



**JAWAHARLAL NEHRU ARCHITECTURE AND FINE ARTS  
UNIVERSITY** Mahaveer Marg, Masab Tank, Hyderabad – 500 028.

**Academic Regulations for B.Arch. Program**  
(Under the CBCS, Effective from the Academic Year 2017-2018)

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**Preamble:**

JNAFAU's Choice Based Credit System (CBCS) aims to provide comprehensive learning opportunities which takes into account individual interests and abilities of the students. Apart from the compulsory core courses, the students can choose from the elective courses on offer in the university or also from approved online platforms like the MHRD's SWAYAM or MOOCs.

*These regulations are subject to amendments as may be decided by the Academic Council / Committee of the University from time to time. Any or all such amendments will be effective from such date and to such batches of students (including those already in the middle of the program) as may be decided by the Academic Council / Committee.*

**1. Glossary of Terms**

- 1.1. **Program:** An educational program leading to award of a Degree in a discipline.
- 1.2. **Course:** Generally referred as a 'subject' offered under the degree program. Each course is identified by a unique course code and course title. A course may be designed to comprise lectures/ studio/tutorials/ laboratory work/fieldwork/ outreach activities/ project work/vocational training /seminars /term papers/ assignments/ presentations/ self-study etc. or a combination of some of these. All courses do not carry the same credits.
- 1.3. **Choice Based Credit System (CBCS):** In addition to the compulsory core courses in a program, CBCS provides **choice** for students to select from a number of elective courses offered. The term **credit** refers to the weightage given to the course and is usually the number of periods per week allotted to it.
- 1.4. **Re-admission:** When a student is detained in a course due to shortage of attendance or the student takes a break of study, the student has to take re-admission to continue the program.
- 1.5. **Re-registration:** When a student has failed in a course due to low internal assessment marks, but has satisfactory attendance, the student can re-register to improve performance in internal assessment as well as external evaluation.
- 1.6. **Re-appearance/ supplementary examinations:** When a student has failed in a course and wishes to improve performance only in end semester external examination he/she can register to reappear for the supplementary examination.
- 1.7. **Director of Evaluation (DE)** means the Authority of the University who is responsible for all activities of the End Semester Examinations of the University.

- 1.8. **Director, Academic and Planning (DAP)** means the authority of the University who is responsible for all academic activities for the implementation of relevant rules and regulations.

## 2. Program Structure

- 2.1. **Category of Courses:** The program shall have a curriculum with syllabi consisting of courses as prescribed by the Board of Studies, and broadly categorized under:

- 2.1.1. **Compulsory Core (CC)** are courses deemed to be the core learning required for the discipline. These courses are part of the compulsory requirement to complete the program of study. A core course cannot be substituted by any other course. A core course offered in this program may be treated as a Professional or Open Elective by other programs.
- 2.1.2. **Professional Electives (PE)** are courses which are elective courses relevant to the discipline. An Elective course is generally a course that can be chosen from a pool of courses on offer. Every student shall be required to opt for the electives from the list of electives offered. Students can also opt for the electives on offer from any of the other Programs, besides his / her own discipline courses, or even do online courses subject to the respective Program specific regulations.
- 2.1.3. **Open Electives (OE)** are chosen generally from an unrelated discipline/ subject, with an intention to seek exposure/ add generic proficiency. These may include Liberal Arts courses, Humanities and Social Science courses, etc. and essentially facilitate the student to do courses (including Core Courses or Professional Electives) offered by other departments/ programs / institutions or online. Open Electives need not be specified in the course structure and the University may approve and offer any Open Elective courses in any semester as an option for the students.
- 2.1.4. **Ability Enhancement Courses (AEC).** These are mandatory courses based upon content that lead to general knowledge, ability and soft skills enhancement, such as, Environmental Studies, Communication Skills, Value Education, etc.
- 2.1.5. **Non- Credit Courses / Activities mandatory for award of Degree:**  
There are some non-credit courses / activity such as: 1) English, 2) Co-Curricular Activity / Extension Activity (EA), 3) any other as specified in the respective course structure / syllabus. A 'Satisfactory' grade in the above, is compulsory for the award of degree.
- 2.1.6. **Online Courses:** Students may be permitted, with the prior approval of the Department, to take online courses through SWAYAM or MOOCs or any other approved online facility, in lieu of the Electives (both PE and OE) offered in the University.

**2.2. Credits:**

2.2.1. Credits are indicative of the importance of the course. In the case of core courses 1 period of direct teaching per week (Theory / Tutorial/ Studio/ Practical) = 1 credit

2.2.2. In the case of other courses like the Electives and the AEC courses, the credits are based on their level of importance as decided by the Board of Studies and as described in their respective course structures.

2.3. **Pre-requisites:** Some of the courses may have pre-requisites (i.e. the student may be required to have registered and attended the course specified as a pre-requisite.)

**2.4. Types of Courses and Learning Sources**

<b>Types of Courses</b>	<b>Learning Sources</b>
Compulsory Core (CC)	Parent Department
Professional Elective (PE)	(PD) PD / OD / online
Ability Enhancement Course (AEC)	PD / OD / online / Univ.
Open Elective (OE)	PD / OD / online / Univ.
Extension Activity (EA)	PD, OD, Univ.

Note: PD = Parent Department; OD = Other Departments / Institutions / Universities

**3. Duration of Program**

3.1. A student is normally expected to complete the Program in five academic years (10 Semesters) but in any case not more than 10 years (including break of study for personal reasons or suspension/ detention due to disciplinary action, etc.).

3.2. Each semester shall normally consist of 90 working days (excluding end semester examination days).

3.3. A student may be permitted to take a break of study for a maximum of one academic year for any personal or medical reason with prior approval. In such cases also the student will be eligible for award of First Class with Distinction/ other awards. Rules of re-admission will apply to such cases.

**4. Registration for choice of Electives:**

4.1. Each student shall be deemed to have registered for **all the compulsory core and other mandatory (AEC) courses** of every semester that he/she is admitted to / promoted to, on the payment of the requisite fees.

4.2. However, in the case of electives (as per the course structure), students shall submit their preferences from the list of electives on offer (including approved online courses), and after allotment of the elective course, register for elective courses of their choice – both professional and open electives.

- 4.3. The information on the list of all the courses offered in every department specifying the course code, course title, credits, prerequisites, the timetable slots and the registration process with the time schedules will be made available on the University website. Every student is expected to go through the above information, consult the faculty members, understand the choices and select their choice of elective courses.
- 4.4. Every student shall submit their preferences from the list of electives on offer (including approved online courses), register / re-register as per the registration process and the schedule notified.
- 4.5. The departments shall put up the list of electives allotted to the students, using their(departments') discretion based on physical and other capacities, with first preference given to the students from the parent department and later, considering a first come first and/or SGPA basis for students from other departments. However, students who have registered for elective courses previously are allowed to re-register for courses in which they have failed.
- 4.6. In case none of the student's preferred choices is allotted, or even otherwise, the student may propose an alternative choice from among the available ones after due consultation with the respective faculty. In any case, the students shall register (which is effected only on their choice of elective being approved) for the courses within the given schedule/ deadline.
- 4.6 After registering for a course, a student shall attend the classes, satisfy the attendance requirements, earn Internal Assessment marks and appear for the End Semester Examinations.
- 4.7 A student is permitted to cancel his/her registration for the elective courses, within two weeks of starting of the semester.
- 4.8 To enable the students to choose electives from across the departments, the DAP shall in consultation with all the departments, facilitate the announcement of a common time-slot for the elective periods in the individual time tables of the departments.
- 4.9 No elective course shall be commenced unless a minimum number of students are registered(this number may be different for different courses and Programs and may be decided by the Departments / College/ University every semester).

## **5. Attendance Requirements**

- 5.1A student has to put in a minimum of 75% of attendance, in aggregate of all the courses registered in the semester (excluding approved online elective courses) for becoming eligible to register for the end examinations and for acquiring credits in each semester.
- 5.2 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the College Academic Committee

on genuine and valid (including medical grounds), based on the student's representation with supporting evidence.

- 5.3 Condonation of shortage of attendance as stipulated above, shall not be automatic but on the merits of the case to the satisfaction of the College Academic Committee.
- 5.4 A stipulated fee shall be payable along with the application for condonation.
- 5.5 Shortage of attendance below 65% in aggregate (including medical grounds) shall in no case be condoned.
- 5.6 A student will not be promoted to the next semester unless the attendance requirement of the present semester is satisfied. In case of such detention the student is not eligible to take the End Examination of that semester and the course registration shall stand cancelled. The student shall seek re admission for that semester when offered next.
- 5.7 In the case of re-registration (clauses 10.4 to 10.7) for a course/s, the attendance requirement is not applicable.

## 6. Assessment

**6.1 Distribution of Internal Assessment and End Exam Marks:** Performance in each course shall be evaluated as prescribed in the respective Program's course structure and syllabus. As a general pattern, 50% of the marks in a course are through internal assessment and 50% through end semester examinations. A few courses may have 100% of the assessment purely through internal assessment. The thesis, the internship courses and many of the studio courses are assessed through a jury and viva-voce for the end semester examination.

**6.2 Schedule for Internal Assessment:** The students shall diligently follow the given internal assessment schedule for the semester including submissions and tests.

**6.3** The compiled cumulative internal assessment marks and attendance of the students will be displayed once in every four weeks for information to the students. 50% of the marks allotted for the internal assessment courses shall be finalized before the 10<sup>th</sup> week. All internal assessment marks have to be finalized and submitted to the DE before the first day of End Semester Examinations of the semester.

**6.4 Assessment for Online Courses:** In case of credits earned through approved online modes, the credits and grades shall be assigned by a committee consisting of Head of the Department or a teacher nominated by the HoD and a senior faculty member nominated by the DAP/ Principal (in case the credits or grades are not included by the online course faculty).

**6.5 Non-Credit, Mandatory Courses / Activity:** Assessment in these courses or activity will be only in terms of "Satisfactory" or "Not Satisfactory". A

'Satisfactory' grade in these listed courses/ activities is compulsory for the award of degree.

6.5.1 English Course: A Test will be administered to the students after admission to assess proficiency in English. Students not passing this test of proficiency will study English as a bridge course (without credits) during the First Semester. They have to acquire a "Satisfactory" grade in the course to be considered eligible for award of a degree.

6.5.2 Co-Curricular Activity / Extension Activity (EA) (for all round development) : Every student has to participate in any one of the following activities like NCC/ NSS/ Sports/ FSAI University's Pro-bono project activity/ any national or international student camp /any other community development activity listed by the University and acquire a "Satisfactory" grade to be considered eligible for award of a degree.

6.5.2.1 The student's performance shall be examined by the faculty in-charge of the relevant extension activity along with the Head/ Coordinator of the Department/ activity.

6.5.2.2 Physically challenged students who are unable to participate in any of the above activities shall be required to take a test in the theoretical aspects of any one of the above activities and be graded and certified accordingly.

6.5.3 Any other course or activity as specified (including the mode of assessment) in the respective course structure or syllabus.

## 7. Award of Letter Grades

7.1 The performance of a student will be reported using letter grades, each carrying certain points as detailed below:

S. No.	%of Marks		Letter Grade	Grade Points
	Minimum	Maximum		
1.	90.00	100.00	A+	10
2.	80.00	89.99	A	9
3.	70.00	79.99	B	8
4.	60.00	69.99	C	7
5.	50.00	59.99	D	6
6.	00.00	49.99	F	0
7.	<i>Shortage of attendance and hence prevented from writing end semester examination</i>		SA	0
8.	Absent for End semester		Ab	0
9.	Satisfactory *		Satisfactory	0

Note: \* Satisfactory grade will be given only for the non-credit courses/ activity such as mentioned in clause 6.5. A 'Satisfactory' grade in these listed course/ activities is compulsory for the award of degree.

Example of assignment of letter grade and grade points for marks:

Course Title	Int. Marks	End Exam	Total	Grade	Grade point (GP)
Course X1	26	25	51	D	6
Course X2	39	41	80	A	9
Course X3	37	34	71	B	8
Course X4	29	30	59	D	6
Course X5	29	34	63	C	7

7.2. A student who earns at least a D grade in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course. A course successfully completed cannot be repeated.

7.3. Students who fail to appear for end semester examinations will be marked as 'Ab' (Absent) and should register for supplementary examination by paying the prescribed fees.

**8. Academic Requirements:** The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in clause 7.

8.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if the student secures not less than 50% marks in the semester end examination, and a minimum of 50% of marks in the sum total or aggregate of the Internal Assessment and Semester End Examination taken together; in terms of letter grades, this implies securing 'D' grade or above in that subject/ course.

8.2 A student failing in any course on the first attempt, will not be eligible for any awards, and/or distinctions including the award of Distinction at the end of the course.

8.3 A student eligible to appear in the end semester examination for any course, but absent from it or failed (thereby failing to secure 'D' grade or above) may reappear for that course in the supplementary examination as and when conducted. In such cases, the internal marks obtained earlier for that course will be retained, and added to the marks obtained in the end semester supplementary examination for evaluating performance in that course.

**9. Promotion between Semesters:**

9.1. A student shall be promoted from odd to even semester if the minimum requirement of attendance as in clause 7 is fulfilled.

9.2. A student shall be promoted from even to odd semester, if the minimum requirement of attendance as in clause 7 is fulfilled and as per the other requirements specified in the following table.

## 9.3. Table indicating promotion requirements from even to odd semesters:

From 2 <sup>nd</sup> sem. to 3 <sup>rd</sup> sem.	If the student does not have more than three backlog courses in the 1 <sup>st</sup> semester.
From 4 <sup>th</sup> sem. to 5 <sup>th</sup> sem.	Secured all the credits upto 2 <sup>nd</sup> semester and does not have more than three backlog courses in the 3 <sup>rd</sup> semester
From 6 <sup>th</sup> sem. to 7 <sup>th</sup> sem.	Secured all the credits upto 4 <sup>th</sup> semester and does not have more than three backlog courses in the 5 <sup>th</sup> semester
From 8 <sup>th</sup> sem. to 9 <sup>th</sup> sem.	Secured all the credits upto 6 <sup>th</sup> semester and does not have more than three backlog courses in the 7 <sup>th</sup> semester

**10. Re-admission and Re-registration**

- 10.1 A student may be detained in a semester either due to shortage of attendance, or due to having more than the permissible number of backlog courses. Students detained due to shortage of attendance may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements.
- 10.2 A student detained due to not having enough credits or having more than the permissible number of backlog courses, shall be promoted to the next academic semester only after fulfilling the requirements as per Table 9.3.
- 10.3 No grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which student has been detained.
- 10.4 The academic regulations under which a student has been first admitted shall be applicable in all cases of re-admission.
- 10.5 If a student fails in a Professional Elective or an Open Elective, the student may re-register for the same or register afresh for any other Professional Elective or Open Elective course respectively in the subsequent semesters. In case of re-registration in the same courses, attendance is not mandatory, whereas registration for any other elective course/s requires the student to attend the classes and fulfill the attendance requirements as per Clause 7.
- 10.6 A student who fails in any course may be permitted the option of re-registering in that subject only if the internal assessment marks are less than 40%, so as to enable him to improve/redo and resubmit the work for internal evaluation. In such cases of re-registration, the student's previous performance both in the internal evaluation and end evaluation in the particular subject/s shall stand cancelled and he/she shall be required to appear for the end semester evaluation again (end examination and /or external jury as the case may be).

10.7 The maximum number of courses a student may be permitted for 're-registration' in a semester, is limited to three. Re- registration of any course should be done within 15 days from the date of commencement of class work. A stipulated fee shall be payable towards re registration in any subject.

10.8 The student may attend classes in the case of the re-registered courses, if the student wishes. However, the attendance requirement is not compulsory for such courses.

## 11. Grade Points, SGPA and CGPA Calculation

11.1. After the results are declared, Grade Sheets will be issued to each student which will contain the list of courses registered during the semester and the performance in each with details of whether passing or failing, credits earned promoted or not, letter grades, grade points ,etc.

11.2. **Grade Points:** The grade points obtained in a subject multiplied by the credits for that subject will be the weighted grade points.

$$\text{Weighted Grade Points (WGP)} = C \times GP$$

Where 'C' is the number of credits assigned for the subject and 'GP' is the Grade Point obtained as per the Table in clause 7.1 above.

