Lucknow 1983.
3. PWD Specifications of Tamil Nadu State Government.
4. CPWD Specifications of Government of India.

		L	T	P	C
16AR 403	**WORKING DRAWING**	0	0	5	3
	Prerequisite - Nil				

OBJECTIVES:

- To develop an understanding of standards and conventions used for preparation of architectural drawings to develop the skills of preparing various architectural drawings and details used for construction of buildings.
- The students should be able to prepare drawings in sufficient details such that the contractor is able to construct a building as per the design.
- Graphical presentation of all the components of a building along with dimensioning and annotations. Understand and apply IS Codes.
- Conventions/ methods of preparing a working drawing along with tabulation of schedules of materials, finishes and hardware/ Linking up working drawings / specifications in an architectural project.

UNIT- 1 BUILDING DRAWING **15**

Centre line plan, Foundation plan, Structural grid plan (in case of framed structures), Basement floor plan, Ground floor plan, Typical floor plan, All elevations, All sections: one at least through staircase and one through toilet, Terrace floor plan giving details of surface drawing etc.

UNIT- 2 SERVICES **15**

Sanitation drawings showing fixtures etc, Electrical layout plan, Typical wall profiles sections, Detailed drawings of special rooms like kitchens, toilets, staircase etc.

UNIT- 3 SPECIFICATION **15**

In addition to the above, students are expected to prepare a detailed clause by chance specifications for at least one of the 3 projects Specifications writing include the following aspects: Materials, Pre and post installation work., Test if any, Mode of measurements, Knowledge of manufacturers specifications as a database for writing specifications for the following materials, based on surveys:

UNIT- 4 MATERIALS **15**

Glass Plywood and laminates Hardware Electrical wires and accessories Water supply and plumbing: fittings and fixtures Flooring and cladding.

UNIT- 5 EXERCISE **15**

One working drawing of a previous year architectural design project having load bearing structure with minimum 150 sq. m. carpet area not exceeding 2 stories. Two details such as doors/windows/railings/kitchen etc.

TOTAL: 75 Hours

OUTCOME:

Utilize architectural terms and symbols; apply construction materials and processes; identify the relationship between specifications and drawings; identify architectural requirements and governing codes; and produce a set of commercial construction drawings to include a site plan, floor plans, reflected ceiling plan, sections, elevations, schedules, and details.

REFERENCES:

1. Building construction specification – Jack Lerrs
2. Standard specification of state governments
3. Specification in detail –Frank W.Makay
4. Building Drawing – M.G.Shah, CM,Kale, S.Y.Paoui
5. Architectural Working Drawings –Ralph W.Liebing, Mimi Ford.

		L	T	P	C
16AR 405	**COMPUTER STUDIO III**	0	0	4	2
	Prerequisite - Nil				

OBJECTIVES:

- To equip the students with skills required in using computer as a digital media for design and preparation of 3D images of Architectural drawings and structures. However, the software may change over time & hence training would be imparted in their use.

BASIC MODELING

New Features of Revit, Editing and Working with Families in a Project, Concepts of Revit, creating a shared Family, Project and System settings. Creating the Basic Model, Adding Doors and Windows, Floors and Floor Openings, Roof and Ceiling, Staircases

DETAIL MODELING

Creating Walls, Doors. Windows, openings, stairs, railings, roofs, curtain systems. Creating drawings, Creating detail from Building Model, Scheduling, Annotating and Dimensioning Applying Materials and textures, creating a perspective views, rendering an Exterior view, rendering an Interior views, Creating and Recording Walkthroughs, creating 3D cutaways with Section Boxes

TOTAL: 60 Hours

OUTCOME:

Exposure to Revit will help students to produce advanced 3D drawings.

REFERENCES:

1. Autodesk REVIT 9.1 Manual, Autodesk publications
2. REVIT 9.1 Tutorials, Autodesk publications

		L	T	P	C
16AR 407	**ARCHITECTURAL DESIGN STUDIO VI**	0	0	16	8
	Prerequisite – Architectural Design studio III				

OBJECTIVES:

Architecture as a design response to Technology -This Design studio attempts to foster an understanding of the hospitality industry in the first project & requires the student to handle large scale buildings such as transportation nodes and sports facilities inn the second project. Innovation & experimentation with regard to form / space and lines / patterns will be encouraged.

PROJECT I: DESIGN FOR HOSPITALITY INDUSTRY **120**

The project requires the understanding of the special nature and functioning of the hotel industry and to respond with suitable concepts of space planning, circulation, interior design, materials and lighting. Example: Hotels- Business, resort, heritage, boutique etc. The student needs to concentrate on site planning, space planning, circulation, services and the various aspects of interior design such as furniture, flooring, ceiling, lighting etc. Students get exposure to the difference between a business hotel & a resort as well as the special needs of heritage and Boutique hotels. Exercises in interior space visualization using computer software is attempted.

PROJECT II: URBAN INFRASTRUCTURE PROJECTS **120**

Contemporary transportation terminals and stadiums are large buildings with multiple entries & exits dealing with large crowds and having multiple levels with large spans, complex services & demanding environmental conditions. Function, convenience and security will become the basic design parameters. Example - Bus terminal / Railway station / Indoor sports complex / Aquatic complex etc. This studio challenges the designer to come up with a feasible structural solution after undertaking a study of large span structural systems. Moreover planning for transport terminals requires understanding of safety norms & to design sport facilities understanding of optimum environmental parameters is the requisite.

TOTAL: 240 Hours

OUTCOME:

The student develops the ability & confidence to handle large complex projects in the urban scenario & gets to understand the materials and technology required to build the same. Visualization of projects using computer software is also acquired.

REFERENCES:

1. Time saver standards for building types, DeChiara and Callender, Mc Graw hill company
2. Neufert Architect's data, Bousmaha Baiche & Nicholas Walliman, Blackwell science ltd
3. National Building Code - ISI
4. New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press

VIII SEMESTER

		L	T	P	C
16AR 402	**TOWN PLANNING**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To outline the concepts of eminent Town planners and their contribution to planning thought.
- To understand the contemporary issues in urban planning.
- To create an overall understanding of classification of settlements, land-use, zoning and types of development plan.
- To familiarize with simple Town planning techniques.
- To understand the changing scenario in the context of globalization.

UNIT- 1 PLANNING CONCEPTS **9**

Role and contribution of the following towards contemporary town planning thought – Geddesian Triad and outlook Tower by Patrick Geddes, City Beautiful by Daniel Burnham, Garden city by Ebenezer Howard, Neighbourhood by C.A.Perry, Radburn by Henry Wright and Clearance stein, Ekistics by CA Doxiadis, City for three million habitat, Radiant city and Chandigarh by Le Corbusier and F.L.Wright

UNIT- 2 CONTEMPORARY ISSUES IN URBAN PLANNING **9**

Contemporary problems of settlements, Environmental impact of unplanned growth. Socio-economic aspects of urban housing and problems of slums, rationale of urban regulatory controls. Urban redevelopment and renewal, urban traffic and transportation planning

UNIT- 3 URBAN AND REGIONAL PLANNING **9**

Influence of socio-economic factors in the development of human settlements, growth and decay of human settlements. Classification of settlements: Classification based on population, functions, locations, Municipal status. Town and its land uses, graphical representation and colour coding of land use, character of a town, categories of a town, densities of a town, Principles, Advantages and types of Zoning. Scope and purpose of Perspective Plan, Regional Plan, Development Plan, Local Area Plan, Special Purpose Plan, Annual Plan, Project.

UNIT- 4 TOWN PLANNING TECHNIQUES. 9

Data Collection Techniques, Types of Surveys, Data and Map Analytical Techniques, Applying Carrying Capacity for Urban and Regional planning, Threshold Analysis – Factors taken into consideration to assess the most suitable land use & weighted overlay of Land suitability, Projection Techniques - Population Projection and Economic Projection, Plan formulation through Remote Sensing & Geographic Information System.

UNIT- 5 EMERGING TRENDS IN URBAN PLANNING. 9

New Urbanism, Smart growth, TOD, Form-Based Codes, Rural village, Transect Future of cities and cities of future - Sustainable cities, Intelligent cities, Liveable cities, Resilient cities, Smart Cities, Global city, Eco city, Compact city, Vertical urbanism, MediCity, Sports city.