11.3. **SGPA:** The sum of the weighted grade points divided by the total number of credits in a semester will give the Semester Grade Point Average (SGPA).

$$\text{SGPA} = \frac{\sum C_i GP_i}{\sum C_{ii}} = 1 \text{ to } n$$

Where n is the number of courses the student registered for in the semester, 'C' is the number of credits allotted to each of the courses, and 'GP' is the grade-point obtained by the student in the respective courses.

An example follows:

Course Title	Credits (C)	Grade (GP)	Weighted Grade Points (WGP)
Course X1	3	7	21
Course X2	8	8	64
Course X3	8	7	56
Course X4	7	7	49
Course X5	2	6	12
Course X6	2	6	12
Total	30		214
Semester Grade Point Average (SGPA) = Total WGP/ Total credits =			7.13

- 11.4. **CGPA:** The Cumulative Grade Point Average (CGPA) will be computed for every student after he/she has secured 283 credits, as:

$$CGPA = \frac{\sum C_i GP_i}{\sum C_i} \quad i = 1 \text{ to } m$$

Where 'm' is the number of subjects registered for in all the semesters from the 1<sup>st</sup> semester onwards. 'C' is the number of credits allotted to each of the courses, and 'GP' is the grade-point obtained by the student in the respective courses.

- 11.5. The CGPA and SGPA will be rounded off to the second decimal place and recorded as such.
- 11.6. For the purpose of computation of the CGPA, award of degree, award of the class as in clause 14, and other honours if any, including medals, the performance in the best 283 credits only will be taken into account.

**12. Eligibility for the Award of Degree:** A student shall be eligible for the award of the "B.Arch." Degree in the specific discipline into which he/she was admitted, if the following academic regulations are fulfilled:

- 12.1. Has pursued the program of study for not less than five academic years and not more than ten academic years. Students, who fail to fulfill all the academic requirements for the award of the degree within ten academic years from the year of their admission, shall forfeit their seat in the program and their seat shall stand cancelled.
- 12.2. Successfully secured at least 283 credits
- 12.3. Successfully secured "Satisfactory" grades in all the mandatory non-credit courses/ activity.
- 12.4. Has secured a minimum of 6.0 CGPA
- 12.5. No disciplinary action is pending against the student.

**13. Withholding of the results:** The results of a student may be withheld if:

- 13.1. He/she has not cleared any dues to the University/Institution/Hostel.
- 13.2. A case of disciplinary action against the student is pending disposal.

**14. Classification of the Degree Awarded**

- 14.1. After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of the B.Arch. Degree in the Program to which he/she was admitted, he/she shall be placed in one of the four classes as shown in the Table.

First Class with Distinction	<ol style="list-style-type: none"> <li>1. 8.0 and above of CGPA and should have cleared each and every subject in a single attempt.</li> <li>2. Should have passed the examination in all the courses of all the eight semesters in the student's First Appearance within five years, which includes any authorized break of study of one year (clause 3.3).</li> <li>3. Withdrawal from examination (as per clause 15) will not be considered as an appearance.</li> <li>4. Should NOT have been prevented from writing end semester examination due to lack of attendance in any of the courses.</li> </ol>
First Class	<ol style="list-style-type: none"> <li>1. Below 8.0 but not less than 7.0 of CGPA and</li> <li>2. Those students who secured a CGPA of 8.0 and above but have cleared at least one or more subjects in more than one attempt.</li> </ol>
Second Class	Below 7.0 CGPA but not less than 6.0

Note: In all the above cases CGPA shall be calculated from the Grade Points secured for the best 276 credits.

- 14.2. A student who is absent in End Semester Examination in a course after having registered for the same shall be considered to have appeared in that examination (except in the case of approved withdrawal from end semester examinations as per clause 15) for the purpose of classification.

#### 15. Provision for Withdrawal from Examination:

- 15.1. A student may, for valid reasons, (medically unfit / unexpected family situations / sports/ etc.) be granted permission to withdraw from appearing for the end semester examination in any course or courses in ANY ONE of the semester examinations during the entire duration of the degree program. The application shall be submitted to the Principal/ Chief Superintendent of the Examination with required documents.
- 15.2. Withdrawal application shall be valid only if the student is otherwise eligible to write the examination (Clause 5) and if it is made before the commencement of the end semester examination in that course or courses and also recommended by the Head of the Department (excepting in the case of any unforeseen incident occurring after registration for the examination, which prevents the student from attending/writing the examination).
- 15.3. Withdrawal shall not be considered as an appearance for deciding the eligibility of a student for First Class with Distinction.
- 15.4. Withdrawal is permitted for the end semester examinations in the final semester only if the period of study of the student concerned does not exceed 5 years.

- 16. Malpractice:** If a student indulges in malpractice in any of the examinations, he/she shall be liable for punitive action as prescribed by the University from time to time.

## **17. General**

17.1 In case of any doubt or ambiguity in the interpretation of the academic regulations, the decision of the Vice-Chancellor is final.

17.2 The University may from time to time revise, amend or change the Regulations, Curriculum, Syllabus and Scheme of Assessment.

**JAWAHARLAL NEHRU ARCHITECTURE & FINE ARTS UNIVERSITY**  
**BACHELOR OF ARCHITECTURE: COURSE STRUCTURE**

S.No.	Course Code	Course Title	Pre-req	Periods per Week				Credits	Marks			End	Remarks*
				L	S/F	P/T/O	Total		Int.	Ext.	Total	W/S/J/P	
FIRST SEMESTER													
1	AR17B1.1C	Basic Design	Nil	1	8	–	9	9	200	200	400	S	Open
2	AR17B1.2C	Architectural Drawing and Graphics-I	Nil	1	3	–	4	4	50	50	100	S	Open
3	AR17B1.3C	Building Construction - I	Nil	1	3	–	4	4	50	50	100	S	–
4	AR17B1.4C	Building Materials – I	Nil	2	–	–	2	2	50	50	100	W	–
5	AR17B1.5C	Structural Mechanics – I	Nil	2	–	1	3	3	50	50	100	W	–
6	AR17B1.6C	Introduction to Art and Architecture	Nil	2	–	–	2	2	50	50	100	W	Open
7	AR17B1.7C	Workshop - Carpentry & Model making	Nil	–	–	4	4	4	50	–	50	–	–
8	GN17B1.2A	Environmental Studies	Nil	2	–	–	2	2	50	50	100	W	–
		Total		11	14	5	30	30	550	500	1050		
SECOND SEMESTER													
1	AR17B2.1C	Architectural Design -I	AR17B1.1C	1	8	–	9	9	200	200	400	S	–
2	AR17B2.2C	Architectural Drawing and Graphics - II	AR17B1.2C	1	3	–	4	4	50	50	100	S	Open
3	AR17B2.3C	Building Construction – II	AR17B1.3C	1	3	–	4	4	50	50	100	S	–
4	AR17B2.4C	Building Materials – II	AR17B1.4C	2	–	–	2	2	50	50	100	W	–
5	AR17B2.5C	Structural Mechanics – II	AR17B1.5C	2	–	1	3	3	50	50	100	W	–
6	AR17B2.6C	History of Architecture -I	Nil	3	–	–	3	3	50	50	100	W	Open
7	AR17B2.7C	Surveying and Leveling	Nil	2	–	1	3	3	50	50	100	W	Open
8	GN17B2.1A	Communication Skills	Nil	1	–	1	2	2	50	50	100	W	Open
		Total		13	14	3	30	30	550	550	1100		
THIRD SEMESTER													
1	AR17B3.1C	Architectural Design -II	AR17B2.1C	1	8	–	9	9	200	200	400	J	–
2	AR17B3.2C	Architectural Drawing and Graphics - III	AR17B2.2C	–	3	–	3	3	50	50	100	S	Open
3	AR17B3.3C	Building Construction - III	AR17B2.3C	1	3	–	4	4	50	50	100	S	–
4	AR17B3.4C	Structural Mechanics – III	AR17B2.5C	2	–	1	3	3	50	50	100	W	–
5	AR17B3.5C	History of Architecture - II	Nil	3	–	–	3	3	50	50	100	W	Open
6	AR17B3.6C	Building Services - I	Nil	3	–	–	3	3	50	50	100	W	–
7	AR17B3.7C	Climatology	Nil	2	–	1	3	3	50	50	100	W	–
8	GN17B2.2A	Value Education	Nil	2	–	–	2	2	50	0	50	-	–
		Total		14	14	2	30	30	550	500	1050		

FOURTH SEMESTER													
1	AR17B4.1C	Architectural Design -III	AR17B3.1C	1	8	–	9	9	200	200	400	J	–
2	AR17B4.2C	Building Construction - IV	AR17B3.3C	1	3	–	4	4	50	50	100	S	–
3	AR17B4.3C	Design of Structures - I	AR17B3.4C	2		1	3	3	50	50	100	W	–
4	AR17B4.4C	History of Architecture - III	AR17B3.5C	3	–	–	3	3	50	50	100	W	Open
5	AR17B4.5C	Building Services - II	AR17B3.6C	3	–	–	3	3	50	50	100	W	–
6	AR17B4.6C	Landscape Design and Site Planning	Nil	2	–	1	3	3	50	50	100	W	Open
7	AR17B4.7C	Computer Applications - I	Nil	–	–	3	3	3	50	50	100	P	–
8	GN17B4.1A	Cultural and Political Studies	Nil	2	–	–	2	2	50	0	50	–	Open
		<b>Total</b>		<b>14</b>	<b>11</b>	<b>5</b>	<b>30</b>	<b>30</b>	<b>550</b>	<b>500</b>	<b>1050</b>		
FIFTH SEMESTER													
1	AR17B5.1C	Architectural Design -IV	AR17B4.1C	1	8	–	9	9	200	200	400	J	–
2	AR17B5.2C	Building Construction -V	AR17B4.2C	1	3	–	4	4	50	50	100	S	–
3	AR17B5.3C	Design of Structures - II	AR17B4.3C	2	–	1	3	3	50	50	100	W	–
4	AR17B5.4C	History of Architecture - IV	AR17B4.4C	3	–	–	3	3	50	50	100	W	Open
5	AR17B5.5C	Computer Applications -II	AR17B4.7C	–	–	4	4	4	50	50	100	P	–
6	AR17B5.6C	Building Estimating, Costing and Specifications	Nil	2	–	2	4	4	50	50	100	W	–
7	AR17B5.xE	<b>ELECTIVE - I</b>	Nil	1	2	–	3	3	50	0	50	–	Open
	AR17B5.1E	Workshop - Vernacular Architecture											
	AR17B5.2E	Workshop - Universal Design											
		<b>Total</b>		<b>10</b>	<b>13</b>	<b>7</b>	<b>30</b>	<b>30</b>	<b>500</b>	<b>450</b>	<b>950</b>		
SIXTH SEMESTER													
1	AR17B6.1C	Architectural Design -V	AR17B5.1C	1	8	–	9	9	200	200	400	J	–
2	AR17B6.2C	Working Drawing and Details	AR17B3.2C& AR17B4.2C	1	3	–	4	4	50	50	100	J	–
3	AR17B6.3C	Architectural Acoustics	Nil	3	–	–	3	3	50	50	100	W	–
4	AR17B6.4C	Building Economics and Sociology	Nil	4	–	–	4	4	50	50	100	W	–
5	AR17B6.5C	Human Settlements & Town Planning	Nil	4	–	–	4	4	50	50	100	W	Open
6	AR17B6.6C	Environment Responsive Design	AR17B3.7C	3			3	3	50	50	100	W	
7	AR17B6.xE	<b>ELECTIVE -2</b>											
	AR17B6.1E	Theory of Design and Architecture	AR17B5.4C	3	–	–	3	3	50	50	100	W	Open
	AR17B6.2E	Advanced Construction Technology & Structural	AR17B5.2C										
		<b>Total</b>		<b>19</b>	<b>11</b>	<b>0</b>	<b>30</b>	<b>30</b>	<b>500</b>	<b>500</b>	<b>1000</b>		

**SEVENTH SEMESTER**

1	AR17B7.1C	Architectural Design -VI	AR17B6.1C	1	9	–	10	10	200	200	400	J	–
2	AR17B7.2C	Advanced Services	AR17B4.5C	3	2	–	5	5	50	50	100	W	–
3	AR17B7.3C	Energy Conservation Building Code	AR17B6.6C	3	-	2	5	5	50	50	100	P	
4	AR17B7.xE	<b>ELECTIVE -3</b>	Nil	4	-	-	4	4	50	50	100	W	
	AR17B7.1E	Urban Design											
	AR17B7.2E	Housing											
	AR17B7.3E	Building Construction Management											
	AR17B7.4E	Interior Design											
	AR17B7.5E	Landscape Architecture											
5	<b>Open Elective - 1</b>						*	*					
6	GN17B7.1A	Personality Development		2		1	3	3	50	-	50	-	
		<b>Total</b>		<b>13</b>	<b>11</b>	<b>3</b>	<b>30</b>	<b>30</b>	<b>400</b>	<b>350</b>	<b>750</b>		

**EIGHTH SEMESTER**

1	AR17B8.1C	Design Studio	AR17B7.1C	1	10	–	11	11	200	200	400	J	–
	AR17B8.1.1C	Architectural Design - VI (Design Studio)											
	AR17B8.1.2C	Building Construction Management (Design Studio)											
	AR17B8.1.3C	Landscape Architecture (Design Studio)											
	AR17B8.1.4C	Interior Design (Design Studio)											
2	AR17B8.2C	Pre-Thesis Seminar	AR17B7.1C	–	2	2	4	4	100	0	100	-	–
3	AR17B8.xE	ELECTIVE - 4		2	2	-	4	4	50	50	100	W	
	AR17B8.1E	Architectural Illumination	AR17B4.5C										
	AR17B8.2E	Architectural Journalism	GN17B2.1A										
4	AR17B8.xE	ELECTIVE - 5		2	2	-	4	4	50	50	100		
	AR17B8.3E	Structures Project	AR17B5.3C									J	
	AR17B8.4E	Workshop - Tall Buildings	AR17B7.2C									W	
5	AR17B8.xE	ELECTIVE -6											
	AR17B8.5E	Furniture and Product Design	AR17B7.4E	2	2	-	4	4	50	50	100	J	
	AR17B8.6E	Architectural Documentation	Nil						100	-	100	J	
	AR17B8.7E	Building Information Modeling	AR17B5.5C						50	50	100	P	
6		Open Elective -2					*	*					
		Total		7	18	2	30	30	450	350	800		

**Note:** \* indicates credits for Open Electives. It is assumed as 3 credits for the purpose of the Course Structure and will depend upon the Course opted.

NINTH SEMESTER													
1	AR17B9.1C	Design Thesis	AR17B8.1C	2	21	–	23	23	300	300	600	J	–
2	AR17B9.2C	Professional Practice & Building Codes	Nil	4	–	–	4	4	50	50	100	W	–
3	AR17B9.xE	<b>ELECTIVE - 7</b>		3	–	–	3	3	50	50	100		–
	AR17B9.1E	Disaster Resistant Architecture	Nil									W	
	AR17B9.2E	Intelligent Buildings	AR17B5.5C									W	
		<b>Total</b>		<b>9</b>	<b>21</b>	<b>0</b>	<b>30</b>	<b>30</b>	<b>400</b>	<b>400</b>	<b>800</b>		
TENTH SEMESTER													
1	AR17B10.1C	Practical Training	AR17B8.1C	–	–	30	30	30	150	150	300	J	–
						<b>30</b>	<b>30</b>	<b>30</b>	<b>150</b>	<b>150</b>	<b>300</b>		
		<b>Total</b>					<b>300</b>	<b>300</b>	<b>4600</b>	<b>4250</b>	<b>8850</b>		

**Note:** \* indicates credits for Open Electives. It is assumed as 3 credits for the purpose of the Course Structure and will depend upon the Course opted.

## FIRST SEMESTER

### AR17B1.1C BASIC DESIGN

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*L/S: 9/WK INT: 200 END EXAM: 200 TOTAL: 400 END EXAM: 5HRS CR: 9*

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#### Course Overview:

Basic Design provides the framework for understanding design by sensitizing students to the conceptual, visual and perceptual issues involved in the design process, through exercises in simple two dimensional and three dimensional compositions.

#### Objectives of the Course:

- To understand the elements and principles of Basic Design as the building blocks of creative design through exercises to develop expression and creative thinking.
- Introduction to design - problem-solving, elements of design, principles of design, 2-D designs in different mediums, colours and textures for articulation of abstract ideas.
- Learning in the subject to be strengthened by conducting at least two workshops (preferably conducted by fine arts faculty), one of which should focus on visual art.

#### Expected Skills / Knowledge Transferred:

The Course prepares ground for the students to gain an understanding into the fundamental issues in design and develop the skill to create solutions for simple elements of building.

#### Course Contents:

##### Unit – I

Introduction to design – importance of design; Study and appreciation of design examples from forms in nature and analysis with respect to

their colour, form, texture and structure.

Exercises involving these natural forms and various approaches to art such as – Representation, Abstraction, and Non-Representational/ Non-Objective compositions.

Analysis of Simple Objects: Critical analysis of simple man-made objects and environments to understand the underlying concepts in their design. Studies to understand function - Aesthetic Relationship, and Anthropometrics.

##### Unit – II

Elements of design: point, line, shape, form, space, texture, value, colour and material; Introduction to the principles of composition: unity, balance, symmetry, asymmetry, proportion, scale and proportion, hierarchy, rhythm, contrast, harmony, focus, movement, direction, gradation, repetition, etc; Application of the principles of composition in two dimensional compositions;

##### Unit - III

Compositions in two dimensions: shapes and patterns; use of grids in creating repetitive patterns; Principles of composition-using grids, symmetrical /asymmetrical, rule of thirds, center of interest etc.

Form generation through addition & subtraction, Anomaly, Positive & Negative spaces, Solid and Voids.

Developing compositions in two dimensional designs like- logos, cover page, collage, mural, floor patterns, grills, railings, gates etc.

##### Unit - IV

Concepts of geometry –different three dimensional forms, primitive forms and understanding the behavior when combined- Transformations to three dimensional forms; Explorative exercises in three dimensional compositions.

Making three dimensional sculptures involving the basic platonic solids and abstract sculptures using various techniques/ materials. (Ex: POP, wire/ matchstick, soap, clay etc.)

## Unit - V

Colour theory, color wheel, primary, secondary, tertiary colors, color schemes, color value and intensity, colour coding systems and psychological factors governing the choice of colour schemes in architecture. Theoretical inputs to be followed by exercises to develop the ability to translate abstract principles into two and three dimensional compositions.

## UNIT VI

Design of non-enclosed object. eg. park seat, push-cart, built-in furniture etc. Developing compositions in of semi-enclosed spaces-entrances, gateways, portal, compound walls etc.

## Unit - VII

Study of ornament in architectural design: documentation and comparison of different types of ornamentation in historical and contemporary buildings, to understand their design features as studied in the previous units.

### Reference books:

**Wucius, Wong.** Principles of two Dimensional Design. Van Nostrand Reinhold 1972.  
**Maier Manfred** Basic Principles of Design, Vol.1, 2, 3 & 4, Van Nostrand Reinhold, NY. (1977)

**Ching, Francis D.K.** Architecture: Form, Space, and Order, 2<sup>nd</sup> ed. Van Nostrand Reinhold, New York, 1996.

**Hanks, A. David.** Decorative Designs of Frank Lloyd Wright, Dover Publications, Inc. New York, 1999.

**Hepler, E. Donald, Wallach, I. Paul.** Architecture Drafting and Design, 3<sup>rd</sup> ed. McGraw-Hill Book Company, New York, 1977.

**Itten, Johannes.** Design and Form: The basic course at the Bauhaus, Thames and Hudson Ltd., London 1997.

**Krier, Rob.** Architectural Composition, Academy Editions, London, 1988.

**Meiss, Pierre Von.** Elements of Architecture: From form to place, E and FN Spon, London, 1992.

**Pipes, Alan.** Drawing for 3-Dimensional Design. Thames and Hudson Ltd., London 1990.

**Shibikawa, Ikuyoshi and Takahashi, Yumi.** Designers Guide to Colour.

**Smithies, K.W.** Principles of Design in Architecture. Chapman and Hall, 1983.

## AR17B1.2C ARCHITECTURAL DRAWING AND GRAPHICS – I

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*L/S: 4/WK INT: 50 END EXAM: 50 TOTAL: 100 END EXAM: 5HRS Cr: 4*

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### Course Overview:

The course introduces the fundamental techniques of architectural drawing and develops the appropriate skills for visualization and representation.

### Objectives of the Course:

To introduce architectural drawing techniques and to facilitate effective visual communication.

**Expected Skills / Knowledge Transferred:** Freehand, scale drawing, conventional architectural representations in drawings and graphics.

### Course Contents:

#### Unit – I

**Introduction:** Fundamentals of drawing and its practice, introduction to drawing equipment, familiarization, use and handling. Drawing sheet sizes, layouts and composition. Simple exercises in drafting, line types, line weights; dimensioning, use of scale

#### Unit – II

Typography –anatomy of Type, Styles, Roman and Gothic style lettering; freehand lettering, title panels and legends.

#### Unit – III

**Geometrical Construction:** Constructing simple and complex geometrical shapes involving various drafting techniques; regular shapes using T-squares, set-squares; straight lines, triangles, quadrilaterals, circles, tangents, regular polygons, polygons inscribed in circle.

Description of Plane Curve: Ellipse, Parabola, Hyperbola and Ovals.

## Unit – IV

**Architectural Symbols:** Representation of building elements, openings, materials, furniture and accessories; human postures; vegetation; vehicles; terminology and abbreviations used in architectural representation.

## Unit – V

**Measuring and Drawing to Scale:** Scales and construction of scales, scaled drawings of simple objects, dimensions; scaled drawings of furniture, rooms, doors and windows etc., in plan, elevation and section. Reduction and enlargement of drawings.

## Unit – VI

**Free Hand Drawings:** Line strokes, light and shade techniques of simple, natural and 3D geometric forms. Study of proportions and scale; structure and axes of objects; Indoor and Outdoor sketching of built and natural forms: Still life, furniture, etc.

**Note:** This is a studio subject and students should be made to prepare drawings as studio exercises along with the theoretical inputs. The studio work should be supplemented with appropriate site visits.

### Reference books:

- Moris, I.H.** Geometrical Drawing for Art Students.  
**Thoms, E. French.** Graphic Science and Design, New York: MC Graw Hill.  
**Nichols, T.B. and Keep, Norman.** Geometry of Construction, 3<sup>rd</sup> ed. Cleaver – Hume Press Ltd., London, 1959.  
**Bhatt, N.D. and Panchal V.M.** Engineering Drawing: Plane and Solid Geometry, 42<sup>nd</sup> ed. Charotar Pub., Anand, 2000.  
**Gill, P.S.** T.B. of Geometrical Drawing, 3<sup>rd</sup> ed. Dewan Suhil Kumar Kataria, Ludhiana, 1986.  
**Shah, M.G., Kale, C.M. and Patki, S.Y.** Building Drawing: with an integrated approach to built environment, 7<sup>th</sup> ed. Tata McGraw Hill Pub., Delhi, 2000.  
**Bies, D. John.** Architectural Drafting: Structure and Environment. Bobbs – Merrill Educational Pub., Indianapolis.  
**Nelson, A. John.** H.B. of Architectural and Civil Drafting, Van Nostrand Reinhold, New York, 1983.

## AR17B1.3C BUILDING CONSTRUCTION- I

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<i>L/S: 4/WK</i>	<i>INT: 50</i>	<i>END EXAM: 50</i>	<i>TOTAL: 100</i>	<i>END EXAM: 5HRS</i>	<i>Cr: 4</i>
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### Course Overview:

The course introduces to the methods and techniques of construction of basic elements of a simple building.

### Objectives of the Course:

To understand the elementary and simple construction methods, explaining basic principles and considerations in the construction of one roomed rectilinear building with verandah.

### Expected Skills / Knowledge Transferred:

To understand the techniques of construction of a simple load bearing structure with simple material like brick, stone etc.

### Course Contents:

#### Unit I

**Basic building components:** Cross section of a small building to understand foundation, plinth beam flooring, sill, lintel, roof beam and slabs parapet & weathering course

Walls: Details of walls section across the opening (door & window)  
Roofs: simple configurations and details of various forms of roofs (flat, slope pyramidal & dome)

#### Unit – II

Brickwork: Various types of bonds, stopped ends, junctions, piers, jambs, footings, foundations, corbelling, damp proof course, window sills, thresholds, copings, mortar joints and pointing.

#### Unit – III

Stone masonry: stone walls, rubble work, ashlar work, masonry joints, window sills, plinth, cornices, surface finishes.

## Unit – IV

Composite masonry: Brick backed ashlar, rubble backed ashlar, concrete backed masonry, ashlar faced concrete walls, marble faced masonry; tile faced concrete, hollow block masonry.

Cladding: Cladding of various materials-marble, granite, slate, tiles, metal etc.

## Unit – V

Lintels: Lintels of wood, stone, brick.

Arches: arches; terms defined; various forms of arches like segmental, semi-circular, elliptical, three-centered, flat and relieving arch, etc.

## Unit – VI

Building Foundations: Definition, safe bearing capacity of soils; brick and stone foundations, simple, steeped, combined and cantilevered footing, RCC footing.

Basement: Damp proofing, different types of damp proof materials, their compositions and application, Constructional details of walls, floors, foundations etc. with respect to their damp proofing and natural ventilation.

## Unit – VII

Construction techniques of the past: Ground and upper floors: solid floor, brick flooring, floor finishing and floor coverings, Basement floor. Wooden ground and upper floors: Terms defined, bridging joists, binding joists, binders, beams and girders, solid and herring bone strutting, floor boards, ceiling joists, trimming floors to accommodate fire place. Details of fire place.

Flat roofs: Madras terrace, Jack arch, elementary knowledge about R.C.C roof and floor slabs.

This unit to be taught with the objective of giving a historical perspective. A broad orientation may be given without preparation of drawing plates.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organizations or field/site visits should be organized. At least two exercises to be done in the construction yard. A weight age of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

## Reference books:

**Barry, R.** The Construction of Buildings Vol. 2, 5th ed. East-West Press. New Delhi, 1999.

**Bindra, S P. and Arora, S P.** Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub. New Delhi, 2000.

**Hailey and Hancork, D.W.** Brick Work and Associated Studies Vol. 2. MacMillan, London, 1979.

**Moxley, R. Mitchell's** Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004.

Sushil Kumar. T.B. of Building Construction, 19th ed. Standard Pub, Delhi, 2003.

## AR17B1.4C BUILDING MATERIALS – I

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L/S: 2/WK	INT: 50	END EXAM: 50	TOTAL: 100	END EXAM: 3HRS	Cr: 2
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### Course Overview:

The course provides information on the properties, use, installation and costs of basic building materials.

### Objectives of the Course:

To impart knowledge on the various building materials,

To highlight the current trends and innovations in the usage of building materials.

### Expected Skills / Knowledge Transferred:

Knowledge required for specifying appropriate materials for various spaces in buildings.

### Course Contents:

#### Unit –I

Brick as a building material: Types, properties, uses and manufacturing methods. Brick: Composition of earths, standard, market and ISI. size properties, as per ISI brick manufacturing processes, requirements and tests for good bricks. Fire clay bricks - varieties; sand lime bricks;

paving bricks; Terra-cotta-its varieties: ordinary, glazed, porous, polished and fine; sun dried brick, Special types of bricks, uses and properties Different uses of brick in construction.

**Building Tiles:** Roof, floor and wall tiles.

#### Unit –II

**Stones:** Classification of stones: granite, laterite, quartzite, marble and slates -properties and uses; stone units - khandki, rubble, black stones, stone metal, flag stones. method of quarrying of building stones, types of stone dressings defects in stone, stones used in construction, uses in construction, aggregates. tool used, Preservation of stone work.

#### Unit –III

**Sand :** Pit, river sea sand, gravel, bulk age of sand, impurities in sand their removal, tests for silt and organic contents different grades of sand with respective to size and their application. I.S.I. standards, use in mortar and concrete.

#### Unit –VI

**Cement:** Ingredients and properties of cement, Types of cement, Grades of cement, Initial and final setting time, Test of cements, ISI Standards, Pozzolana material and its properties.

#### Unit –V

**Mortars:** Types, proportioning, mixing and grinding, mortar, cement mortar, lime mortar, methods of preparing, handling and uses of mortars, Surkhi-mortar, light weight mortars i.e. cinder, sawdust and fibrous plaster, gypsum plaster, Plaster of Paris and application.

**Concrete:** Concrete and its constituents, aggregate: coarse and fine, properties of concrete, strength, durability, etc. Effect of age on strength.

Grading: importance, fineness modulus, combined aggregate, water cement ratio. Mixing and Curing.

#### Unit –VI

**Timber:** Building timber types and its properties, sawing of timber, shrinkage and distortion, wastage, methods of sawing. Drying and seasoning, moisture contents, purpose of seasoning, natural and artificial. Defects in timber. Use and application of timber in construction.

**Processed woods:** Plywood and Synthetic boards properties and application. Use of alternative materials as substitute to wood.ISI standards

#### Unit –VII

**Ferrous Metals -** Pig iron, cast iron, wrought iron, steel, manufacturing processes and casting. Characteristics form and uses of cast iron, wrought iron and steel.

Alloys steel, stainless steel, steel-treatment, steel tempering, annealing, normalizing, and case hardening, their objectives and effect on alloy steels. Galvanizing, oxidation and casting of metallic products, corrosion of iron and their prevention. Metallic protective coatings.

**Non ferrous Metals:** Basic idea of important ores, properties and uses of Aluminum, Zinc, Copper, Tin and Lead

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

*Students should be exposed to Lab tests in the context of the listed materials.*

#### Reference Books:

**Hailey & Hancock, D.W.** Brick Work & Associated Studies Vol. 2. MacMillan, London, 1979.

**Moxley, R.** Mitchell's Elementary Building Construction, Technical Press Ltd. **Rangwala,**

**S.C.** Building Construction, 22<sup>nd</sup> ed. Charotar Pub. House, Anand, 2004. **Sushil Kumar.**

T.B. of Building Construction, 19<sup>th</sup> ed. Standard Pub, Delhi, 2003.

## AR17B1.5C STRUCTURAL MECHANICS – I

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*L/S: 3/WK INT: 50 END EXAM: 50 TOTAL: 100 END EXAM: 3 HRS Cr: 3*

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### Course Overview:

Gives an in-depth understanding of the concepts associated with different Elements of Structures.

### Objectives of the Course:

To provide knowledge of different forces, force systems, Beams types sectional Properties behavior of different members due to applied forces.

**Expected Skills / Knowledge Transferred:** Basic principles of mechanics and behavior of elements of structures.

### Course Contents:

#### Unit – I

**Introduction:** Forces, system of forces, resultant, equilibrant Parallelogram law, Triangle law, Lamis Theorem, polygon law, resultant of coplanar, concurrent force system, couple, characteristics of couple, moment, Equilibrium, Varignon's Theorem.

#### Unit – II

Analysis of trusses, types of stresses, Loads on trusses, 2-D truss analysis using method of joint (Cantilever & Simply Supported)

#### Unit – III

Stress, Strain, type of stresses, stress-strain curve for ductile Material, Hooke's law, Modulus of Elasticity, Bars of Varying Section, Bars of Composite Section.

#### Unit – IV

Shear stress, types of Strain, poissons Ratio, Shear modulus Bulk Modulus Relation between the three Elastic Constants members

subjected to 3 mutually perpendicular forces

#### Unit – V

Types of Beams, types of loads, calculation of reactions for simply supported beam (Using Point loads & Udl's) definition shear force & Bending Moment SFD& BMD for Cantilever beams.

#### Unit – VI

Shear force & Bending Moment diagrams for simply supported & over hanging beams for point loads & UDL, point contra flexure & its location, Relation between loading, SF & BM

#### Unit – VII

Definition of centroid, line of symmetry ,centroid for some standard shapes, calculation of centroid for shapes like L,T,C,I Sections etc., moment of inertia, Derivation of M.I formula for Rectangle, circle, Triangle, calculation of M .I for L,T,C,I Sections etc.,

#### Unit VIII

Types of joints, lap joint & butt joint, failure of riveted joints, strength of the joint, efficiency of joint, Unwins formula, chain riveting & Diamond Riveting

### Reference Books

**Khurmi. R.S.** Engineering Mechanics, S. Chand and Co. Ltd., New Delhi, 1999.

**Ramamrutham. S.** Engineering Mechanics, 7th ed. Dhanpat Rai Pub. Co. Ltd., Delhi, 2004.

**Timoshenko. S. and Young, D.H.** Engineering Mechanics, McGraw-Hill International Editions.

## AR17B1.6C INTRODUCTION TO ART AND ARCHITECTURE

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*L/S: 2/WK INT: 50 END EXAM: 50 TOTAL: 100 END EXAM: 3 HRS CR: 2*

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### Course Overview:

Introduces fundamental ideas, methodologies and terminologies in art and architecture, shedding light on why certain works were produced, what meanings they communicated, and how they are important to our contemporary society. Emphasis will be placed on styles and the unique historic contexts and circumstances that shaped them.