TOTAL: 45 Hours

OUTCOME :

The student will understand and familiarize the planning concepts of eminent town planners, will be acquainted with the current issues in urban planning. They will be exposed to classification of settlements, land-use, zoning, types of development plan and familiarize the students with simple Town planning techniques.

REFERENCES:

1. John Ratcliffe, *An Introduction to Town and Country Planning*, Hutchinson 1981
2. Arthur B. Gallion and Simon Eisner, The Urban Pattern – *City planning and Design*, Van Nostrand Reinhold company
3. Rangwala, *Town Planning*, Charotar publishing house
4. G.K.Hiraskar, *Town Planning*
5. Rame Gowda, *Urban and Regional planning*
6. *Town Planning*, A.Bandopadhyay, Books and Allied, Calcutta 2000

		L	T	P	C
16AR 404	**PROFESSIONAL PRACTICE**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To develop understanding of the duties and liabilities of an architect along with knowledge of bye-laws that relate to the building & the environment in the Indian context .

UNIT- 1 THE PROFESSIONAL ROLE OF AN ARCHITECT & SERVICES RENDERED 9

Architect's role in society, IIA code of conduct, salient features of architect's act 1972, the council of architecture – Architect's office and its management, elementary accountancy required for the same etc. Architectural services- conditions of agreement- scope of work, comprehensive architectural services and architectural competitions, conditions of engagement, remuneration, professional fees and charges as per IIA norms, - copy rights of drawings.

UNIT- 2 ARCHITECTURAL COMPETITIONS & LEGISLATIONS 12

Regulations governing the conduct of competitions, Types of competition (open & closed competitions), appointment & duties of Assessors, instructions to participants, award of premium. Role of development authorities & urban arts commissions, salient features of the DCR for CMA, important regulations in the Tamilnadu cinema rules 1973 & the TN factory rules 1950, Environmental acts & laws, special rules governing hill area development & coastal area management, Heritage act of India etc.

UNIT- 3 EASEMENTS & ARBITRATION 6

Easement Rights –Definition, characteristics of an easement, Natural Rights ,Various easement rights- Easement of support, Easement of light and air, Easement of right of way, Easement of eave projection, etc . Continuous and Discontinuous easements, extinction of easements, Modes of acquiring easement rights – Need for Arbitration, arbitration agreement, role of arbitrators, umpire etc, excepted matters, arbitral award.

UNIT- 4 TENDER & CONTRACT 10

Calling for Tenders, tender documents, open & closed tenders, various types such as item rate, lump sum, labour & demolition tenders, conditions of tender, submission, scrutiny, recommendations &

award of contract. Conditions of contract, IIA form of contract, articles of agreement, certification of contractor's bills, defects liability. Earnest money deposit, security money deposit etc.

UNIT- 5 VALUATION & RENT **8**

Valuation – purpose of valuation, types of valuation- book value – salvage value- scrap value depreciation- obsolescence- sinking fund- land valuation ,building valuation- mortgage and lease- Annuity- definition, Fixation of rent- out going- gross and net income – year's purchase- capital cost standard rent- market rent- economical rent.

TOTAL: 45 Hours

OUTCOME:

The students are able to Learn the basic principles of architecture profession & Learn various issues in the architectural practice. Knowledge of the professional responsibilities within the ambit of the laws of the land by studying building bye laws, etc. Knowledge of Easement rights, arbitration, Valuation and laws relating to land and property. Understand the Tender & Contract.

REFERENCES:

1. Hand book on Professional Practice by I. I. A, Image systems, Mumbai,1998.
2. Estimating and Costing by Dutta
3. CMDA-Development control rules for CMA.
4. TN cinematograph manual, govt central press, Chennai,1998.
5. Environmental Acts of the Ministry of Environment & forests, GoI.

		L	T	P	C
16AR 406	**URBAN DESIGN AND RENEWAL**	2	0	2	3
	Prerequisite - Nil				

OBJECTIVES:

- Students will understand the fundamental concepts and theories of urban design and apply them in their design projects.

UNIT- 1 INTRODUCTION **5**

Emergence of urban design as a discipline, need for urban design, Elements of urban design(buildings, streets, public spaces, transports, other elements etc. Principles of urban design-creating form and spatial definition in articulation of urban design expression.

UNIT- 2 STUDY AND ANALYSIS OF URBAN SPACES IN HISTORY AND MODERN CONCEPTS IN URBAN DESIGN **15**

A brief study and analysis of urban spaces in history-in the west(Greek, Roman, Medieval and Renaissance towns)and the east(in India-Vedic towns, temple towns, medival and Islamic towns). Modern concepts in urban design. Study of Urban design theories of Gordon Cullen and Kevin Lynch. Relevance of historic concepts of urban design in the present context-Critical analysis of Indian cities & understanding the urban design projects of Singapore, China & United States.

UNIT- 3 BASIC PRINCIPLES & TECHNIQUES IN URBAN DESIGN **10**

Components in urban design composition. Urban scale, mass and space, definition of urban fabric, visual surveys and their influence for urban design, various methods of conducting a visual survey. Definition and purpose of open spaces and their hierarchy in urban design-hierarchy of utility spaces for residential, commercial, recreational and industrial use. Special focus on streets-Expressive quality of built forms, spaces in public domain.

UNIT- 4 RENEWAL, RE-DEVELOPEMENT AND FORMULATING URBAN DESIGN **10**

Definition and need for urban renewal and re-developement, scope for urban renewal in India challenges and implementation methods of urban renewal for Indian historic towns and cities, impact

of public participation. Analysis and formulation of urban design guidelines for new developments. National and international case studies for urban renewal.

UNIT- 5 URBAN DESIGN SURVEY AND PRESENTATION 20

Conducting an urban design survey of Conservation of historic cities, open-spaces, development of market spaces, transit oriented developments, water front development in India. Analysis of data. Formulating urban design guidelines for an area-practical problem solving, understanding various presentation techniques for urban design presentations.

TOTAL: 60 Hours

OUTCOME:

Students will understand the terminologies, elements, principles & concepts & components of urban design techniques. It helps us to understand the evolution of urban development from past to present through various examples.

REFERENCES:

1. The Concise townscape- Gordon Cullen,The Architectural press
2. Image of the city - Kevin Lynch
3. Architecture of town and cities - Paul D. Speriregon, The MIT press
4. Urban design – Ornament and decoration , Cliff Moughtin, Bath Press
5. Urban design – street and square, Cliff Moughtin, Bath Press
6. Town and square - Paul Zucker
7. The urban pattern - Arthur B Gallion, CBS publishers
8. Architecture and the urban experience - Raymond J Curran. Van Nostrand Reinhold Company
9. Indian city in the arid West - Kulbashan Jain , Aadi Centre
10. Indian mega city and economic reforms - A.K.Jain, Management publishing Company

		L	T	P	C
16AR 408	**ARCHITECTURAL DESIGN STUDIO VII**	0	0	16	8
	Prerequisite – Architectural Design Studio -IV				

OBJECTIVE:

Architecture & Urbanism projects at the city level – This Design studio addresses predominantly urban issues such as Housing, Urban design and Conservation. Though emphasis is on the study of existing problems in our cities, scholars will be encouraged to strive for innovative architectural solutions for the same. Team work will be required to undertake such projects & hence the ability of the student as a team player will be critical.

PROJECT I: HOUSING 120

The various types of housing projects in a typical urban scenario can be taken with suitable design parameters that get established after conducting a rigorous study. Analysis of existing design trends & user preferences need to be ascertained. Awareness about special building byelaws applicable for Group housing schemes is essential. In addition to design issues such as security, accessibility, identity, social interaction, comfort, economy etc. that would be investigated. The application of Fractals in design can also be explored. Ex. Housing for the poor /Slum dwellers, Multi-storied apartments for Govt. / corporate employees, Multi-storied condominiums for the rich etc.