### Objectives of the Course:

To analyze various art forms, and understand the techniques involved in creative thinking.

**Expected Skills / Knowledge Transferred:** Understanding various art forms, appreciate art and architecture.

### Course Contents:

#### Unit – I

**Purpose and relevance of art, Art consciousness:** Aesthetics, perception, symbolism, expression, style, fashion, appropriateness and values. Understanding works of art.

Its role meaning and purpose in terms of basic characteristics and development as an expression of culture

#### Unit – II

Development of art; A survey of history of art forms; pre-historic period to the present times; Changing nature of art through time in terms of content; form and material

#### Unit – III

Exploration of art forms - Role and meaning of art-various types of arts - fine arts, performing arts, commercial arts, industrial arts, folk arts, abstract art, visual arts, spatial arts, temporal arts, pop art etc.

Nature and characteristics of art forms such as Painting, Sculpture, Architecture, Photography, Almost Art; Nature and characteristics of

art forms such as Dance, Drama, Music, The Film, Literature  
Relationship between art and architecture from earliest times.

#### Unit – IV

Definitions and general understanding of architecture, role of architect in a building project. The changing role of architects, his relation with other consultants, contractors and client, technical knowledge and other skills required as inputs. Various subjects to be learnt by architecture students, their relevance to practice.

#### Unit – V

Various factors influencing the architecture of a region, architecture as a response to social, technological and environment forces. Evolution of shelter forms in regions of the world and examples of vernacular architecture in the world, with particular reference to India.

### Reference Books:

**Craven, C. Roy.** Indian Art a Concise History.

**Kumar, Raj (Ed.).** Essays on Indian Art and Architecture. Discovery Pub., New Delhi, 2003.

**Fisher, E. Robert.** Buddhist Art and Architecture. Thames and Hudson, London, 1993.

**Ghosh, A (Ed.).** Jain Art and Architecture Vol. 1-3. Bharatiya Jnanpith, New Delhi.

**James C. Snyder,** Introduction to Architecture, New York: Mc Graw Hill.

**Christopher Alexander,** Pattern Language, New York: Oxford University Press

**Thomas Mitchell,** Redefining Designing: From to Experience,

**James snyder and Anthony Y catanse,** Introduction to Architecture, Mc Graw-Hill Book company, New York, 1979.

Rapoport, Amos, House form & Culture.

## AR17B1.7C WORKSHOP- CARPENTRY & MODEL MAKING

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L/S: 4/WK	INT: 50	END EXAM: NIL	TOTAL: 50	END EXAM: NIL	CR: 4
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### Course Overview:

The course provides the foundation and capability to represent the concepts three dimensionally.

### Objectives of the Course:

To introduce various fabrication skills and techniques necessary to produce scale-models and to encourage preparation of models as an essential phase in design development and evaluation.

**Expected Skills / Knowledge Transferred:** Dexterity; Knowledge of materials and their properties; craft skills; visualization skills;

### Course Contents:

#### Unit – I

Introduction to model-making: Need; role of scale-models in design; general practices; Digital models.

#### Unit – II

Essentials of model-making: understanding of various tools and machines employed, best practices involved in operating the tools and the techniques.

#### Unit – III

Survey of various materials available for model making such as papers, mount boards, wood, plastics, films, plaster of paris, acrylic, Styrofoam, wax, metals, glass, FRP, etc. and exploring their potential in model-making. Chamfering at 45 degrees in mountboard.

#### Unit – IV

Techniques of Scale-modeling: Use of different scales; templates; measuring aids; conventions followed.

#### Unit – V

Techniques for preparation of presentation models, mock-ups, simulation of various materials and textures such as wood, glass, aluminum, steel, bricks, roofing tiles, flooring, corrugated sheets, upholsteries etc.

#### Unit – VI

Carpentry: Introduction to the use of different types of tools and different types of joints used in carpentry. Joinery details which are commonly used in timber construction. Application of surface finishes such as polish, varnish, lacquer on wood.

#### Unit—VII

Photography in built models, using lighting and natural background.

### Assignments.

At least three major assignments involving the individual students to fabricate

- Scale model of a piece of furniture
- Presentation of models
- mock-up of an everyday object
- Three-dimensional forms etc.

Documentation of the important phases of fabrication is must which shall become the basis for internal evaluation.

### Reference books:

**Bernald, S and Copplene, Myers.** History of Art.

**Craven, C. Roy.** Indian Art a Concise History.

**Krier, Rob.** Element of Architecture. Academy Editions, London, 1992.

**Lang, Jon.** A Concise History of Modern Architecture in India. Permanent Black, Delhi, 2002.

**Magnet, Jacque.** The Aesthetic Experiences: An anthropologist looks at the Visual Art.

**Preble, Duame.** Art Forms.

**Snyder, C. James and Catanese, J. Anthony.** Introduction to Architecture.

**Tapert, Annette. Swid Powell:** Objects by Architects. Rizzoli, New York, 1990. **Thyagarajan.** Basic practical photography

**Ching Francis D.K:** Architecture: Form, Space, and Order.

## GN17B1.2A ENVIRONMENTAL STUDIES

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L/S: 2/WK INT: 50 END EXAM: 50 TOTAL: 100 END EXAM: 3 HRS CR: 2

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### Course Overview:

A compulsory subject for all the undergraduate students of various discipline highlights significance of maintaining balance and sustainability of various components of the environment.

### Objectives of the Course:

To sensitize the students towards sustainable environment.

### Course Contents:

#### Unit – I

**Environmental studies – Introduction:** - Definition, scope and importance, Measuring and defining environmental development indicators.

#### Unit - II

**Environmental and Natural Resources:** Renewable and non-renewable resources - Natural resources and associated problems - Forest resources - Use and over - exploitation, deforestation, case studies - Timber extraction - Mining, dams and other effects on forest and tribal people - Water resources - Use and over utilization of surface and ground water - Floods, drought, conflicts over water, dams - benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

#### Unit - III

**Basic Principles of Ecosystems Functioning:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

#### Unit - IV

**Biodiversity and its conservation:** Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values *Biodiversity* at global, National and local levels. - India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

#### Unit - V

**Environmental Pollution:** Definition, Cause, effects and control measures of:

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

#### Unit - VI

Social Issues and the Environment: From unsustainable to sustainable development -Urban problems related to energy -Water conservation,

rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies - Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. -Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

### **Unit - VII**

Human Population and the Environment: Population growth, variation among nations. Population explosion - Family Welfare Programme. - Environment and human health. -Human Rights. -Value Education. - HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. -Case Studies.

### **Unit - VIII**

Field work: Visit to a local area to document environmental assets River /forest grassland/hill/mountain -Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystems pond, river, hill slopes, etc.

### **TEXT BOOK:**

**Erach Bharucha**, A Text Book of Environmental Studies for Undergraduate Courses, University Grants Commission.

## SECOND SEMESTER

### AR 17B2.1C ARCHITECTURAL DESIGN – I

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: 5 hrs    Cr: 9*

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#### Course Overview:

This course is intended to provide framework for understanding design as a process.

#### Objectives of the Course:

Simple space organization starting with single activity to multifunctional spaces.

Spaces responding to human anthropometrics

#### Expected Outcome:

To understand principles of design. To develop the ability to translate abstract principles of design into architectural solutions for small problems.

#### Course Contents:

##### Unit - I

Anthropometrics: Basic -average measurements of human body in different postures-its proportion and graphic representation, application in the design of simple household and street furniture. Use of mannequins in defining spatial parameter of design.

##### Unit - II

Study of functional spaces and the issues like clearances, lighting and ventilation, furniture arrangements; Minimum and optimum areas for various functions; Detailed study of spaces such as living, dining, bedrooms, kitchen, toilet, etc.

Study of the human considerations like, privacy, convenience, comfort, etc.; Case study of a house and a critical appraisal of the spaces.

##### Unit - III

Introduction to design process. Pre- Design Studies: Preparation of design brief, the user requirement and their implications, Study of the site and the context;

Design Response: Development of concept, Graphic tools like circulation diagrams, Figure Ground studies, etc. Integration of form and function in the design of an enclosed object/space using the materials studied. e.g. Security cabin, grocery store, caravan, bus shelter, milk booth, traffic police kiosk, flower stall, ATM Center, etc.

##### Unit – IV

Listing of important local buildings and understanding the reasons for their importance.

Listing and Drawing silhouettes of favourite buildings or places.

Observing the built environment around and experiencing enclosures (field trips)

Local stories on architecture.

Introduction to basic development of forms: additive form, deductive form, rhythm, contrast, balance and symmetry.

Concepts of volume and scale, width to height ratio.

Study models to explore the design principles. Multiple sectional drawings of study models.

At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

**Reference books:**

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1980.

**Kirk, Paul Hayden and Sternberg, D. Eugene.** Doctors Offices and Clinics, 2<sup>nd</sup> ed. Reinhold Pub., USA, 1960.

**Neufert, Ernst.** Ernst Neufert Architects Data, Granada Pub. Ltd., London, 1970.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

Shah, S. Charanjit. Architects Hand Book Ready Reckoner. Galgotia Pub. Co., New Delhi, 1996.

**AR 17B2.2C ARCHITECTURAL DRAWING AND GRAPHICS – II**


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<i>L/s: 4/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 5hrs</i>	<i>Cr: 4</i>
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**Course Overview:**

The course is intended to develop the techniques of architectural drawing pertaining simple and complex solid geometrical forms of Building geometry Sciography and Documentation.

**Objectives of the Course:**

To impart the skills of three dimensional visualization and presentation.

**Course Contents:****Unit – I**

Orthographic Projections (first angle projection): Principles of orthographic projection; projections of points, lines, planes –all combinations; Orthographic projection of solids; Orthographic projection of architectural built elements and built forms: (with increasing complexity)

Building Geometry: Study of points, lines, and planes leading to simple and complex solid geometrical forms; Representation of 3D elements in Plan and Elevations

Use of circle in mouldings and arch forms - Ovolo Covetta, Ogee, Lancet, Horse shoe, Moorish, Stilted and Rampant, Tudor, three

centered and drop. Exercises on Ionic volute, Entasis of column etc., working with models to facilitate visualization.

**Unit –II****Sciography:**

Simple and composite forms, shadows on horizontal, vertical planes and on their own surfaces. Study of shade and shadows of simple geometrical solids of various forms and groups of forms.

Shade and shadow techniques leading to advanced practical examples: shades and shadows on buildings or parts of buildings. Relative changes in building shades and shadows with sun angle, time, building height. Introduction to sciography in perspective.

**Unit-III****Architectural Documentation:**

Detailed measured drawing and documentation of any interesting historical or modern building – preparation of maps, plans, elevations, sections, views etc.

**Reference books:**

**Thoms, E. French.** Graphic Science and Design, New York: MC Graw Hill.

**Nichols, T.B. and Keep, Norman.** Geometry of Construction, 3rd ed. Cleaver – Hume Press Ltd., London, 1959.

**Bhatt, N.D. and Panchal V.M.** Engineering Drawing: Plane and Solid Geometry, 42nd ed. Charotar Pub., Anand, 2000.

**Gill, P.S. T.B.** of Geometrical Drawing, 3rd ed. Dewan Suhil Kumar Kataria, Ludhiana, 1986.

**Shah, M.G., Kale, C.M. and Patki, S.Y.** Building Drawing: with an integrated approach to built environment, 7th ed. Tata McGraw Hill Pub., Delhi, 2000.

**Claude Batley:** Design Development of Indian Architecture

**Ernest Burden:-**Architectural Dilineation

## AR 17B2.3C BUILDING CONSTRUCTION – II

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr: 4*

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### Course Overview:

The course introduces to the methods and techniques of construction of doors and windows, stairs and partitions of a building using different materials.

### Objectives of the Course:

To understand the elementary and simple construction methods like joinery details in wood, fixing of hardware.

### Expected Skills / Knowledge Transferred:

To understand the techniques of constructing doors and windows, staircase and partitions using different materials

### Unit – I

Carpentry and joinery: Terms defined; mitring, ploughing, grooving, rebating, veneering. Various forms of joints in wood work, such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon etc;

### Unit – II

Doors: Definition of terms, types of doors: wooden, ledged, ledged and braced, paneled, flush door. Hinged, single and double shutters, sliding, folding, revolving, pivoted.

### Unit – III

Windows: Casement, top and bottom hung, pivoted and sliding sash, UPVC doors and windows.

Hardware: fixtures, locks, hinges, fastenings for doors and windows.

### Unit – IV

Steel: windows, rolling shutters and grills. Aluminium doors and windows.

### Unit – V

**Partition Walls:** Various types of glazed and wooden partitions and paneling; Sound proof and light weight partitions; Brick partition, reinforced brick partition, brick nogged partition, lath and plaster partition, pre-cast concrete partition, glass block and glass create partition, common wooden partition, trussed partition.

### Unit – VI

Staircases: Principles of staircase construction and its elements; Terms defined, Tread, riser, stringer, nosing, flight, landing, head room, handrail, balusters, newel post etc., types of stairs i.e., straight, doglegged, open well, geometrical, circular, spiral, bifurcated, wooden stairs, stone stairs, metal stairs and elementary knowledge of R.C.C. stairs. Details of various staircases in wood, stone, steel and RCC.

### Unit – VII

Flooring & Flooring finishes: Various natural and manufactured materials: Types of Stone flooring: Granite, Marble, Kota, Shahbad (Limestone), Flagstone, Wooden Flooring, Ceramic and Vitrified Tiles. Concrete floors, Brick on edge, Indian patent floor, granolithic, terrazzo, pitch mastic, Magnesium Oxide, Chloride.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

### Reference Books

**Barry, R.** The Construction of Buildings Vol. 2, 5th ed. East-West Press. New Delhi, 1999.

**Bindra, S P. and Arora, S P.** Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub. New Delhi, 2000.

**Hailey and Hancock, D.W.** Brick Work and Associated Studies Vol. 2. MacMillan, London, 1979.

**Moxley, R. Mitchell's** Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction, 22nd ed. Charotar Pub. House, Anand, 2004.

**Sushil Kumar. T.B.** of Building Construction, 19th ed. Standard Pub, Delhi, 2003.

## AR 17B2.4C BUILDING MATERIALS – II

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<i>L/s: 2/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 3hrs</i>	<i>Cr: 2</i>
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### Course Overview:

The course is intended to provide information on the properties, uses, installation and costs of building materials. The course highlights on Mechanical and physical properties of various materials. Influence of various factors on these properties. Causes of defects, their prevention and remedies. Testing of materials.

### Objectives of the Course:

To provide knowledge on the various types of building materials used while highlighting the current innovations and trends.

### Expected Skills / Knowledge Transferred:

Knowledge required for specifying appropriate materials for various spaces in buildings.

### Course Contents:

#### Unit – I

**Laminates and Veneers:** Resin bonded ply wood, types of laminates, laminated wood, insulating boards and other

miscellaneous boards, veneers from different varieties of timber, their characteristics and uses MDF& HDF Boards.

#### Unit – II

**Paints and Varnishes:** Protective coating, paints, constituents of paints, their functions, water paints, distempers, and cement based paints, emulsion paints, selection of paints, and storage of paints.

**Types varnishes** (oil and spirit): characteristics and uses of varnishes. French polish, anti-corrosive paint, damp proofing finishes.

#### Unit – III

**Glass and glass products:** Composition and fabrication of glass, types of glass, wired glass, fiber glass, rock wool, laminated glass, glass-crete blocks, structural glass, their properties and uses in buildings.

#### Unit – IV

**Plastics:** Polymer types, thermo setting and thermo plastics, resins, common types of moldings, fabrication of plastics, polymerization and condensation, plastic coatings.

Composite materials, classification, properties and uses - linoleum, plastic coated paper, polythene sheets, reinforced plastic, plastic laminates and PVC.