PROJECT II: URBAN DESIGN OR CONSERVATION 120

Urban design projects could deal with redevelopment of problem areas such as riverfronts, beach fronts, market areas, bazaars or commercial & residential districts that have reached dead end situation. It could also deal with emerging nodes of transportation with its surrounding areas, the design of city level open spaces such as parks, plazas etc. Alternatively, conservation strategies for heritage areas along with revitalization techniques can also be attempted. The projects thus undertaken as group work will have to ultimately contribute ideas for the improvement of the quality of the urban environment. Ex. George town,Poonamalee, Panangal park, Mylapore, Tambaram, Marina,

Cooum riverfront, Elliots beach,Ambattur, Harbour area, Island grounds, Santhome beach, Congress grounds, Adyar riverfront etc.

TOTAL: 240 Hours

OUTCOME:
The scholar gets exposure to urban design issues at the city level & the strategies that are commonly employed. The housing project makes the student conversant with the problems in community living and how to address the same.

REFERENCES:

1. Time saver standards for building types,DeChiara and Callender, Mc Graw hill company
2. Neufert Architect's data, Bousmaha Baiche & Nicholas Walliman, Blackwell science ltd
3. National Building Code - ISI
4. New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press
5. Time saver standards for landscape architecture – Charles W.Harris – McGraw Hill

IX SEMESTER

CODE	COURSE TITLE	CATEGORY	CT HRS	L	T	P	C
16AR 501	**Professional Training**	EEC	X	X	X	X	8
16AR 503	**Documentation** (Heritage Buildings)	PC	X	X	X	X	3
	TOTAL		**X**	**X**	**X**	**X**	**11**

PURPOSE:
To give practical exposure to the students by making them interact with the industry.

INSTRUCTIONAL OBJECTIVES:
The students should work in architectural firms and their performance reports are maintained during the training program. Every student must work in an architect's office as a full time trainee for a period of 12 calendar weeks (3 months) from the date of commencement of training. The training should be undertaken in a firm, where the chief architect is registered with the council of architecture and has a professional standing of 5 years at least. The student should involve himself / herself in various aspects of office work such as working drawings, presentation drawings, quantity estimation, site supervision and preparation of corporation drawings. The student is required to maintain a work diary from which he would have to submit a detailed report with a set of drawings of at least 2 projects and which he / she has worked during the training period. This would be evaluated by an internal examiner through a viva voce examination.

X SEMESTER

		L	T	P	C
16AR 502	**LANDSCAPE ARCHITECTURE**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- Understanding environment, human interventions and the impacts on it and knowledge about various measures of protecting it.
- Exposure to various concepts, ideas and techniques prevalent in landscape architecture .

UNIT-1 INTRODUCTION **9**

Introduction to landscape architecture, ecology, ecological balance, landscape conservation, reclamation and landscaping of derelict lands, environmental impact assessment.

UNIT- 2 ELEMENTS OF LANDSCAPE ARCHITECTURE AND LANDSCAPE DESIGN **9**

Elements of landscape – land elements, land form plants and planting, water, lighting etc. characteristics and classification of plant materials, basic principles of landscape design; Factors to be considered, Use and application of plant materials in landscape design, and other components involved

UNIT-3 HISTORY OF LANDSCAPE ARCHITECTURE **9**

Development of landscape design: Detailed study of selected examples from Eastern, Central and Western traditions; Ancient Heritage - Mesopotamia, Egypt, Greece, Rome; Western Civilization – Europe: Italy, France, and England; The middle-east - The Persian tradition and its far reaching influence Eastern Civilisation: China and Japan Ancient and medieval period in India; Mughal and Rajput Landscapes and study of contemporary landscape architecture

UNIT-4 URBAN LANDSCAPE **9**

Basic principles and elements of Urban landscape, Significance of landscape in urban areas, introduction to street furniture, road landscaping, waterfront development, landscaping of residential areas, Industrial Landscaping.

UNIT- 5 LANDSCAPE EXERCISE **9**

Landscape design of a neighborhood open space (area of 2000 to 3000 sq. metres)

TOTAL : 45 Hours

OUTCOME:

The student understand the scope of landscape architecture and elements of landscape. The student understand the impact of human activities on the environment and the role of architect in mitigating it.

REFERENCES:

1. T S S for Landscape Architecture, Mc Graw Hill,Inc, 1995 .
2. Grant W Reid, From Concept to Form in Landscape Design, Van Nostrand Reinhold Company, 1993 .
3. Brian Hacket, Planting Design .
4. T.K. Bose and Chowdhury, Tropical Garden Plants in Colour, Horticulture And Allied Publishers,Calcutta, 1991.
5. Motloch, J.L.,Introduction to Landscape Design", Van Nostrand Reinhold Publishing Co., New York, 1991.
6. Bring, M, "Japanese Gardens: "design & Meaning
7. Simonds, J.O., "Earthscape: A Manual of Environmental planning", McGraw Hill Book Co., New York, 1978.
8. Motloch, J.L., "Introduction to Landscape Design", Van Nostrand Reinhold Publishing Co., New York, 1991.., McGraw Hill Book Co., New York, 1981.Sam kubba, " Green construction project management and cost oversight", Elseiver, 2010

PROFESSIONAL ELECTIVE - I

		L	T	P	C
16AR 351	**BIOMIMETICS**	3	0	0	3

OBJECTIVES:

- To equip the students with multi-disciplinary approach to sustainable design such as design methodology, resource optimization and innovative approaches to eco-design.
- To familiarize the student with some of the acclaimed sustainable buildings designed within the past decade.

UNIT-1 INTRODUCTION **9**

Definition, need, History – Biomorphism, Organic Architecture, Metabolist architecture; basic principles; Characteristics – nature as a model, measure and mentor; Three levels of mimicry – the organism, its behaviours, and the ecosystem; Application in fields other than architecture. Approaches – design looking towards biology or Biology influencing design.

UNIT-2 ORGANISM **9**

Biomimicry at organism level – mimicry of external forms, Fowers, phyllotaxy, soap bubbles pollen grain, insects, animals etc.Adoption of materials, structural systems and other formal characteristics; Phasing and methodology of construction; Project growth through flexible stages similar to an organism.

Case studies: Matthew Parkes' Hydrological Center for the University of Namibia and the stenocara beetle; Nicholas Grimshaw& Partners' Waterloo International Terminal and the pangolin; Norman Foster's Gherkin Tower; Grimshaw Architects; The Eden Project in Cornwall, England.

UNIT- 3 BEHAVIOUR **9**

Biomimicry at Behavioural level – Biomimicry beyond imitating morphological aspects of biology to incorporating functional aspects into architectural design; mimicking the functioning of natural systems or organisms; resource optimization for functioning; Structures non-resistant into their environments; Cost effective solutions to environmental issues – structural efficiency; material manufacture; biomimetic products. Functional mimicry of skin by building facades —communication, thermoregulation, water balance, and protection—translation into design concepts.

Case study: Eastgate Centre, Zimbabwe, Mick Pearce Arup Associates; CH2 Building in Melbourne, Australia; Aesthetics Architects, The Qatar Cacti Building.

UNIT-4 ECOSYSTEM **9**

Ecosystem level – functioning like an ecosystem and forming part of a complex system by utilising the relationships between processes mimicking of how the environments many components work together; ability to participate in the hydrological, carbon, nitrogen cycles; Cyclical closed-loop system; Strategy to combat climate change; zero waste systems; Reversal of environmental degradation. Applicable to projects on an urban scale or a larger project with multiple element

Case studies: Lloyd Crossing Project, Portland, USA; Tirau's iconic dog building, New Zealand town; The Cardboard to Caviar Project by Graham Wiles, Wakefield, UK; The Sahara Forest Project by Exploration Architecture; Lavasa, India by HOK (Hellmuth, Obata, and Kassabaum); Tetro Del Agua, Grimshaw Architects, Cannary Islands; Adam Joseph.

UNIT-5 FUTURE PROSPECTS **9**

Criticisms: Future scope; Sustainability through Biomimicry; Design Challenges; possibilities for architecture and allied fields; Role of computers. Limitations and approaches to overcome them.

TOTAL: 45 Hours

OUTCOME:

Students will get exposure to theoretical and practical aspects of sustainable design and technologies involved in executing them.