Properties and architectural uses of plastics – structural plastics – Reinforced plastics and Decorative laminates-plastic coatings, Adhesives and sealants – Modifiers and

Primary plastic building products for walls, roof and partitions. Secondary building products for rooms, windows, roof lights, domes, gutters and handrails.

#### Unit – V

**Floorings:** Introduction, essential requirements of a floor, factors affecting selection of flooring material, Various natural as well as artificial flooring materials like brick, flag stone, tiled, cement

concrete, granolithic, terrazzo, marble, shahbad stones timber flooring, timber floor supported on RSJ, flag stone floor resting on RSJ,, vitrified tiles, ceramic tiles, , Mosaic, rubber, Linoleum, and PVC and PVA flooring

## Unit – VI

**Roof Coverings:** Introduction, requirements of good roof, technical terms, classification, types of roof coverings for pitched roof. : Roofing tiles and roofing with cement products like A.C. sheet roofs, G.I. Sheets roofs, slates.

## Unit – VII

**Miscellaneous Materials and treatments:** Properties and uses of Asbestos, cork, felt, mica, adhesive, Bakelite, china clay, fiber glass, leather, canvass, jute, rubber, Asphalt and Bitumen

**Materials for Special Treatments:** Fire resistant, waterproofing, and anti-termite treatment. 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: waterproofing membranes such as rag, asbestos, glass felt, plastic and synthetic rubber- vinyl, butyl rubber, neoprene, polyvinyl chlride – prefabricated membranes sheet lead, asphalt their properties and uses.

Application: application of the above in basement floor, swimming pool, and terraces.

Thermal insulation: Heat transfer heat gain/ loss by materials - vapour barriers and rigid insulations, blanket, poured and reflective insulation – properties and uses of spun glass foamed glass, cork, vegetable fibers 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, fiber board, cook, quilts and mats – their properties and uses – current developments.

Applications: Applications of the above insulations in seminar hall, theater and cold storage.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

### Reference books:

**Chowdary, K.P.** Engineering Materials are used in India, 7th ed. Oxford and IBH Pub. Ltd., New Delhi, 1990.

**Moxley, R. Mitchell**"s Elementary Building Construction, Technical Press Ltd.

**Rangwala, S.C.** Building Construction: Materials and types of Construction, 3rd ed. John Wiley and Sons, Inc., New York, 1963.

## AR 17B2.5C STRUCTURAL MECHANICS –II

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L/s: 3/Wk	Int: 50	End Exam: 50	Total: 100	End Exam: 3hrs	Cr: 3
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### Course Overview:

Gives an in-depth understanding of the concepts associated with different Elements of Structures.

### Objectives of the Course:

To provide knowledge of behavior beams, columns stress behavior due to applied forces.

**Expected Skills / Knowledge Transferred:** Basic principles of mechanics and behavior of elements of structures.

### Unit-I

Theory of simple bending Introduction, pure bending & ordinary bending, Assumptions derivation of flexure formula section modulus Numericals on flexure equation.

### Unit-II

Shear stresses in beams Introduction, derivation of shear stress formula, shear stress distribution for standard shapes like rectangle circle triangle I, T L, C Section Numericals.

### Unit-III

Direct & bending Stresses Introduction, stress distribution of eccentrically loaded column, middle third rule, core or Kern of Section, stress distribution for column with one axis eccentricity, two axis eccentricity, Numericals.

### Unit IV

Deflection-I-Introduction of slope & deflection, slopes & deflections for cantilever beams with point load & udl's using double integration method & moment area methods

### Unit V

Deflection-II- Introduction of Macaulay's method, slopes & deflections simply supported beams with point load & udl's double integration & Macaulay's methods

### Unit-VI

Fixed beams Introduction Advantages and disadvantages of fixed beams over simply supported beams, SFD & BMD for fixed beams with combination of point loads & udl's (No formula derivations)

### Unit-VII

Propped Cantilevers Introduction, Reaction of a prop, Cantilevers with Udl's, point loads, prop at end & at intermediate positions, slope & deflection

### Unit-VIII

Welded joints: Introduction, Advantages and disadvantages of welded joints, types, strength of fillet weld, design of welded joint for plates and unsymmetrical sections for axial loading

### Reference Books:

**Khurmi. R.S.** Engineering Mechanics, S. Chand and Co.Ltd., New Delhi, 1999.

**Ramamrutham. S.** Engineering Mechanics, 7th ed. Dhanpat Rai Pub. Co. Ltd., Delhi, 2004.

**Timoshenko. S. and Young, D.H.** Engineering Mechanics, McGraw-Hill International Editions

## AR 17B2.6C HISTORY OF ARCHITECTURE - I

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<i>L/s: 3/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 3 hrs</i>	<i>Cr: 3</i>
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### Course Overview:

History of Architecture to be studied as development of building forms in response to social, religious, aesthetic and environmental factors. The study should focus on the three dimensional forms, plan forms, façade organization, structural solution, construction methods and ornamentation. The study should focus on the general trends and not on specific examples of buildings

### Objectives of the Course:

- To expose the students to a wide spectrum of architectural styles ranging from pre-historic to modern times.
- To explain to the students the evolution of architecture in relation to time with special emphasis on social, religious and environmental factors.
- To make the students understand the developments in the construction technology in different periods.

### Expected Skills / Knowledge Transferred:

- 1) Acquire knowledge to identify the common characteristics among the monuments of a particular style.

2) Acquire graphic skills to present a building, analyze its elements and explain the composition.

3) Acquire knowledge on good practices of architecture in the past.

### Course Contents:

#### Unit – I

Architectural development in the ancient civilizations in Indus valley, Egypt and Mesopotamia, Study of Pyramids, Temples, Mastabas, Ziggurats.

#### Unit – II

Architecture in the Classic Greek periods, different orders, optical correction and appreciation of perfection.

#### Unit – III

Architecture in Roman period; Grand scale, application of Greek orders; Construction of vaults; study of different typologies of buildings; development of roads and aqueducts;

#### Unit – IV

Architecture in the early Christian, Byzantine, Romanesque, Gothic periods in Europe and rest of the world excluding Asia.

#### Unit – V

Architecture in Renaissance and Baroque: revival in architecture, study of building typologies.

#### Unit-VI

The other architecture styles preceding the advent of Industrial revolution in Europe - Mannerist architecture, Jacobean architecture, Elizabethan architecture, Victorian architecture and Moorish architecture.

### Reference books:

**Fletcher, Sir Banister.** A History of Architecture, 19th ed. CBS Pub., Delhi, 1992.  
**Yarwood, Doreen.** A Chronology of Western Architecture. B.T. Batsford Ltd., London, 1987.

**Schulz, Christian Norberg.** Meaning in Western Architecture, 2nd ed. Rizzoli Intl. Pub., New York, 1981.

**Copplstone, Trewin and Others.** World Architecture: An Illustrated History, 11th ed. Hamlyn, London, 1979.

**Bindoo. D.D,** History of Architecture, Milind P Lakshana, Hyderabad – 2006.

Wittkaner R Architectural Principles in the Age of Humanism, Chichester :Academy Editions 1998

### AR 17B2.7C SURVEYING AND LEVELING

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<i>L/s: 3/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 3hrs</i>	<i>Cr: 3</i>
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### Course over view

To explain the different techniques and instruments used in survey of land tracts

### Objectives of the Course:

To explain the techniques and instruments used in survey of land tracts.

### Expected Skills / Knowledge Transferred:

Surveying skills and related theory.

### Course Contents:

#### Unit – I

Introduction – Definitions – Basic Principles of Surveying; Classification of Survey; Uses of Survey - Scales and Symbols- Sources of errors in Survey – Linear Measurement: accurate and approximate methods, duties of Surveyor.

## Unit – II

Chain Surveying – Introduction – Types of chains and tapes. Instruments for chaining and taping – ranging-cross staffs – offsets – obstacles in chain surveying – errors and corrections (standardization, temperature and pull) composition of Areas (Trapezoidal rule – Average ordinate-Simpson rule).

## Unit – III

Compass Surveying: Introduction – Prismatic Compass and Surveyors Compass – Types of Bearings-Designation of bearings – Fore bearing and back bearing – Types of Traverse – Temporary adjustments of prismatic compass, local attraction, Corrections, precautions, errors.

## Unit – IV

Plane Table Survey: Introduction – Types of Plane Tables and their Accessories – Setting up the plane table – traversing – Radiation Method – Intersection Method – Resection Method (two point problem). Three point problem

## Unit – V

Leveling – Introduction –Definitions of terms used in leveling – Principle of leveling – Classifications temporary adjustments of dumpy level, RL's by height of Instrument and rise and fall method, Contouring and their characteristics, uses, – errors in leveling.

## Unit – VI

Theodolite – Introduction – vernier Theodolite – uses of Theodolite - Temporary adjustments – Traversing.

## Unit – VII

Automated Surveying – Introduction to use of Digital Surveying – Instruments such as distomat – total station, Electronic Theodolite, G.P.S.

## Unit – VIII

Site Studies – Plot, site, land and regions, size and shape of site, Analysis of accessibility, Topography, Climate, land forms, Surface Drainage, Soil, Water, Vegetation, Ecology and Visual aspects.

### Reference books:

**Arora, K.R. Surveying Vol. I, 6<sup>th</sup> ed.** Standard Book House, Delhi, 2000.

**Lynch, Kevin.** Site Planning. MIT Press, Massachusetts, 1962.

**Punmia, B.C.** Surveying Vol. 1, 13<sup>th</sup> ed. Laxmi Publications Pvt. Ltd., New Delhi, 1996.

## GN 17B2.1A COMMUNICATION SKILLS

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<i>L/s: 2/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 3hrs</i>	<i>Cr: 2</i>
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**Course Overview:** To prepare students to acquire understanding and fluency in English for professional work

**Objectives of the Course:** To provide an adequate mastery of technical and communicative English Language training primarily, reading and writing skills, and also listening and speaking skills.

**Expected Skills / Knowledge Transferred:** To prepare students for participation in seminars, group discussions, paper presentation and general personal interaction at the professional level.

**Unit I:** Communication: Importance of Communication; Elements of good individual communication; organizing oneself; different types of communication; Barriers in the path of Communication

**Unit II:** Listening skills: Listening to conversation and speeches (Formal and Informal)

Reading: Techniques of reading, skimming, Scanning, SQ3R technique

**Unit III:** Creative Writing: Scope of creative writing; Writing skills  
Signposting, Outlines, Rephrasing  
Writing a report/ format of the report; Paragraph, Letter Writing,  
Essay writing, Memo, Circular, Notice, Cover Letter, Resume,  
Writing with a thesis, Summary, Précis, Product description –  
Description of projects and features  
Oral Report; Periodical Report; Progress Report; Field Report  
Preparation of minutes; Video conference; Tele conference / Virtual  
meeting

**Unit IV:** Speaking: How to converse with people, How to  
communicate effectively; Language and grammar skills;  
Pronunciation drills, Phonetics, vowels, Diphthongs, consonants,  
Stress, Rhythm and intonation, Conversational skills  
Features of effective speech - practice in speaking fluently –role  
play – telephone skills – etiquette.  
Short Extempore speeches – facing audience – paper presentation  
– getting over nervousness – Interview techniques – preparing for  
interviews – Mock Interview – Body Language.

**Unit V:** Impact of internet on communication; communication  
through computers; voice mail; broadcast messages; e-mail auto  
response; etc.

**Reference books:**

1. **Krishna Mohan & Meera Banerji:** Developing Communication Skills  
Macmillan India
2. **C S Rayudu:** Principles of Public Relations, Himalaya Publishing  
House
3. **K. Ashwathappa:** Organizational Behavior, Himalaya Publishing  
House
4. **Daniel Colman:** Emotional Intelligence,

## THIRD SEMESTER

### AR17B3.1C ARCHITECTURAL DESIGN – II

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr: 9*

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#### Course Overview:

This course is intended to provide skills for designing a single use, small span and single-storey buildings.

#### Objectives of the Course:

To develop abilities in design in the context of user requirements.

**Expected Skills / Knowledge Transferred:** Use of standards, handling of space, and application of knowledge gained from other subjects in design.

#### Course Contents:

The design issues to be addressed:

- Various functions and their spatial implications.
- Formulations of concept.
- Anthropometry and furniture layout
- Horizontal circulation
- Interior volumes and space articulation through different materials.
- Integration of form and function.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

The list of suggested topics to be covered as design problems:

Balwadi, Kindergarten School, Primary Health Centre, Doctor's Clinic, small Cafeteria, Highway Restaurant, Village Post Office, Bank extension counter, Police Station, Architect's Office, Departmental Store, School Gymkhana and Youth Club etc.

Necessary theoretical inputs to be given highlighting the norms and design issues. The topics not covered as design problems will have to be covered by the Studio faculty members through lecture/slide show sessions and site visits.

At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

Note: In end exam which is a viva-voce the students have to present the entire semester work for assessment.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

#### Reference books:

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1980.

**Kirk, Paul Hayden and Sternberg, D. Eugene.** Doctors Offices and Clinics, 2nd ed. Reinhold Pub., USA, 1960.

**Neufert, Ernst. Ernst Neufert Architects Data,** Granada Pub. Ltd., London, 1970.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Shah, S. Charanjit.** Architects Hand Book Ready Reckoner. Galogotia Pub. Co., New Delhi, 1996.

## AR17B3.2C ARCHITECTURAL DRAWING & GRAPHICS – III

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr: 3*

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### Course Overview:

The course is intended to develop the techniques of architectural rendering, graphic skills required for effective presentations and documentation techniques.

### Objectives of the Course:

To impart the skills of composition, rendering and documentation

### Course Contents:

**Geometrical Drawing:** Solid Geometry: Multi-view projection of solids – cube, prism, pyramids, cones, cylinders etc. Sections of solids, true shape of solids.

### Introduction to Pictorial Views:

**Solid Geometry :** Simple Projections – Projection of solids – Developments

Isometric & Axonometric

Isometric Views of Objects, building components such as Steps, Canopy etc. Diametric and Trimetric Views, Oblique View etc.

**Axonometric view:** Axonometric view of objects, interior view of rooms etc.

### Unit –I

#### Perspective:

Characteristics of perspective drawings: perspectives of simple geometric solids and spaces and complex geometries. Advanced examples in one point or parallel perspective, two point or angular perspective, introduction to three point perspective.

### Unit-II

#### Rendering techniques:

Introduction to surfaces and media, observation, recording and basic representation techniques in different media through drawing pencil, pen, brush, charcoal, crayons etc.

Introduction of rules of composition, color study, values, tones and general approach to rendering, Entourage, Treatment of sky, clouds, landscape elements, human figures, foreground and surroundings, shadow projections in renderings.

### Unit-III

#### Graphic skills and Presentation Techniques:

Page layout and Composition grids; Illustration techniques; Portfolio design and formats; Digital techniques in graphics

#### Reference books:

**David E. Carter, The Big Book of Design**, David E. Carter Books  
Joyce Rutter Kaye, **Design Basics**, Rockport.

**Graphics Book**, Rotovision

**Ellen Lupton and Jennefer Cole Phillips**, Graphic Design The New Basics, Princeton Architectural Press

**Atkin, William W, Corbelletti, Raniero and Fiore, R. Vincent.** Pencil Techniques in Modern Design, 4<sup>th</sup> ed. Reinhold Pub. Corporation, New York, 1962.

**Bellings, Lance Bowen.** Perspective-Space and design.

**Burden, Ernest.** Architectural Delineation: A photographic approach to presentation, 2<sup>nd</sup> ed. McGraw-Hill, Inc., New York, 1982.

**Conli, Claudius.** Drawings by Architects.

**Hagarth, Paul.** Drawing Architecture.

**Pranchlay, H.** Perspective

### AR17B3.3C BUILDING CONSTRUCTION-III

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L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5hrs    Cr:4

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#### Course Overview:

The course focuses on understanding the potentials as well as shortcomings of RCC as a building material.

#### Objectives of the Course:

To introduce and expose the students to various ways in which RCC is used in building construction. The course intends to impart the theory of reinforced concrete construction (in conjunction with the Theory of Structures which is a separate course), and practical knowledge through site visits to the construction sites.

#### Course Contents:

##### Unit I :

**Introduction to RCC:** Understanding the properties and characteristics of RCC. Its advantages and disadvantages. Cast-in-situ and pre-cast constructional methods in RCC.

##### Unit II :

Understanding the structural components of a typical RCC frame structure with reference to their location, junctions, load transfer and design.

##### Unit III:

**Substructure:** RCC foundations – isolated footing (rectangular and trapezoidal footings), pile foundation, combined footing, raft foundation.

##### Unit – IV

**Superstructure:** RCC columns – different shapes, different combinations and loading conditions (axial, bending, non

axial), slenderness factor. RCC beams - Single and doubly reinforced beams, T and L beams, continuous beams, lintels and brackets. RCC slabs – One way and two way slabs.

##### Unit - V

**Miscellaneous:** RCC staircases and ramp – Waist slab and folded plate staircases. RCC Balconies, chajjas, lintels, arches etc.

##### Unit VI:

**Advanced concepts:** Flat slab, coffered slab, diaphragms, retaining walls and water tanks.

**Note:** This is a studio subject and students should be made to prepare construction drawings as studio exercises along with the theoretical inputs.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

#### References:

**Bindra and Arora.** Building Construction: Planning Techniques and Methods of Construction, 19<sup>th</sup> ed. Dhanpat Rai Pub., New Delhi, 2000.  
**Foster, J. Stroud.** Mitchell Building Construction: Elementary and Advanced, 17<sup>th</sup> ed. B.T. Batsford Ltd, London, 1963.  
**McKay, W.B.** Building Construction Metric Vol. 1 – IV, 4th ed. Orient Longman, Mumbai, 2005.  
**Sushil Kumar.** T.B. of Building Construction, 19<sup>th</sup> ed. Standard Pub. Distributors, Delhi, 2003.

### AR17B3.4C STRUCTURAL MECHANICS –III

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr: 3*

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#### **Objectives of the Course:**

To impart sound knowledge of strength, behavior of various materials and techniques in the analysis of structures.

#### **Expected Skills / Knowledge Transferred:**

Ability to analyze the standard members in structures.

#### **Course Contents:**

##### **Unit – I**

**Continuous beams:** Shear Force and Bending Moment diagrams for continuous beams using theorem of three moments (excluding derivation and sinking of supports).

##### **Unit – II**

**Moment Distribution Method:** Introduction, carryover, relative stiffness, application of Moment Distribution Method to Continuous beams, single bay frame without sway (excluding sinking of supports)

##### **Unit – III**

**Kani's method / Rotation Contribution Method:** Introduction, rotational factors, application of Kani's method for beams and frames (single bay without sinking of supports).

##### **Unit – IV**

**Columns and Struts:** Buckling and crushing failures, types of end conditions, Euler's theory of long columns for different end conditions and equivalent length derivations, Rankine's equation, Derivation and application of the basic formula.

##### **Unit-V**

wind pressure on chimneys, Maximum & Minimum intensities of stress at bottom of chimneys Retaining walls subjected to earth pressure.

##### **Unit – VI**

**Torsion of Shafts:** Assumptions, Derivation of basic equation  $T/J = G\theta/l = fs/R$ , Power Transmitted by shafts, application of basic equation to shafts.

##### **Unit – VII**

**Arches:** Determination of horizontal thrust, bending moment and radial shear for three-hinged parabolic and segmental arches with supports at same level and different levels.

#### **Reference books:**

**A.K.Jain and Punmia.** Strength of Materials

**Ramamrutham, S.** Theory of Structures, 17th ed. Danpat Rai Pub. Co. Ltd., New Delhi, 2005.

**Reddy, C.S.** Basic Structural Analysis, 18th ed. Tata McGraw Hill Pub.Co.Ltd., New Delhi, 1991.

### AR17B3.5C HISTORY OF ARCHITECTURE - II

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr: 3*

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#### **Course Overview:**

History of Architecture to be studied as development of building forms in response to social, religious, aesthetic and environmental factors. The study should focus on the three dimensional forms, plan forms, façade organization, structural solution, construction methods and ornamentation. The study should focus on the general trends and not on specific examples of buildings.

**Objectives of the Course:**

- To expose the students to a wide spectrum of architectural styles ranging from pre historic to pre independence period in India.
- To explain the students the evolution of architecture in relation to time with special emphasis to social, religious and environmental factors.
- To make the students understand the developments in the construction technology in different periods.

**Expected Skills / Knowledge Transferred:**

- 1) Acquire knowledge to identify the common characteristics among the monuments of a particular style.
- 2) Acquire graphic skills to present a building, analyze its elements and explain the composition.
- 3) Acquire knowledge on good practices of architecture in the past.

**Course Contents:****Unit – I**

Development of Vedic Architecture, Development of architecture in India and rest of Asia in Buddhist Architecture

**Unit – II**

Evolution of Hindu temple form, early rock cut examples; Early Chalukyans.

**Unit – III**

Development of Hindu Architecture: Nagara style in Orissa, Kahjuraho, Gujarat etc.

**Unit – IV**

Development of Hindu Architecture: Dravidian style in Pallava, Chola, Pandya periods.

**Unit – V**

Development of Hindu Architecture under late Chalukyans, Development of Jain Architecture.

**Unit-VI**

Islamic Architecture in India: Early Saracenic School in India: Imperial school at Delhi

**Unit-VII**

Islamic Architecture in India: Provincial styles at Gujarat, Deccan, Bengal, Moghul Architecture in India.

**Reference books:**

**Brown, Percy.** Indian Architecture: Buddhist and Hindu Periods. D.B. Taraporevala Sons and Co., Mumbai, 2003.

**Grover, Satish.** The Architecture of India. Vikas Pub. House Pvt. Ltd., Ghaziabad, 1980.

**Rowl, Benjamin.** Art and Architecture of India.

**Tadgell, Christopher.** The History of Architecture in India: from the Dawn of Civilization to the End of the Raj. Om Book Service, New Delhi, 1990.

**Vistara.** The Architecture of India

**AR17B3.6C BUILDING SERVICES – I**

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<i>L/s: 3/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 3hrs</i>	<i>Cr:3</i>
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**Course Overview:**

Understanding the significance, design and functioning of water and sewerage systems as essential components in building design and site planning.

**Objectives of the Course:**

To introduce and provide information on the principles and appurtenance of water supply and sanitation systems, and their integration with architectural design.

**Expected skills and knowledge transferred:** To enable students to design sanitary and water supply systems for buildings, and prepare water supply and drainage plans for building sites.

## **Course Contents:**

### **Unit I:**

**Introduction to water supply:** Traditional sources of water supply and sanitation. Different sources of water supply such as wells, reservoirs, etc. Conventional water treatment – sedimentation, coagulation, filtration and disinfection. Classification of water based on its usage. Water and its qualities; Impurities and treatment; Hardness of water – softening.

Demand of water for domestic, commercial, industrial and public utility purposes as per BIS standards. Per capita demand.

### **Unit – II**

Elements of public / private water supply system, Storage and Distribution of Water - Different methods of water distribution; gravity and pressure distribution by storage tanks of individual buildings. Pumping and Distribution at city level, boosting water.

### **Unit – III**

Domestic water supply system- water meter, sump, pump, centrifugal pump, check valves, foot valves and pressure test gauges, overhead tank; System of water supply: Continuous, intermittent, their advantages and disadvantages Service connections, types and sizes of pipes, Types of fittings like taps, bathtubs, showers, jets, cocks, valves, electrical fixtures, etc. Faucets for kitchens, bathrooms and toilets.

### **Unit – IV**

Building service connections, cold and hot water distribution systems in buildings and their design, materials, joints, fittings and valves (gate, flap, ball, flush valves etc.). Direct and indirect systems, individual water supply, water supply for multistory buildings, Fire hydrants, Hot water supply systems, solar heating systems. Simple exercises on water supply, fire fighting and sanitary layout of residential and public buildings.

### **Unit – V**

**Sanitation** - Introduction, purpose and importance Types of refuse, collection and disposal; Separate, combined and partially separate systems, advantages, disadvantages; Sanitary requirements of buildings, types of pipes, sanitary fittings

Inspection chamber: sizes and construction, manhole, traps used in the plumbing system; Septic tank, Dispersion trench and soak pits, house drainage & layout; Ventilation of house drainage: Anti siphonage and vent pipes, single stack and double stack system

Design of sewerage systems, Location of sewage systems, conventional wastewater treatment, activated sludge, trickling filters etc.; septic tank and its design, soil absorption system, alternatives, solid wastes collection and removal from buildings. On-site processing and disposal methods. Aerobic and Anaerobic decomposition, purifying capacity of water bodies.

Sewage treatment (outline of various processes)

Biochemical Oxygen Demand

### **Unit – VI**

**Drainage:** Principles of drainage, surface drainage combined and separate system oGf drainage, shape and sizes of drains and sewers, storm water over flow chambers, methods of laying and construction of sewers

Design of drainage and vent pipes, system for low-rise and high-rise buildings, building drains, sewers, gullies, connection to public sewer, cross connections.

### Unit VII

Types of fixtures and materials - wash basins, water closets, urinals, bidets, sinks etc. Conditions of flow in building drainage pipes, traps, vents and their material specifications. Over-head and under-ground reservoirs. Detailed study of Independent House and Apartment

### Unit –VIII

**Solid Waste Disposal:** Properties of Solid Wastes: Physical and chemical composition of municipal solid wastes, waste generation rates. Management of Solid Wastes in India: Prevalent SWM practices and deficiencies: Storage of waste at source, segregation of wastes, primary collection of waste, transportation of waste, disposal of wastes. Disposal of Wastes: Sanitary landfilling, Composting, Incineration, Pyrolysis – advantages and limitations.

### Unit – IX

**Roads and Pavements** – Different types, water bound macadam, tar bitumen, asphalt and Cement concrete roads, soil stabilization, types of paving-murram, brick, and stone paving. Drainage of roads, sub-drains, culverts, ditches and gutters.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

## AR17B3.7CCLIMATOLOGY

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr:3*

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### Course Overview:

Science (tools, data, standards, methods and principles) of building design and site planning as related to climate, particularly to tropical climates as found in India.

### Objectives of the Course:

To equip the student with the basic understanding of climatic types in India, and the impact on requirements of building design and site planning; to introduce them to the basic science of building design and site planning for thermal comfort, daylighting and natural ventilation; familiarize them with the data, methods, principles, standards and tools for planning and designing for climatic comfort

### Expected Skills / Knowledge Transferred:

The student should be able to 'predict' climatic conditions in a given building (simple residence) and undertake redesign for given parameters

### Course Contents:

Note: The topics here to be dealt with keeping in mind Indian climatic conditions. NBC and BIS guidelines / standards have to be introduced at all relevant contexts.

### Unit – I

#### Introduction to Building Climatology:

Climate and built form interaction. Global Climatic factors, elements of climate, graphic representation of climatic data, Mahoneys Tables, macro and micro climate; challenge of rapid, extreme environmental change

## Unit – II

### Tropical Climates:

Definition, classification of tropical climates, characteristics of different climatic zones, Design considerations for warm-humid, hot-dry, composite and upland climates.

## Unit – III

### Thermal Comfort:

Thermal comfort factors, Physiological aspects, Body heat balance, comfort range, comfort charts.

## Unit – IV

### Heat flow through Buildings:

Basic principles of heat transfer through buildings, performance of different materials, Periodic heat flow.

## Unit – V

### Sun and the Design process:

Solar geometry, Solar charts, Sun angles and shadow angles, orientation for sun, sun control, design of shading devices, building form and heat gain, basic principles of daylighting, sunlight and glare.

## Unit – VI

### Natural Ventilation:

Air movement around and through buildings, Orientation for wind, stack effect, Induced ventilation.

## Unit – VII

### Passive Cooling:

Passive methods of Cooling, traditional and contemporary; roof pond, desiccant cooling, evaporative Cooling, and earth sheltered buildings etc.

Site Planning (including landscaping) and building planning and design considering climate factors

Detailed appraisal/analysis of climatological performance of an

existing residence and or a workplace; followed by redesigning or the same to improve climatological performance.

### Reference books:

**Koenigsberger, O.H. and Others.** Manual of Tropical Housing and Building. Orient Longman, Chennai, 2003.

**Konya, Allan.** Design for Hot Climates.

**Kukreja, C.P.** Tropical Architecture. Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 1978.

**Markus, T.A. and Morris.** E.N. Buildings, Climate and Energy. Pitman Pub. Ltd., London, 1980.

**Olgyay and Olgyay.** Solar Control and Shading Devices.

## GN17B2.2A VALUE EDUCATION

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<i>L/s: 2/Wk</i>	<i>Int: 50</i>	<i>End Exam: Nil</i>	<i>Total: 50</i>	<i>End Exam: Nil</i>	<i>Cr:2</i>
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**Course Overview:** To provide guiding principles and tools for the development of the whole person, recognizing that the individual is comprised of Physical, Intellectual, Emotional and Spiritual dimensions.

### Knowledge Transfer /Expected Skills:

\_ To help individuals think about and reflect on different values.

\_ To deepen understanding, motivation and responsibility with regard to making personal and social choices and the practical implications in relation to themselves and others, the community and the world at large

\_ To inspire individuals to choose their own personal, social, moral and spiritual values and be aware of practical methods for developing and deepening them.

## Unit I

Value Education—Introduction – Definition of values – Why values? – Need for Inculcation of values – Object of Value Education – Sources of Values – Types of Values: i) Personal

values ii) Social values iii) Professional values iv) Moral and spiritual values) Behavioral (common) values

## **Unit II**

Personal values – Definition of person – Self-confidence – Relative and absolute confidence, being self-determined, swatantrata (loosely equivalent to freedom).

Self-discipline – Self Assessment – Self-restraint –Self motivation – Determination – Ambition – Contentment  
Self-respect and respect to others; expression of respect

## **Unit III**

Social values – Units of Society - Individual, family, different groups – Community – Social consciousness – Equality and Brotherhood – Dialogue – Tolerance – Sharing – Honesty-Responsibility – Cooperation; Freedom – Repentance and Magnanimity.

Peer Pressure – Ragging - examples - making one's own choices

## **Unit IV**

Professional values – Definition – Competence – Confidence – Devotion to duty –Efficiency – Accountability  
– Respect for learning /learned – Willingness to learn-Open and balanced mind – Team spirit – Professional

Ethics – Willingness for Discussion; Difference between understanding and assuming

Time Management: Issues of planning, as well as concentration (and aligning with self-goals)

Expectations from yourself. Excellence and competition, coping with stress, Identifying one's interests as well as strengths.

## **Unit V**

Behavioral values – Individual values and group values.  
Anger: Investigation of reasons, watching one's own anger;

Understanding anger as: a sign of power or helplessness, distinction between response and reaction.

Right utilization of physical facilities. Determining one's needs, needs of the self and of the body, cycle of nature.

Relationship with teachers. Inside the class, and outside the class, interacting with teachers.

## **Unit VI**

Complimentary nature of skills and values. Distinction between information & knowledge

Goals: Short term goals and long term goals; How to set goals; How to handle responsibilities which have to be fulfilled while working for goals.

## **Reference Books**

1. **Ramancharla Pradeep Kumar.** Compiled Reading Material IIT Hyderabad
2. **Dr. S. Ignacimuthu S. J.,** Values for life, Better yourself Books, Bandra Mumbai-600 050 (1999).
3. Values (Collection of Essays)., Published by : Sri Ramakrishna Math., Chennai—4.,(1996)
4. **Prof. R.P.Dhokalia.,** Eternal Human Values NCRT –Campus Sri Aurobindo Marg., New Delhi
5. **Swami Vivekananda.,** Education. Sri Ramakrishna Math., Chennai-4(1957)
6. Holy Books of all religions

## FOURTH SEMESTER

### AR17B4.1C ARCHITECTURAL DESIGN- III

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total:400    End Exam: Viva-voce    Cr: 9*

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#### Course Overview:

This course focuses on buildings for residential use.

#### Objectives of the Course:

To enhance the understanding of the complexities of architectural design for residential needs and develop creative design solutions for good living environments.

#### Course Contents:

##### The design issues to be addressed:

- Organization of functional activities in relation to user requirements and the site.
- Relating the system of horizontal and vertical circulation, open spaces, parking etc.
- Responding to socio-economic factors such as income levels, privacy, territoriality, interaction etc.
- Considering materials, structure and services in relation to the design proposal.
- Integration of plan forms and three dimensional compositions.
- Detailing for the physically handicapped and the elderly.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

The list of suggested topics to be covered as design

problems:

Large guest house, students hostel, small hotel, holiday resort, motel, row houses, block of flats and residential complexes at a small scale, housing for specific communities in urban and rural areas such as home for the aged, fishermen's housing etc.