REFERENCES:

1. Biomimicry in Architecture, Michael Pawlyn.
2. Biomimicry:Innovation Inspired by Nature Paper Back by Janine M.Benyus.
3. Vincent, Julian. Biomimetic Patterns in Architectural Design. Architectural Design 79, no. 6(2009).
4. Design by Nature:Using Universal Forms and Principles in Design, By Maggie Macnab.
5. Architecture Follows Nature-Biomimetic Principles for Innovative Design, by Illaria Mazzoleni.

		L	T	P	C
16AR 353	**ENERGY EFFICIENT ARCHITECTURE**	3	0	0	3

OBJECTIVES:

- A growing worldwide concern for the conservation of energy & environment has led to the emphasis on sustainable habitats as a key solution to growing urban concerns.
- Sustainable architecture aims to create environment – friendly and energy efficient building by actively harnessing renewable nature sources of energy (solar energy etc) and utilizing materials that least pollute the environment.

UNIT-1 CLIMATE & SHELTER **9**

Over view of the different Passive Solar Techniques &**Climate responsive design** features adopted in thetraditional / vernacular architecture of various places in different climate zones – Control of Micro-climatearound the building by settlement pattern, built form – open space relationship & façade articulation &appropriate use of building materials in historic buildings.

UNIT -2 SOLAR ENERGY & BUILDING **9**

Solar geometry and built form – Various techniques of shading to reduce heat gain in tropical climate –Various methods of Maximizing exposure to solar radiation in cold &temperature climate. Heating & coolingloads – Energy estimates - Energy conservation – Efficient day lighting – Solar Water heatingsystem**.**Exercises on heating and cooling load calculations in buildings**.**

UNIT -3 PASSIVE SOLAR HEATING **9**

General principles – Direct gain systems - Glazed walls, Bay windows, Attached sun spaces etc. Indirect gainsystems – Trombe wall, Water wall, Solar Chimney, Transwall, Roof pond, Roof radiation trap, Solarium etc -Isolated gain systems – Natural convective loop etc.Case studies on buildings designed with passive heating techniques.

UNIT-4 PASSIVE COOLING CONCEPTS **9**

General principles – Evaporative cooling, Nocturnal radiation cooling, Passive Dessicant cooling, inducedventilation, earth sheltering, Berming, Wind Towers, earth – Air tunnels, Curved Roofs & Air Vents, Insulation, Vary Thermal wall etc.Case studies on buildings designed with passive cooling techniques.

UNIT-5 OVERALL DESIGN CONCEPTS **9**

Land form & orientation – Vegetation & Pattern – Water Bodies – Open Space & Built form - Plan form &Elements – Roof form – Fenestration pattern &Configuration – Building envelope & finishes.

OUTCOME:

Students will get awareness of designing energy efficient building envelopes that respond to theclimate of a place,building, lighting resource – efficient practices in India, advocating of the application ofrenewable energy system and the promotion of efficient lighting & HVAC system to reduce energy demand.

TOTAL:45 Hours

REFERENCES:

1. MiliMajunder, Teri – Energy – Efficient Bldg in India – Thomson Press , New Delhi – 2001
2. J.K Nayak&Others ,Energy Systems Energy Group,- Isa Annal Of Passive Solar Architecture.
3. Arvind Krishnan & Others – Climate Responsive Architecture, Tata Mcgraw –Hill New Delhi 2001.
4. James D. Ritchie – Successful Alternate Energy Methods – Structures Publishing Co. Michigan 1980.
5. George Basid& Others – Energy Performance of Bldg – CRC Press, Florida 1984.
6. Ralph M .Lebens – Passive Solar Architecture in Europe – 2, Architecture Press, London 1983.
7. Bill Baker – How to beat the Energy Crisis and Still Live in Style – G.P. Putnarms Sons, Newyork 1979.

		L	T	P	C
16AR 355	**SITE PLANNING**	3	0	0	3
	Pre-requisite: Nil				

OBJECTIVES:

- To develop an understanding of the importance of site conditions for the creation of good architectural solutions and focus on the site as a fundamental component of bldg. design.
- To examines the interrelationship of intended site use with the environment and also topography, vegetation and landscape, climate, geography, as well as theoretical aspects of site development.
- To emphasize the synthesis of programmatic and environmental requirements into a coherent concept for building placement and site improvements.

UNIT-1 INTRODUCTION TO SITE ANALYSIS **10**

Introduction to Site analysis, Importance of site analysis ; interrelationship between nature and humaninterventions , thematic traditions in site design, history of site design as a source for precedent analysis

UNIT -2 SITE INFLUENCING FACTORS **8**

On site and off site factors; Analysis of natural, cultural and aesthetic factors; topography, hydrology, soils,landforms, vegetation, climate, microclimate.; influence of water bodies

UNIT-3 DESIGN OF LANDFORMS IN A SITE **8**

Contours - representation of landforms and landform design, interpolation of contours, slope analysis, uses andfunction. Grading - Symbols and grading and alignment of paths/roads, angle of repose and use of retaining walls.Grading terraces. Drainage - surface drainage, functional and aesthetic considerations

UNIT-4 SITE PLANNING PRINCIPLES AND TECHNIQUES **9**

Site Zoning. Organization of vehicular and pedestrian circulation; parking ; street widths; turning radii ; street intersections ;steps and ramps. Site planning considerations in relation to water systems, sewage disposal, outdoor electrical systems.

UNIT-5 SITE CHARACTERISTICS AND DESIGN REQUIREMENTS 10

Exploration of site planning options for residential, commercial, office, industrial and mixed-use projects; streetnetwork, civic space, and open space planning; emphasis on walkable, mixed-use, transit-oriented sustainable development.

TOTAL : 45 Hours

OUTCOME:

Students will get exposure to the various techniques of site analysis and planning.

REFERENCES:

1. Kevin Lynch , “Site Planning”, MIT Press, 1967
2. Time Savers Standards for Site Planning, McGraw Hill, Inc, 1995
3. Richard Untermann and Robert Small, “Site planning for cluster housing”, Van Nostrand ReinholdCompany, 1977
4. Michael Laurie, “An Introduction to Landscape Architecture”, Elsevier, 1986
5. TSS for Landscape Architecture, McGraw Hill, Inc, 1995
6. John Ormsbee Simonds, “Landscape Architecture: A manual of site planning & design”, McGraw Hill,1961.
7. Joseph De Chiarra and Lee Coppleman, “Planning Design Criteria”, Van Nostrand Reinhold Co., NewYork, 1968
8. Thomas H. Russ, “Site Planning and Design Handbook” Pearson Education, 2002

PROFESSIONAL ELECTIVE – II

		L	T	P	C
16AR 352	**ARCHITECTURAL PHOTOGRAPHY & JOURNALISM**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To provide the skills relevant to the practice of professional journalism, and to introduce students to the fundamentals of writing, explaining of various strategies and their criticism.

UNIT -1 INTRODUCTION TO ARCHITECTURAL PHOTOGRAPHY 9

General introduction to the art of photography; concept of color; concepts of lighting, distance, visual angle, frames; media. Technical definitions, types of lighting fixtures, types of flashes, controlling lighting levels with flash photography.Color rendering in photographic medium, color rendering in photographs under different lighting condition, lighting colors and its effect on a photograph, color filters in a camera. Exercise in lighting photography with artificial light and black and white photos.

UNIT-2 PHOTOGRAPHIC TECHNIQUES AND COMPOSITION 9

Equipment: cameras and lenses – techniques: film speed, exposure measurement, gray scale– photo-finishing and editing digital images.

Perspectives: Single Point, Two- Point, Three- Point and methods of correcting distortions – Lighting: External and Interior

UNIT-3 JOURNALISM 9

Introduction to journalism, key concepts and objectives of Journalism – Specialized journalism: with emphasis on architectural journalism - Journalism skills: research, reporting, writing, editing, criticism.

UNIT- 4 DISCUSSIONS AND ISSUES **9**

Regional, National and International discussion forums, Changes in contemporary and historical design practices. Discussions on topics needed in an architectural journal and current issues - types of journals, works of key architectural journalists, Public Discourse on the Internet, Mass Media and Public Opinion – critique on selected pieces of journalism.

UNIT-5 FIELD PROGRAM **9**

Exercise on integrating photography in architectural journalism.

TOTAL: 45 Hours

OUTCOME:

An ability to critically think and analyze about the effects of architecture on society as well as the tools to enable recording of the same.