Necessary theoretical inputs to be given highlighting the norms and design issues. The topics not covered as design problems will have to be covered by the Studio faculty members through lecture/slide show sessions and site visits.

At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

Note: In end exam which is a viva-voce the students are to present the entire semester work for assessment.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

#### Reference books:

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1990.

**Neufert, Ernst.** Ernst Neufert Architects Data, Granada Pub. Ltd., London, 2000.

**Peloquin, Albert.** Barrier-Free Residential Design. McGraw-Hill, Inc., New York, 1994.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Shah, S. Charanjit.** Architects Hand Book Ready Reckoner. Galgotia Pub., New Delhi, 1996.

**Untermann, Richard and Snall, Robert.** Site Planning for Cluster Housing.

## AR17B4.2C BUILDING CONSTRUCTION-IV

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*L/s: 4/Wk    Int:50    End Exam: 50    Total: 100    End Exam: 5 hrs    Cr:4*

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### Course Overview:

The course work deals with principles, methods and construction practices of structural steel work.

### Objectives of the Course:

To introduce and expose students to various aspects involving use of steel for construction activity of buildings and structures.

### Course Contents:

#### Unit - I

**Structural Steel Work:** General principles and terms defined, standard sections i.e. beams joints, angles, channels, tees, bolts, rivets and welding.

#### Unit – II

##### Steel Work Connections

Bolt Connections, Riveting and welding methods.

#### Unit – III

##### Steel Members

Columns and stanchions, stanchions or column bases, beam and girders, column and beam connections plate girders, lattice or warren girder.

#### Unit - IV

##### Steel Roof Trusses

Steel trusses, types for various spans, tubular steel roofs, monitor roof, north light roof truss, details of steel –roof trusses.

#### Unit – V

Lantern light, dome light, structural steel practice and drawings as per IS Code.

#### Unit – VI

Portal frame, Geodesic principles, cable net and tensile structures.

**Note:**A hands-on fabrication project to be taken up as part of the internal assignments. This is a studio subject and students should be made to prepare construction drawings as studio exercises along with the theoretical inputs. The studio work should be supplemented with appropriate site visits.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

### Reference books:

**Bindera and Arora.** Building Construction: Planning Techniques and Methods of Construction, 19<sup>th</sup> ed. Dhanpat Rai Pub., New Delhi, 2000.

**McKay J.K.** Building Construction Metric Vol. 4, 4<sup>th</sup> ed. Orient Longman Pvt. Ltd., Mumbai, 2002.

**Mitchell.** Advanced Structures.

**Rangwala, S.C.** Engineering Materials: Material Science, 31<sup>st</sup> ed. Charotar Pub. House, Anand, 2004.

## AR17B4.3C DESIGN OF STRUCTURES -I

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3hrs    Cr:3*

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### Course Overview:

This course focuses on structural design of different elements of building in RCC.

### Objectives of the Course:

To develop the structural design skills in RCC elements

### Course Contents:

#### Unit – I

Introduction to RCC design, Design Philosophies: Working stress and limit state method, singly reinforced beam, Analysis and Design using both working stress and limit state methods.

#### Unit – II

Situations where doubly reinforced beams are used, analysis and design of doubly reinforced beam using limit state method only.

#### Unit – III

T-beams: introduction, analysis and design of T-beam using Limit State method only. Design of shear reinforcement for all types of beams with and without cranking (Limit State method only)

#### Unit – IV

Slabs: Introduction, Design of One way and two way reinforced slabs (simply supported, Restrained, continuous) by limit state method only.

### Unit-V

Design of axially loaded RCC columns and columns subjected to BM about one and two axis using limit state method only.

### Unit-VI

Design of stair case (Dog-legged only) using working stress method.

Design of lintels and cantilever beams and slabs using limit state method only

### Unit-VII

Design of RCC Isolated footings for columns (Square and Rectangle) - working stress method only.

### Unit-VIII

Introduction, to prestressed concrete, Pretensioning & Post tensioning methods, Problems of beams.

### Reference books:

**A.K.Jain.** Reinforced Concrete: Limit State Design, 5<sup>th</sup> ed. New Chand and Bros., Roorkee, 1999.

**Ramamrutham. S. and Narayan, R.** Design of RCC Structures, 12th ed. Dhanpat Rai Pub. Co. Pvt. Ltd., Delhi, 1998.

## AR17B4.4C HISTORY OF ARCHITECTURE- III

*L/s: 3/Wk    Int: 50    EndExam:50    Total: 100    End Exam: 3hrs    Cr:3*

### Course Overview:

History of Architecture to be studied as development of building forms in response to social, religious, aesthetic and environmental factors. The study should focus on the three dimensional forms, plan forms, façade organization, structural solution, construction methods and ornamentation. The study should focus on the general trends and theories and not on specific examples of buildings.

### Objectives of the Course:

To expose the students to a wide spectrum of architectural styles and theory.

To explain the students how architecture evolved in relation to time with special emphasis to social, religious and environmental factors.

To make the students understand the developments in the construction technology in different periods.

### Expected Skills / Knowledge Transferred:

Acquire knowledge to identify the common characteristics among the monuments of a particular style.

Acquire graphic skills to present a building, analyze its elements and explain the composition.

Acquire knowledge on good practices of architecture in the past.

### Course Contents:

#### Unit – I

Influence of Industrial Revolution on building materials, Construction Technology, evolution of new building types and increasing user requirements.

#### Unit – II

Characteristic styles of modern architecture up to First World

War. Steel structures, Arts and crafts movement, Art Nouveau, Vienna School, Chicago School, Monumentalism, Expressionism and beginning of RCC. Theories of John Ruskin, William Morris, Henry Vandevelde, Otto Wagner, Peter Behrens and Louis Sullivan.

#### Unit – III

Contributions to Architecture and Theory made by pioneers- Le-Corbusier, Frank Lloyd Wright, Walter Gropius, Mies Van der Rohe in the periods between the Worlds Wars.

#### Unit – IV

Characteristics of modern architecture after the Second World War. Study of Alvar Aalto, Ero Saarinen, Richard Neutra, Louis I Kahn, Phillip Johnson, etc.

#### Unit – V

Design theories and contributions of Engineer- architects like Pier Luigi Nervi, Felix Candela, Buckminster Fuller, and Frei Otto.

#### Unit – VI

Pre-independence architecture in India: Development of secular architecture from the end of the 18th Century to the middle of the 20th Century.

### Reference books:

**Benevolo, Leonardo.** History of Modern Architecture: the tradition of modern architecture Vol.1. Routledge and Kegan Paul, London, 1971.

**Frampton Kenneth** **Modern Architecture: A Critical History** London: **Thomes& Hudson, 1980**

**Benevolo, Leonardo.** History of Modern Architecture: the modern movement Vol.2. Routledge and Kegan Paul, London, 1971.

**Curtis, J.R. William.** Modern Architecture since 1900. Prentice-Hall, Inc., New Jersey, 2002.

**Giedion, Sigfried,** Space, Time and Architecture: the growth of a new tradition, 4th ed. Harvard Universtiy Press, Cambridge, 1962.

**Hilberseimer, L.** Contemporary Architecture: Its roots and trends. Paul

theobald, Chicago, 1964.

**Pevsner, Nicolaus Oersonem:** Pioneers of Modern Design from William Morris to Walter Gropius-.

**Sharp, Dennis.** Twentieth Century Architecture: A Visual History, Facts on File. New York, 1991

Norberg schul C., Principles of Modern Architecture, London Andreas papadakes, 2000.

## AR17B4.5C BUILDING SERVICES – II

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<i>L/s: 3/Wk</i>	<i>Int:50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>EndExam:3 hrs</i>	<i>Cr: 3</i>
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### Course Overview:

The study to focus on understanding basic working, principles, terms and definitions, as well as practical aspects and solutions utilized in architecture.

### Objectives of the Course:

#### Course Contents:

To impart knowledge and skills related to electrical services, illumination and mechanical service and their integration into Architectural design.

#### Unit – I

Fundamental principles of Electricity: Voltage, Amperage, wattage, generation, and transmission of power, distribution in cities, HT and LT consumers, Transformers and load calculations, Single and three phase connections, Indian Electricity rules, Types of Generators, UPS

#### Unit – II

Building Wiring System: Service wires, metering, light and power circuits. electrical safety devices, MCB, ELCB, distribution boards, wiring methods, ISI Codes and standard materials, Conductors, switch boards, electrical points in general building, pipe earthing, plate earthing.

#### Unit – III

Electric layouts: Electrical symbols, NBC, preparation of

layouts for residences, offices, Domestic appliances their location in buildings, Types of electric motors and pumps.

Principles of illumination – Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candle– utilization factor – Solid angles - Depreciation factor – Laws of illumination, inverse square law, Lamber's Cosine law, application of laws in lighting calculations using point by point method.

**Light Flux Method:** Calculation of number of lamps required for achieving a particular level of illumination.

Introduction to power and lighting circuits,

#### Unit – IV

##### Electrical load estimation.

##### Indian Electricity Rules- relevant codes of practice', energy auditing

Building lighting system: artificial illumination, various types of lamps, advantages and disadvantages, method of lighting, direct, semi direct, indirect, concealed lighting, spot lighting, task lighting, decorative lighting, rope lights, neon lights, flood lighting, yard lighting, under water lighting.

Preparation of a lighting and electrical scheme

#### Unit – V

##### Lighting Design

Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. 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. Lighting Calculation: NBC standards, nominal illumination levels in building interiors, lux, lumen, intensity, lighting schemes.

## Unit – VI

Principles of air-conditioning: IAQ, comfort conditions, gas laws, refrigeration cycle, a/c equipment, compressor heat exchangers, condenser, evaporators,

## Unit – VII

Types of Air-conditioning: single zone, multi zone, window air conditioners, split air conditioners, ductable air conditioners, package system and central air conditioning, all air systems and chilled water systems. a/c plant room, AHU's Building ducting, diffusers and grills, FC units.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

### Reference books:

**Electrical wiring and Contracting (Vol.1 to Vol.4)**, London The New era Publishing Company.

**Dr. FrithAbnws and others**, Electrical Engineering hand Book

**William. J. Guinnesss**, Mechanical and electrical Equipment for Buildings, New York: Willey

**Bovay. H.E.**, Handbook of Mechanical and Electrical Systems for Buildings New York: MC Graw Hill

## AR17B4.6C LANDSCAPE DESIGN AND SITE PLANNING

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L/s: 3/Wk	Int:50	EndExam:50	Total:100	End Exam: 3 hrs	Cr: 3
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### Course Overview:

This course introduces students to landscape design and site planning and relate it to design and planning of built environments. It provides an overview of development of landscape design, site studies, plant studies and application of the knowledge at various levels of design.

### Objectives of the Course:

1. To develop a conceptual understanding of landscape design and site planning principles.
2. To develop skills in integrating landscape design with built environments.

### Course Contents:

#### Unit – I

Introduction and History of Landscape Architecture. Introduction to landscape Architecture and Role of Landscape design in built environment.

A brief review of Landscape Design and garden design in history in various regions Persian, Spanish, Italian, French, Moghul, English, Japanese Garden styles.

Changing perception of mans relationship with nature in various phases of history and its influence on environment.

Evolution of concepts in landscape design after the industrial revolution leading to new theories in integrating built spaces to open spaces. Increasing awareness of ecological variables in landscape design.

#### Unit - II

Site Studies and Site Planning

Principles of site Planning and land use; review of definition applied in typical landscape development situations.

Site survey and appraisal – understanding different site characteristics –topography, vegetation, Hydrology, Access, Surroundings etc. documents, site characteristics and establishing relationship with design / Architecture Programme requirements.Provision of vehicular and pedestrian circulation; parking; street widths; turning radii; street intersections; steps and ramps.

Site planning considerations in relation to surface drainage, water systems, sewage disposal, outdoorelectrical systems.

Philosophical and design issues related to site development – sitting of buildings, spatial and contextual relationships of built and outdoor space and circulation, site and its relationship to surroundings. Importance of climate and social factors in development of site.

Process of design development. Identifying functional requirements of site. Development of site by mutual exploitation of forms and use of grading principles.

### **Unit -III**

#### **Plants and Design**

Introduction to study of plants in relation to landscape design and architecture. An overview of use of plants in history.

Study of Plant material – Botanical Nomenclature anatomy and physiology of plant growth study of trees, shrubs, ground cover, indoor plants in Indian context.

Design with plants – Basic principles of designs. Plant selection criteria -The physical attribute of plants and relation to design. Appearance, functional and visual effects of plants in landscape design and built environment.

Selection and management of plant material in relation to built environment.

### **Unit -IV**

#### **Elements in Landscape Design**

Use of landform, water and vegetation in landscape design.

Hard landscapes: design of paths, roadways streets, terraces etc and use of land form effectively.

Soft landscapes: design of lawns, shrubs, hedges, trees – in relation to buildings and other landscape elements.

Design concepts related to use of sculpture, outdoor lightings, Architectural feature, street furniture and grouping them into meaningful compositions for visual and functional effects.

### **Unit -V**

#### **Landscape Construction and Services**

Study of landform its technical expression through grading plan, sections and earthwork computations.

Irrigation systems – sprinkler trickle irrigation, drip irrigation and laying irrigation networks.

Construction of structure in landscape circulation roads, parking, paths, level changes – walls, steps lamps, construction of screens, trellis, wall fences gales decks, pools etc.

### **Unit -VI**

Contemporary concepts and concerns and design of open spaces – Urban landscape, Parks, Rural landscape etc.

Introduction to concepts of green architecture and micro climate planning. The role of landscape components in modifying micro climate with respect to temperature, humidity, precipitation and percolation.

### **Assignments**

Simple exercises in using plants and landscape elements

Studio exercise emphasizing relationship between built form and outdoor areas and site planning issues.

### **Reference books:**

**Blake, Alan.** Landscape Construction and Detailing. B.T. Batsford Ltd., London, 1996.

**Colvin, Brenda.** Land and Landscape.

**Hacheat, Brian.** Planting Design.

**Harris, C.W. and Dines, T. Nicholas.** T.S.S for Landscape Architecture. McGraw Hill, New York, 1995.

**Laurie, Michael.** An Introduction to Landscape, 2nd ed. Prentice Hall, New Jersey, 1986.

**Lynch, Kevin.** Site Planning. MIT Press, Massachusetts, 1962.

John I.Mutloch. Introduction to Landscape Design, 2nded.John Wiley & Sons, Inc, New york, 2001

**Santapau. H.** Common Trees. National Book Trust, New Delhi, 1981.  
**Trivedi, P. Pratibha.** Beautiful Shrubs. Indian Council of Agricultural Research, New Delhi, 1990.

## AR17B4.7C COMPUTER APPLICATIONS-I

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: Practical    Cr:3*

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### Course Overview:

To orient the student to create two and three-dimensional objects in space with special emphasis on presentation and visualization of interiors and exteriors of building using different rendering techniques using CAD.

**Objectives of the Course:** To explore computer modeling techniques using CAD

### Expected Skills / Knowledge Transferred:

To learn basic skills of modeling, scripting (rendering) in CAD, and to exercise methods of interface within CAD.

### Course Contents:

#### Unit - I

Starting Auto CAD: Introduction to the menu, starting drawings from scratch, Creating and using templates-starting drawings with setup wizards. Saving and closing a file.

#### Unit - II

Using co-ordinate system: The UCS, Working with Cartesian and polar co-ordinate systems, using displays with key shortcuts.

#### Unit – III

Setting up the drawing environment: Setting the paper size, Setting units, setting grid limits, drawing limits, Snap controls, Use of paper space and model space.

#### Unit - IV

Basic commands dealing with drawing properties: Layer control, change properties, line weight control, etc.

#### Unit - V

Inquiry methods: Using database information for objects, calculating distance and angle, areas etc.

#### Unit - VI

Dimensioning commands and Blocks: Dimensioning the objects in linear, angular fashions along with quick time dimensioning etc. Creating and working with blocks, creating symbols, use of blocks in creating a layout of a residential area- one exercise to be done as lab assignment.