REFERENCES:

1. Julian Calder and john Garrett, The 35mm Photographer's Handbook, Pan Books, London 1999
2. Julie Adair King, Digital Photography for Dummies, COMDEX, New Delhi 1998
3. Professional photography –photographing buildings, David Wilson, Rotovision
4. Point view- The art of architectural photography , E.Manny A Ballan, VNR
5. Huckerby, Martin., The Net for Journalists: A Practical Guide to the Internet for Journalists in Developing Countries. UNESCO/Thomson Foundation/ Common wealth Broadcasting Association, 2005.
6. Ward, S. J. A. "Philosophical Foundations of Global Journalism Ethics." Journal of Mass Media Ethics., Vol. 20, No. 1, 3-21, 2005

		L	T	P	C
16AR 354	**INDUSTRIAL BUILDING SYSTEMS**	3	0	0	3

OBJECTIVES:

- To impart knowledge about the importance, necessity & techniques of pre fabricated building components used for construction.
- To increase awareness about new techniques & technologies adopted by construction industry.

UNIT-1 INTRODUCTION **9**

Post independence condition of nation, need for housing, Challenge for government: Five year plans and thrust in housing, latest decision of current govt. of having 15 yrs vision plan factoring social & sustainable development goals.- issues in urban housing, Issues in Urban Housing, current scenario in construction industry, Social problems and thus the need of IBS, innovations in modern building materials. Introduction, definition & classification of IBS: frame, panel & box systems

UNIT-2 APPLICATION OF INDUSTRIAL BUILDING SYSTEM **9**

Types of IBS: structure system, wall system and other simplified solutions like repetitions of structural system etc. Classification (depending on material) of IBS: Precast concrete (frame, panel & box),steel framing, prefabricated timber framing, steel formwork & block work system, Feasibility of using industrial building system in Residential and Non Residential buildings, Sequence of activities in prefabrication, manufacturing of building components, design considerations, Technology requirements for industrial building system, Use of Industrial building system as an option for disaster mitigation.

UNIT -3 MODULAR COORDINATION **9**

Concept and definition of Modular dimensional discipline, the building reference system, Advantages, benefits and Limitations of modular principle, Application/ use of MC: columns, beams, floor slabs, walls,

lift cores, stairs, external cladding, doors & windows etc., Graphical Representation of modular coordinated drawing, module grids & planning, Practical application of modular coordination in architectural projects

UNIT-4 PREFABRICATION SYSTEM **9**

Objective and necessity, Off site on site prefabrication elements and construction joints
prefabricated components (pre stressed/ post tension) used in construction, types of precast systems: large panel, frame, slab column & mixed system, Architectural and technical limitations. Manufacturing process, pre stressing of elements, storage, forms, moulds & formwork.

UNIT- 5 PROCEDURES AND MANUFACTURING **9**

Equipments: diff. types of Cranes, lifting tools, rigging tools, conveyors & materials used in manufacturing process, Transportation of components, cost implications, Erection, Assembly and finishing : diff. Types, joints for precast elements, Structural, social and economic issues related to industrial building systems, Adoptability of IBS

TOTAL: 45 Hours

OUTCOME:

Students will get acquainted with various types of IBS in construction industry and will understand the importance of modular coordination in Architecture & industrialised building system.

REFERENCES:

1 S. G. Bruggeling& G. F. Huyghe, Prefabrication with Concrete, AABalkema, 1991.
2 F. (Eph.) BUUGER, Design of Precast Concrete Structures, John Wiley & Sons, 1988.
3 IS Codes on Modular Co-ordination.
4 Industrial Building & Modular design by HenrickMissen- C&CK, UK 1972
5 Prefab architecture - A Guide To Modular Design and Construction – Ryan E.Smith

		L	T	P	C
16AR 356	**FINE ARTS**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- The objective of including the fine Art is to familiarize the students with the various styles and modes of art expressions from different parts of world.
- This would enrich their vision and enable them to appreciate and develop an aesthetic sensibility to enjoy the beauty of nature and life.

UNIT -1 ART AND THE ARCHITECT **9**

Impact of Art on Architectural practice and architecture; Need for collaborative and trans-disciplinary thinking; Art enhancement of the key aspects of creative thinking: Fluency, Flexibility, Originality and Elaboration. Architecture as the ultimate synthesis of art, craft, and technology. Influence of Art movements on Architecture: Futurism, De Stijl, Art Deco, Constructivism, Post-impressionism, Art Nouveau.

UNIT- 2 REALISM **9**

Meaning; Origin, Characteristics; Factors affecting Verisimilitude – Selective Vision, Period vision, Visual Illusions, Medium, Artist's prowess, Material and Technical constraints. Types: Illusionism, Naturalism, Photorealism, Hyperrealism, Contemporary realism; Real and imaginary subjects; Advantages: Standard of Artistic Merit, A Foundation for All Visual Art, Accessibility to the Public. Study of various types of objects (natural and man-made) and transforming them into flat pictorial images and 3D sculptures.

UNIT- 3 REPRESENTATIONAL ABSTRACTION **9**

Meaning; Origin; Inspirations from physical reality; Observation Vs Interpretation, Various degrees of abstraction; Characteristics: Subjectivism, Deviations, Distortions, Exaggerations, and Stylization of form & Colour, Rejection of Perspective and Pictorial Depth; Exotic and super-natural elements; Biomorphic/organic abstraction. Related Art styles: Impressionism, Post-Impressionism, Dadaism, Surrealism, Fauvism, Cubism and Expressionism. Study and subjective interpretation of various types of objects and expressing them in the artist's style as flat pictorial images and 3D sculptures.

UNIT -4 PURE ABSTRACTION OR NON-OBJECTIVE 9

Meaning; Origin; Characteristics: Simplicity, Purity, Geometricity, Shift from representational to formal qualities of Art; Intellectualism, Reduction of art to its fundamental elements; Lack of objective meaning and interpretations, Types: Curvilinear, Colour-Related or Light-Related, Geometric, Emotional or Intuitional, Gestural, Minimalist. Advantages: Timelessness, Artistic freedom of expression, exploration and experimentation. Multiple Interpretations. Art styles: Minimalism, Abstract expressionism, Constructivism, Suprematism, Neo-plasticism, De Stijl, Action Painting, Op art, Lyrical abstraction, Conceptual art, Installation art. Creation of non-objective compositions in 2D & 3D using art elements and principles of composition without any reference to the physical world.

UNIT -5 ART CRITICISM 9

Meaning; Need; Four stages of criticism; Description: Context, Subject matter, Medium, Form, Lively Writing, Internal and External Sources of Information, Truthfulness; Interpretation: Principles; Analysis; Aesthetic judgement: Imitationalism, Formalism & Emotionalism, Instrumentalism; Originality; Craftsmanship; Contribution. Self-criticism of the students' works of Art.

TOTAL: 45 Hours

OUTCOME:

The students will be able to observe and study the evolution of its mutations and synthesis with other style and the rise of an altogether new style.

REFERENCES:

1. Principles of Two Dimensional Design, Wucius Wong
2. Art in Society by Trewin Copplestone.
3. The Art of Colour, by Johannes Itten
4. Criticizing Art: Understanding the Contemporary by Barrett, Terry.
5. Visuality for Architects: Architectural Creativity and Modern Theories of Perception and Imagination, Branko Mitrovic.

PROFESSIONAL ELECTIVE – III

		L	T	P	C
16AR 451	**ENVIRONMENTAL PLANNING**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To know the methods of assessing impact on the environment, the legislations and mitigation methods.
-

UNIT- 1 RESOURCES 12

Man, biosphere, ecosystems, resource identification and its implications for development -soil, water, land, plants, animals, renewable energy and non renewable energy. Preparation and analysis of resource inventories.

UNIT- 2 ENVIRONMENTAL IMPACT ASSESSMENT 6

Methodologies and techniques

UNIT- 3 ENVIRONMENTAL LEGISLATION 9

Significance of law and its relationship to development, evolution of planning legislation. National environmental policy.

UNIT- 4 PLANNING TECHNIQUES 12

Essence of good planning, integration of environmental assessment and planning options, Priorities and strategies for development on urban, coastal and hilly ecosystems.

UNIT- 5 EVALUATION TECHNIQUES **6**

Cost benefit analysis, planning balance sheet and goal achievement matrix. Case study on environmental planning for existing or ongoing projects.

TOTAL: 45 Hours

OUTCOME:

The students are oriented about the concepts of ecosystem carrying capacity, ecological footprint, sustainability and sustainable development and aware of the emerging vulnerabilities of global warming, climate change and understand the contribution of building industry to the same. And with the various approaches to achieve sustainable buildings, communities to understand the various incentives and evaluation systems for green buildings.

REFERENCES:

1. Richard P. Dober – *Environmental Design* – VNR company - New York, 1969
2. Albert J. Rutledge – *Anatomy of a park* – Mc Graw Hill book Co., - USA 1971
3. Harvey M. Rubenstein – *A guide to Site and Environmental planning, 3rd vol.* – John Wiley & sons – New York, 1987.
4. Earthscape - A Manual of *Environmental Planning and Design*, John Ormsbee Simond, Van Nostrand Reinhold Company 1978

		L	T	P	C
16AR 453	**EARTHQUAKE RESISTANT ARCHITECTURE & DISASTER RESISTANT BUILDINGS**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES :

- To understand the causes and effects of natural calamities.
- To familiarize with the factors causing disaster.
- To create an overall understanding of Disaster prevention and mitigation.
- To outline the concepts of disaster resistant construction.
- To expose the students to Case studies of Natural disasters in India.

UNIT- 1 NATURAL HAZARDS AND DISASTER MANAGEMENT **6**

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, Disaster management and Disaster Management cycle
Understanding the Causes and effects of natural calamities - floods, tropical cyclones, landslides, heat waves & Tsunami.
Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter-Governmental Agencies

UNIT- 2 ELEMENTARY SEISMOLOGY **9**

Major Historic Earthquakes in the World, earthquake hazard map of India, Causes of Earthquakes: Elastic Rebound theory, Continental Drift and Plate Tectonics, Types of Plate Boundaries, types of

faults, seismic waves – classification of body waves and surface waves, magnitude, intensity, epicenter and energy release,
Terminologies and Definitions and types of earthquake based on location, size and focal depth characteristics of strong earthquake ground motions, Flexibility of long & short period structures; concepts of response spectrum, Seismological Instruments: Seismograph and Accelerograph, Introduction to Seismic zones, Need for Seismic Zonation, Types of Zonation and Seismic zonation scales

UNIT- 3 LESSONS LEARNT FROM PAST EARTHQUAKES & SEISMIC DESIGN PRINCIPLES 9

Earthquake Effects:- On ground, soil rupture, liquefaction and landslides, Behaviors of various types of buildings, lifelines and collapse patterns, Behaviour of Non Structural Elements like services, fixtures, mountings etc., Social & Economic Consequences of earthquakes
Concept of seismic design, stiffness, strength, period, ductility, damping, hysteric energy dissipation, center of mass, center of rigidity, torsion, design eccentricities, Seismic effects related to building configuration. Plan & vertical irregularities, Special Aspects:- Torsion, appendages, staircases, adjacency, pounding. Ductility based design: Design of energy absorbing devices, Seismic base isolation and seismic active control.

UNIT- 4 STRUCTURAL DETAILING & EARTHQUAKE RESISTANT CONSTRUCTION DETAILS 12

IS Code provisions for the buildings:- IS:1893-2002, IS:4326-1993 Horiz. & vert.seismic co-efficients, valuation of base shear, distribution of shear forces in multistorey buildings.
Seismic Detailing of Masonry buildings (IS: 4326), Seismic Designs & Detailing of RC & Steel Buildings: IS: 1893 - 2002; IS: 13920 - 1993; IS: 456 - 2000; IS: 800 - 2004.
Special reinforcing and connection details in structural drawings.
Various Types and construction details of Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, under ground and overhead tanks, staircases and isolation of structures.
Local practices: traditional regional responses.

UNIT- 5 CASE STUDIES AND DESIGN GUIDELINES 9

Earthquakes at Bhuj, Lattur, etc., Cyclones in coastal Andhra pradesh & Orissa, Land slides in Nilgiris, Himachal etc, Floods in Bangladesh, and Droughts in Rajasthan & Tsunami in Tamil Nadu.
Design guidelines for disaster resistant construction at appropriate situations - Engineering, architectural, landscape & planning solutions for floods, tropical cyclones & Tsunami

TOTAL : 45 Hours

OUTCOME:

To create awareness about natural disasters and factors that causes them to foster knowledge about strategies for disaster management and mitigation. Understanding the design guidelines in disaster resistant construction. To familiarize the students with Case studies of natural disasters in India.

REFERENCES:

1. Agarwal Pankaj, Shrikhande Manish , Earthquake Resistant Design Of Structures, Prentice-Hall of India, New Delhi, 2006
2. S. K. Duggal, Earthquake Resistant Design Of Structures, Oxford University Press, 2007
3. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
4. Guidelines For Reconstruction Of Houses Affected By Tsunami, UNDP India, & Government Of Tamilnadu, 2004
5. Coppola D P, 2007. Introduction to International Disaster Management, Elsevier Science (B/H), London.
6. Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi
7. Disaster Management Act 2005, Publisher by Govt. of India
8. SERC Guidelines for Design and Construction of buildings and structures in cyclone-prone areas, SERC, CSIR, Government of India, 1998,
9. IS 1893(Part 1):2002 ‘Criteria for Earthquake Resistant Design of Structures: Part 1 General provisions and Buildings’
10. IS 13739:1993 ‘Guidelines for estimation of flood damages’

11.IS 15498:2004 ‘Guidelines for improving the cyclonic resistance of low rise houses and other buildings/structures’
12.IS 14680:1999 Guidelines for Landslide Control

		L	T	P	C
16AR 455	**ERGONOMICS & FURNITURE DESIGN**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To introduce the vocabulary of Anthropometry and furniture design.
- To familiar the student with an overview of Applied Ergonomics and furniture design and human environmental relation.
- To inform the various components of ergonomics adapted in furniture design.
- To familiar the student with the various components of Ergonomics and furniture design like design for special need, Biomechanics, Psychological aspects.

UNIT-1 INTRODUCTIONTO ERGONOMICS AND FURNITURE DESIGN 9

Introduction to importance of ergonomics for human being in man-made world, Gross human anatomy, Ergonomics for different age group and gender in relation object used in interior.

UNIT-2 HUMAN FACTORSAND FURNITURE DESIGN 9

Brief study of Anthropometrics –man –machine-environment, static and dynamic, Muscles and work physiology, Static and Dynamic work including maximum capacity , Furniture ergonomics for different age group and gender.

UNIT-3 ERGONOMIC FOR BUILT ENVIRONMENT 9

Built environment for the physically handicapped – Ramp, toilets and corridor design, Spatial Requirements for wheel chair movement-Design issues in the design of old age homes – Criteria to be considered when designing for the Visually handicapped.

UNIT-4 ENVIRONMENTAL ERGONOMICS **9**

Study of Biomechanics, Environmental Condition including, thermal, illumination, noise and vibration, Bio transducers Environmental stress, Psycho Psychological aspects of design.

UNIT-5 ERGONOMICS FOR FURNITURE DESIGN **9**

Study Of Furniture ergonomics for different space like, office , residential, children, Aged and Physically and visually handicapped user.

TOTAL : 45 Hours

OUTCOME:

An understanding of Ergonomics and furniture design as an interdisciplinary as well as allied field related to architecture.

REFERENCES:

1. De Chiara and Callender - Time Savers Standards for Building Types
2. De Chiara and Callender - Time Savers Standards for Architectural data
3. Julius penero and Martin Zelnik,"Human Dimensions and Interior Space"Whitney Library Of Design,NY 1979.
4. Time Saver Standards for Interior Design.
5. An invitation to Design, Helen Marie Evans.
6. Francis D.K.Ching, Interior Design Illustrated, VNR Publications, New York, 1987.
7. Andrew Alpern, Handbook of Specialty Elements in Architecture, McGrawhill Co., USA, 1982.

PROFESSIONAL ELECTIVE - IV

		L	T	P	C
16AR 452	**ARCHITECTURAL CONSERVATION**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- Knowledge about the various techniques of conservation in architecture and the development of the commitment to conserve old buildings of cultural importance.

UNIT- 1 INTRODUCTION **6**

Definition of conservation, Need for conservational activities, brief study in India and abroad, Role of architect in conservation program.

UNIT- 2 HISTORY **12**

Origin and evolution of conservational programs, survey and studies required - methodology and implementation.

UNIT- 3 COMMUNITY PARTICIPATION **9**

Social, cultural, historical and economical values of Conservational projects, involvement of community. Conflict and compatibility between conservation and development - the need to strike a balance.

UNIT- 4 CASE STUDIES OF CONSERVATION PROGRAMS **12**

Case studies of conservation programs which are successful by government and non-governmental agencies.

UNIT- 5 RULES AND REGULATIONS **6**

Rules and regulation, administrative aspects, new concepts in conservation.

TOTAL : 45 Hours

OUTCOME:

The student understands importance of heritage, issues and practices of conservation through case studies and will gain understanding on historic materials and their properties various technologies for investigating masonry, foundation and also traditional and modern repair methods.

REFERENCES:

1. Bernard Fielder (INTACH), Guide to Conservation
2. *Conservation of European* Towns
3. Peter Marston – The book of the *Conservation* – Orion House, London

		L	T	P	C
16AR 454	**HOUSING**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- Understanding of the various issues involved in urban and rural housing and knowledge about the planning and design solutions for low income groups.

UNIT- 1 INTRODUCTION TO HOUSING AND HOUSING ISSUES. **9**

Housing demand and need, Role of Government and public agencies in Housing development, National housing policy, comparison of housing policies and programmes of developed and developing country, Housing agencies, housing programmes and resources, Housing finance.

UNIT- 2 SOCIO ECONOMIC ASPECTS. **9**

Social factors influencing Housing Design – identity, safety, convenience, access, amenities etc, economic factors -affordability and its relationship to house income, incremental housing concept, Slum Upgrading and sites and services schemes and reconstruction process.

UNIT- 3 HOUSING STANDARDS. **9**

Different types of housing standards – spatial standards, safety standards, standards for amenities, Methodology of formulating standards, UD PFI – guide lines, standard and regulations – DCR – performance standards for housing, TCPO, New norms and amenities

UNIT- 4 MODERN TECHNIQUES IN HOUSING CONSTRUCTION. **9**

Prefabrication techniques –modular house, panelized and precast homes, sustainable practices – zero energy home, eco housing, green homes - Teri – Griha and its rating system, Recent

advancement in materials, Design guidelines, Environmental impact of Building materials, Environmental quality.

UNIT- 5 HOUSING DESIGN AND PROCESS. 9

Traditional housing, row housing, cluster housing – apartments and high-rise housing, gated community, Government housing – HUDCO financed project for economically weaker section. .Their Advantages and disadvantages. Methods and approaches to housing design. Various stages and tasks in project development – feasibility study, detailed study.

TOTAL: 45 Hours

OUTCOME:

The students should be aware of the different government agencies and their approach to the improvement of the housing conditions in India. Recognize the current situation of conditions of housing in India. Address eco sensitive sustainable design processes, features etc., Aware of various factors involved in the design of human habitat on various scales.

REFERENCES:

1. Kavita Datta and GA.Jones,'Housing and Finance in Develping Countries',Routledge,London,1999.
2. Housing Design –Eugene Henry Klaber – Reinhold publishing corp.
3. Daniel Vallero and Chris Brasier,Sustainable Design – The science of sustainability and Green Engineering;Wiley;2008
4. Thomas E Glavinich; Green Building Constction; Wiley;2008
5. Geofrey K.Payne, Low Income Housing in the Development World, John Wiley and Sons, Chichester,1984.
6. Martin Evans, Housing, Climate and Comfort, Architectural Press, London, 1980
7. An introduction to Urban Housing Design –Graham Towers -2005

		L	T	P	C
16AR 456	**KINETIC ARCHITECTURE**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- The main objective of this course is to describe the principles of kinetic architecture portable and transformable structures in architecture.
- In this course, main principles of mechanisms will be explained, and uses of mechanisms in architecture will be introduced. In this context, kinematic analysis and synthesis of mechanisms will be made.

UNIT- 1 INTRODUCTION 9

Definition – need – history of occurrence.

UNIT- 2 MOVING FLOORS 9

Dynamic floors – meaning, types, Revolving floors; ecological goals; Partial floors – Whole structure– structural systems –Electro-mechanical technicalities involved – energy sources – Dynamic massing; maximizing exploitation of a site's sensual aspects; functional and aesthetic advantages, Applications. Elevatable floors, Buildings on Wheels.

Case studies: The Villa Girasole, Italy; Heliotrope, Germany; Suite Vollard, Brazil; La Mesa spinning House, California; Everingham Rotating House, NSW, Australia; Dynamic Tower by David Fischer, UAE; Villa Hush Hush by Marks Barfield Architects; Masterplan, Åndalsnes, Norway by Jagnefalt Milton

UNIT-3 RETRACTABLE ROOFS 9

Retractable roofs – meaning, purpose, advantages and applications; Spans; shapes – flat, ridge, hip-ridge, barrel and dome; technicalities involved – structural systems: rotating, sliding, folding; Materials suitability; Sports arenas and other applications; Operational mechanisms; Simpler and economic alternatives for small spans; Functional and aesthetic review.

Case studies: Civic arena, Pittsburgh; Rogers Centre, Toronto; Millennium stadium, Wales; Olympic Stadium, Montreal; Krestovsky Stadium, St.Petersburg, Russia; National stadium, Warsaw; Miller Park, Milwaukee; Õita Bank Dome, Japan; Toyota Stadium, Japan; Mercedes-Benz Stadium, Atlanta; University stadium, Phoenix; Arena Națională, Romania; Safeco Field, Washington; The Gardens By The Bay, Singapore; Cloud Seeding Pavilion, Israel by MODU; Yas Viceroy Hotel, Abu Dhabi; Quadracci Pavilion, Milwaukee Art Museum, Calatrava; City Creek Center, Salt Lake City;

UNIT-4 DYNAMIC FACADES **9**

Dynamic Facades –– definition; Types: User-Controlled, Light Projection – facade graphics, Light Control, Wind Responsive; Climate sensitive opening apertures –movable screens, flapping sun-breakers, automated louver, mechanized mashrabiyas; Materials applied: PTFE based membranes, smart glass, Soladigm Dynamic Glass, Super Cilia Skin; Operational mechanisms – energy sources & internal environment regulation; kinetic systems: Homeostatic Facade System, Smart Screen, Tessellate, Permea, Strata, and Adaptive Fritting; Dynamic aesthetics – Reflective and Interactive media facades; applications.

Case studies: University building, Denmark, Henning Larsen Architects; The cogwheel - Kuggen, Sweden; Arab world Institute, Paris, Jean Nouvel; Kiefer Technic Showroom, Austria; Gaes Hearing Aid Factory, Barcelona; Waterfront pavilion, Festival des Architecture Vives, France; Children's Museum, Pittsburgh, Ned Kahn; Brisbane airport kinetic parking garage facade, Ned Kahn; Q1 headquarters, Essen Germany; One Ocean, Thematic Pavilion EXPO 2012, South Korea; Al Bahr Towers, Abu Dhabi; Greenpix – Beijing, China; 'SPOTS' project – Potsdamer Platz 10, Berlin, Germany; The LightScraper, Victoria, Australia; The Rundle Lantern, Adelaide, Australia; 'Tesellate' - Simons Center for Geometry & Physics at Stony Brook; Tacoma Art Museum, Washington by Oslon Kundig; Media-ICT, Barcelona, Cloud 9; MegaFaces, Sochi, Russia; Kinetower, Kinetura.

UNIT-5 FUTURE PROSPECTS & CHALLENGES **9**

Technological challenges; Future of Dynamic buildings – possibilities and limitations. Research and innovations on the anvil. Functional and aesthetic advantages of Kinetic Architecture.

TOTAL: 45 Hours

OUTCOME:

The student will identify all typologies of movable systems in architecture, to comprehend the principles of common mechanisms and adapt their principles to his/her own projects, identify the dynamic loads on a structural system as well as the static loads; and design according by considering these loads,will be able to adapt information from other disciplines.

REFERENCES:

1 Revolving Architecture: A History of Buildings that rotate, swivel and pivot by Chand Randl.

PROFESSIONAL ELECTIVE – V

		L	T	P	C
16AR 458	**ADVANCED STRUCTURAL SYSTEMS**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- By the end of the course the student shall be capable of designing Shells and Space Frames.
- He shall be in a position to appreciate the difference between RCC and pre stressed concrete.
- Further he shall have sufficient knowledge to design pile foundations and suggest appropriate tall structural systems, shells and folded plates and tensile structure for the space coverage.

UNIT- 1 DEEP FOUNDATIONS **9**

Soil Exploration Studies - Pile foundations – Types of pile foundation – Construction techniques – Design of end bearing piles – Design of under reamed pile foundation for apartment buildings as per National building code – Pile caps – Design as per hand books.

UNIT- 2 PRE STRESSED CONCRETE **9**

Introduction to pre stressed concrete – Pre stressed concrete materials – Methods of pre stressing - Analysis and approximate design of determinate beams - losses of prestressing - Comparison between RCC and pre stressed concrete.

UNIT- 3 TALL BUILDINGS **9**

Tall buildings structural systems – Rigid frames – Braced frames – Shear wall – Buildings – Wall frame buildings – Tubular buildings – Tube-in tube buildings – Outrigger braced system – Brief outline of their behaviour and their applicability for various heights of buildings.

UNIT- 4 SHELLS AND FOLDED PLATES **9**

Shells – Types – Classification as per BIS – Stress resultants – Relative merits and applicability. Folded plates – Types – Comparison with shells – Applicability. Arches – Basic concepts – Analysis of three hinged arches.

UNIT-5 SPECIAL STRUCTURES **9**

Definitions, Types – single, double & multilayered grids – two way & three way space grids, connectors, Grids – Domes - various forms - Geodesic domes, Suspended cable structures – types of cable network systems, shapes of cable suspended systems, examples of tensile membrane structures – types of pneumatic structures.

TOTAL: 45 Hours

OUTCOME:

The student will understand the concepts of flat slab design and sky scrapers with application in real case, concepts of Pre-stressed concrete and applying them in real case and theory of tensile structures, grids, domes, shells and folded plates application in design.

REFERENCES:

1. Sinha .N.C and Roy .S.K, Fundamentals of Reinforced Concrete, S.Chand & Co. Ltd., New Delhi, 2001
2. Ramamrutham .S and Narayanan .R, Reinforced Concrete Structures, Dhanpat Rai Publications, New Delhi, 1997
3. Bryan Stafford and Alex Coull, Tall Building Structures, Analysis and Design John Wiley & Sons, New York, 1991
4. Bandyopadhyay .J.N, Thin Shell Structures Classical and Modern Analysis, New Age International Publishers, New Delhi, 1998
5. Ramaswamy .G.S, Design of Construction of Concrete Shell Roofs, McGraw Hill Publishing Company, New York, 1986
6. Krishna Raju .N, Pre Stressed Concrete, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1988
7. Taranath .B.S, Structural Analysis and Design of Tall Buildings, McGraw Hill, New York, 1988.
8. Purushothaman .P, Reinforced Concrete Structural Elements, Tata McGraw Hill Publishing Co Ltd., New Delhi, 1984.

		L	T	P	C
16AR 460	**PROJECT MANAGEMENT & CONSTRUCTION**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- To expose the students to the currently prevalent techniques in the planning, programming and management of a project.

UNIT- 1 INTRODUCTION. **8**

Project planning and project scheduling and project controlling, Role of decision in project management, Method of planning and programming, Human aspects of project management,.work breakdown structure, Life cycle of a project, Disadvantages of traditional management system.project management constructional organization, delegation of responsibilities, Role of an Architect, Engineer and Contractor.

UNIT- 2 ELEMENTS OF NETWORK & CPM AND PERT ANALYSIS **12**

Event, Activity, Dummy, Network Rules, Graphical guidelines for network, Numbering of events. CPM network analysis & PERT time estimates, time computation & network analysis

UNIT- 3 PROJECT TIME REDUCTION AND OPTIMIZATION **10**

Project cost, Indirect cost, Direct project cost, Slope of the direct cost curve, Total project cost & optimum duration, contracting the network for cost optimization, steps in cost-time optimization.

UNIT- 4 PROJECT UPDATING & RESOURCE ALLOCATION **7**

When to update ? Data required for updating, steps in the process of updating. Resource usage profile: Histogram, Resource smoothing and Resource leveling.

UNIT- 5 COMPUTERIZED PROJECT MANAGEMENT & PRACTICAL IMPLICATIONS 8

Introduction : creating a new project, building task. Creating resources and assessing costs, refining your project. Project tracking – understanding tracking, recording actual. Reporting on progress. Analyzing financial progress, Construction site practices, Inspection & quality control.

TOTAL : 45 Hours

OUTCOME:

Apply the project management techniques in solving the construction problems efficiently Different project management techniques to be applied in respective areas The course of a work from the start to the finish to be analysed before the commencement of the project.

REFERENCES:

1. S.P. Mukhopadyay, “Project Management for architects and Civil Engineers”, IIT, Kharagpur
2. 1974.
3. Jerome D. Wiest and Ferdinand K. Levy, “A Managementuide to PERT/CPM”, prentice hall of Indian pub. Ltd. New Delhi 1982.
4. SR.A. Burgess and G. White, “ Building production and project management”, the
5. construction press, London 1979.
6. Dr. Punmia and K.K Kandelwal – project planning and control with PERT/CPM, Laxmi publications, New Delhi, 1987
7. Elaine marmel, Microsoft office project 2003 Bible, Wiley Dreamtact (p) Ltd, New Delhi, 2004

		L	T	P	C
16AR 462	**REAL ESTATE DEVELOPMENT**	3	0	0	3
	Prerequisite - Nil				

OBJECTIVES:

- By the end of the course, students will be thoroughly exposed to the aspects of Real Estate Management. Students shall be capable of managing retail real estate and corporate real estate effectively.

UNIT- 1 REAL ESTATE DEVELOPMENT 9

Fundamental concepts and techniques, recognizing institutional and entrepreneurial elements, issues encountered in various phases of development like site evaluation and land procurement, development team assembly, market study and development scheme, construction & project management, project marketing and hand-over of completed projects.

UNIT- 2 DEVELOPMENT & PROJECT FINANCING 9

Project Feasibility, Development Financing, Asset Disposal and Redevelopment Options, Analyses of Development Sites and Case Studies, integrated case study on a specific development project, which requires reviewing, analysing and resolving the problems or strategic issues.

UNIT- 3 URBAN POLICY & REAL ESTATE MARKETS 9

Impact of Government Regulations and Public Policies on Real Estate Markets, include urban land rent and location theories, land use structures, community and neighbourhood dynamics, degeneration and renewal in urban dynamics, private-public participation, government policies on

public and private housing, and urban fiscal policy including property taxation, local government finance.

UNIT- 4 CORPORATE REAL ESTATE ASSET MANAGEMENT **9**

Strategic plans to align real estate needs with corporate business plans; Performance measurement techniques to identify asset acquisition or disposal; methods for enhancing value through alternative uses, efficient space utilization or improving user satisfaction.

UNIT- 5 COMMERCIAL REAL ESTATE APPRAISAL **9**

Determination of the capitalization rates across different types of properties; Appraisal of freehold and leasehold interests; Critical analysis of the valuation approaches adopted for securitized real estate; Asset pricing models; investment flexibility and future redevelopment opportunities.

TOTAL: 45 Hours

OUTCOME:

To enable the students understand the concept of Real Estate management & give an overview of the Real Estate Market to the students. Providing exposure, at an advanced level, to the wide range of issues that reflect the principal areas of specialization in the real estate profession; Stimulating an awareness of the issues involved in international real estate; Developing analytical and methodological skills that are critical for management, decision-making and problem-solving roles.

REFERENCES:

1. Barron's real estate hand book V Edition, Hauppauge, NY, Barron , 2001
2. Project planning scheduling & control in construction an encyclopedia of terms & applications , New York, Wiley, 1995