### Reference books:

**Teyapoovan, T.** Engineering Drawing with Auto CAD 2000. Vikas Pub. House Pvt. Ltd., New Delhi, 2000.

**Parker, Daniel and Rice, Habert.** Inside Auto CAD Daniel. 1987.

**Georgeomura,** Auto CAD Release 2000.

**AutoCAD 2010** Textbook-AutoCAD 2010: A Problem-Solving Approach- Customizing AutoCAD 2010

**Beginning AutoCAD 2007-** By Bob McFarlane, Robert McFarlane

## GN17B4.1A CULTURAL AND POLITICAL STUDIES

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*L/s: 2/Wk    Int:50    Total: 50    End Exam:Nil    Cr:2*

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**Course Overview:** Course aims to equip students with the skills needed to function in their professional careers in a well-rounded manner. It supplements and enriches core domain of technical and academic knowledge with awareness of broader issues and challenges faced in development.

**Expected Skills / Knowledge Transferred:**

A familiarity with contemporary issues in the global and national context covering political ideologies and scenarios, globalization, sectoral development in the country, transnational migration, social and cultural changes in society due to globalization. It helps students in technical courses to understand their location in the overall scheme and also their role and skills.

**Unit I**

**Changing International Political Scenario:** The Cold War and after – shift from unipolar to multipolar – growth of alternative centres of power – countries with political influence – changing economic and trade – Non- Aligned Movement, BRIC, European Union – Environmental issues in the context of politics. Major countries, their leaders and political ideologies. Current Indian political scenario in the last few decades – regionalism.

**Unit II****Contemporary India**

Agrarian issues; industrial labour; urbanization; transnational migration; environment and development; caste as a system and ideology; relationship between caste and class; the middle classes and consumption; media depictions; gender identities; education and employment; inequalities in access to resources.

**Unit III****Globalisation**

Globalisation as a process which links people, cities and countries - dimensions of interconnectedness- global village - basic concepts, processes and trends; global business organization; economic globalization; socio-cultural

globalization; global workforce; Anti-globalisation movement; Global inequalities; impacts of globalization; the major drivers of globalization and their linkages, evaluation of globalisation .

**Unit IV****Cultural Psychology**

Definition of culture – its transmission Cultural psychology as a study of psychological and behavioral tendencies rooted in and embodied in culture. Sociocultural perspective in psychology: impact of circumstances surrounding individuals on their behaviours , cultural models, the four Is culture cycle, Whiting model,; Culture and Empathy across Cultures; Criticisms – Stereotyping

**Unit V**

**Anthropology and Popular Culture:** Theoretical foundations and approaches; founders of the discipline; methods of study Seminars to be arranged and various professionalsto supplement the inputs by the core teachers of the subject.

**Note:** A presentation at a public event: debate, skit etc. on appropriate topics to form part of internal assignment.

## FIFTH SEMESTER

### AR17B5.1C ARCHITECTURAL DESIGN – IV

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr: 9*

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#### **Course Overview:**

This course focuses on institutional design - facilities required and detailing design for institutions in urban context.

#### **Objectives of the Course:**

To enable the student to design institutions within the given conditions.

#### **Expected Skills / Knowledge Transferred:**

Detailing skills required for the design of institutions in urban contexts.

#### **Course Contents:**

The following issues relating to institutional design will be addressed to:

- Nature of contemporary institutions, correlation to urban structure.
- Development control and urban infrastructure affecting design.
- Various attitudes to building in urban context.
- Integration of function: movement, climate, acoustics, structure and services into the group of buildings.
- Landscaping and site planning
- Institutional character from abstract to detail.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

Necessary theoretical inputs to be given highlighting the norms and design issues. The topics not covered as design problems may be covered by the studio faculty members through lecture/slide shows. And site visits.

The topics to be covered as design problems may include:

- Institution of learning –colleges with its various departments such as medical, engineering. Law, business, music and dance colleges, vocational training institutions etc.
- Institutions of health such as hospitals, reformatories and rehabilitation institutes for the disabled.
- Institutions of research in various disciplines.
- Administrative and Legal institutions such as high courts, secretariat, development authorities, directorates etc.

At least two major exercise (one problem should be pertinent to the urban fabric) and two minor design/time problems should be given and the final submission shall necessarily include a model for at least one of the two main problems.

**Note:** For the end exam, which is a viva-voce, the students have to present the entire semester work for assessment.

#### **Reference books:**

**Chiara Joseph de and Others.** Time Savers Standards of Building Types. McGraw – Hill, 1990.

Hand Book of Planning and Design Data.

**Kirk, Paul Hayden and Sternberg, D. Eugene.** Doctors' Offices and Clinics, 2<sup>nd</sup> ed. Reinhold Pub., USA, 1960.

**Konya, Allan.** Libraries: A Briefing and Design Guide. The Architectural Press, London, 1986.

**Neufert, Ernst.** Ernst Neufert Architects Data. Granada Pub. Ltd., London, 2000.

**Pevsner, Nikolaus.** A History of Building Types. Thames and Hudson, London, 1976.

**Rosenfield, Isadore.** Hospital Architecture and Beyond. Van Nostrand Reinhold, New York, 1969.

**Stone, G. Louis.** Institutional Buildings Architecture of Controlled Environment.

**Tergsone, W.R.** Practical Laboratory Planning.

**Wild, Friedemann,** Libraries for Schools and Universities. Van Nostrand Reinhold, New York, 1972.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

## **AR17B5.2C BUILDING CONSTRUCTION - V**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 5 hrs    Cr:4*

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### **Course Overview:**

Course focuses on issues related to failures in buildings, decay and damage, approaches for maintenance, repairs and renovation of buildings.

### **Objectives of the Course:**

To create awareness among the students regarding problems related to old buildings and renovations and methods to deal with them.

### **Course Contents:**

#### **Unit - I**

##### **Failures:**

Introduction to building failures: causes of decay and damage in old buildings, issues of maintenance and repair. Preliminary inspection and general observation, decayed elements difference between decay and damage.

#### **Unit - II**

##### **Timber:**

Moisture content, treatment prior to installation, factors reducing strength of timber, approach to repair and to the timber roofing system.

#### **Unit - III**

##### **Bricks:**

Strength reducing factors in brick work, effect of ageing, weathering, temperature variation of brick-work, joints and cracks, construction defects, repair and maintenance.

#### **Unit - IV**

##### **R.C. Concrete:**

Mixing methods at site, structural design for repairs, causes of failure in concrete structures, pressure-grouting.

#### **Unit - V**

##### **Methodical approach to Repairs:**

Cracks over openings, sinking and sagging balconies, repairs to decayed floors and floor joints, example: Jack arch., madras roof terrace, foundation sinking, repairs to walls. Propping, **shoring**, strutting and under pinning.

#### **Unit - VI**

##### **Unusual problems:**

Repairs to large span rooms, water proofing the roof terraces, leakages from toilets, case studies and site visits.

**Note:** This is a studio subject and students should be made to document the problems in old buildings through inspections and propose remedial measures by preparing construction drawings as studio exercise with the theoretical inputs given through lectures.

##### **Reference books:**

**Feilden, M. Bernard.** Conservation of Historic Buildings. Butterworth Scientific, London, 1992.

**McKay, W.B.** Failures and Repair of Concrete Structures Vol. IV.  
**Raika, R.N.** Learning From Failures: Deficiencies in Design. Construction and Service, R and D Centre, New Bombay, 1987.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

### AR17B5.3C DESIGN OF STRUCTURES -II

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L/s: 3/Wk	Int:50	End Exam: 50	Total: 100	End Exam: 3 hrs	Cr:3
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#### Course Overview:

Course focus is on Structural Design of elements of Industrial Building in Steel.

#### Objectives of the Course:

To develop the structural design skills of the student in steel.

**Expected Skills / Knowledge Transferred:** Develop capability to design Steel structures.

#### Course Contents:

##### Unit – I

Design of simple beams including check for shear and deflection for laterally supported and unsupported conditions, analysis of simple beam from strength and stiffness considerations.

##### Unit – II

Design of built up beams with flange plates only, Introduction to plate girders (No Design calculations)

##### Unit – III

Axially loaded tension members: introduction, net effective areas, analysis and design of tension members including rivet and welded connections, (L-Angle and T-section only)

##### Unit – IV

Columns: Analysis and design of axially loaded steel columns using single I-section, 2 channels placed back to back and toe to toe, 4-angles etc., including lacing system.

##### Unit-V

Design of slab base and gusseted base for axial loads (with out moments) for different columns.

##### Unit-VI

Design of grillage foundation for isolated columns only

##### Unit-VII

Purlins: Introduction, Dead load, live load and wind loads, design of angle purlin and I-section purlin.

##### Unit-VIII

Bracket Connections, Riveted & Welded Connections design of Joints.

#### Reference books:

**Ram Chandra.** Design of Steel Structures Vol. I, 10<sup>th</sup> ed. Standard Book House, Delhi, 1999.

**Dayaratnam, P.** Design of Steel Structures. Wheeler Pub., Allahabad, 1992.

**Ramamrutham, S. and Narayanan, R.** Design of Steel Structures, 4<sup>th</sup> ed. Dhanpat Rai and Sons, Delhi, 1995.

### AR17B5.4C HISTORY OF ARCHITECTURE - IV

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L/s: 3/Wk	Int:50	End Exam: 50	Total: 100	End Exam: 3 hrs	Cr:3
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### Course Overview:

The course is designed to study the contemporary developments in Architecture and its impact on built form, structure, construction methods etc.

### Objectives of the Course:

To orient the students to various developments in the field of architecture for a greater understanding of trends in contemporary architecture.

### Course Contents:

#### Unit – I

Contemporary trends in architecture of India after Independence. Influence of Le Corbusier and. Louis.I.Khan.

#### Unit – II

Theory and works of Achyut Kanvinde, J.A. Stein, Habib Rehman etc.

#### Unit - III

Contributions made by Pioneers - Charles Correa and B.V. Doshi. Anant Raje, Raj Rewal

#### Unit – IV

Design Theories and works of contemporary architects - Uttam Jain, Hasmukh Patel, including Chandravarkar and Thacker, Jaisim, Anil Laul, Shirish Beri, Romi Khosla, Ranjit Sabiki, Shashi Bhooshan and Sanjay Mohe.

#### Unit – V

Familiarisation of architecture at Auroville and Laurie Baker's work in Kerala.

#### Unit – VI

Contemporary trends in the rest of the world architecture. Theory of Post Modernism.

#### Unit – VII

Design Theories and works of Charles Moore, Michael Graves, Richard Meyer, Aldo Rossi, Cesar Pelli, I.M. Pei, Yamasaki, Peter Eisenmann etc.

#### Unit – VIII

Design Theories and works of Hassan Fathy, Geoffery Bawa, Norman Foster, Renzo Piano, Richard Rogers, Frank Gehry, Zaha Hadid, Santiago Calatrava, Tadao Ando etc.

### Reference Books:

**Bahga, S.S:** Post Independent Architecture.

**Bhatt, Vikram and Scriver, Peter.** Contemporary Indian Architecture After the Masters. Mapin Pub. Pvt. Ltd., Ahmedabad, 1990.

**Curtis, J.R. William.** Modern Architecture since 1900. Prentice-Hall, Inc., New Jersey, 2002.

**Jencks, Charles.** The Language of Post-Modern Architecture, 4<sup>th</sup> ed. Academy Editions, London, 1984.

Frampton, K Tad Ando- buildings, Projects Writings, New York Rizzoli, 1984.

### AR17B5.5C COMPUTER APPLICATIONS – II

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<i>L/s: 4/Wk</i>	<i>Int:50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: Practical</i>	<i>Cr:4</i>
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### Course Overview:

This subject aims to further architectural design skills through advanced computer applications. The subject focus is in the area of computational media techniques and technologies and their impact on architectural design and production. This digital studio critically explores the impact of existing and emerging digital media and software, for advanced digital visualization, simulation and communication as well as associated theories

and methods on the conceptualization and development of architecture. Computational media is broadly defined across three categories: digital techniques for visualization; data collection and analysis, building information modeling (BIM) and introduction to physical model making using computer technologies.

#### **Unit –I**

Introduction to digital theory and this unit equips students with an understanding of the territory of computational design through its theoretical vocabulary and relevant histories. Making of Architectural vector diagrams to explore design and for digital communication using vector applications like coreldraw, illustrator etc.

#### **Unit –II**

**3d modeling** and different types of methods in 3 modeling like polygonal modeling , NURBS modeling ,subdivision surface modeling and building information modeling etc to design and test Architectural built environments virtually.

#### **Unit –III**

**Scene setup** involves arranging virtual objects, lights, cameras and other entities on a scene which will later be used to produce a still image or an animation. Image processing and video editing to create Architectural walkthroughs.  
Digital solar studies

#### **Unit –IV**

**Building information modeling; using** 3 dimensional, real-time, dynamic building modeling software to increase productivity in building design and construction. The process produces the Building Information Model (also abbreviated BIM), which encompasses building geometry, spatial relationships, geographic information, and quantities and properties of building components.

Design and documentation using building information modeling application like Revit Architecture, ArchiCAD, Bentley Architecture etc

#### **Unit –V**

Introduction to Organic modeling and 3d printing to explore biomimetics and emergent concepts in the field of architecture and design by using advanced computational technologies

#### **References:**

Catalytic Formations: Architecture and Digital Design. Ali Rahim  
BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors- Chuck Eastman  
Building Information Modeling – Willem Kymmell

### **AR17B5.6C BUILDING ESTIMATING, COSTING AND SPECIFICATIONS**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### **Course Overview:**

The course deals with various methods of quantity surveying, rate analysis of building and valuation and specifications for different materials used.

#### **Objectives of the Course:**

To provide the student adequate knowledge to write the specifications for a given item of work, to work out the unit cost of individual items based on their specifications and arrive at the overall cost of the project.

#### **Expected Skills / Knowledge Transferred:**

Techniques of estimating and costing and writing specification related to building construction in order to control/ monitor quality of work and project cost.

## Course Contents:

### Unit - I

**Quantity Surveying:** Introduction - Definitions and terms used, principles, units of measurements. Methods of preparing approximate/preliminary estimates (plinth area and cubic content method), basic differences and advantages.

### Unit - II

**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, Method of obtaining detailed quantities of building items (center line method, long wall and short wall method) PWD System to be followed.

### Unit - III

Detailed estimation for load bearing structure in brick masonry and framed structure (ground floor only)

### Unit - IV

Example and exercise in obtaining all items from excavation to finishes including arches, steps, polygonal, circular rooms, measurement of RCC work in slabs, columns, beams, staircase etc.

### Unit - V

Preparing approximate estimates for services like water supply, plumbing, sanitation, electrical work, mechanical equipment and air conditioning. (for residential building).

Simple earth work calculations for road work – mid sectional area, mean area, prismatic formula methods (no transverse slope)

### Unit - VI

**Rate analysis:** definition; method of preparation; quantity and labour estimate for unit work; Cost of materials and labour for various works, data sheet for different items of works, different methods of execution i.e. piece work, daily basis, lump sum, labour rates and percentage etc; 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.

### Unit - VII

**Specifications:** Definition, purpose and importance of specifications, General or brief specifications, Detailed specifications, writing of specifications for the purpose of calling for tender types of specifications, general specifications for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> class buildings

Specifications for items like earthwork excavations, foundation, CRS masonry, DPC, PCC, RCC, brickwork, doors and windows (wooden), steel and aluminum, mortars, plaster, different types of painting, flooring like terrazzo flooring and tiles, ceramic tiles, marble, granite, distemper, glazing, painting to joinery, varnishing, French polishing; Specification, writing to include materials, tests pre and post installation, modes of measurements.

### Unit-VIII

Introduction to computer software for cost estimation; Introduction to cost accountancy and book keeping

### Reference books:

**Datta, B.N.** Estimating and Costing in Civil Engineering: Theory and Practice, 23rd ed. UBS Pub. Distributors Ltd., New Delhi, 1993.

**Bride, G.S. Estimating and Costing**, 2<sup>nd</sup> ed. Dhanpat Rai and Sons, Delhi, 1982.

**Rangwala, S.C.** Valuation of real Properties, 6<sup>th</sup> ed. Charotar Pub. 6 House, Anand, 2003.

**Standard Specification and rates,** Government of Andhra Pradesh, Government Press, Hyderabad

**Indian Standards Institution.** National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.

**Lerrs, Jack.** Engineering Construction Specification.

**Macey, W. Frank.** Specification in Detail, 5th ed. Technical Press Ltd, London, 1955.

**Lewis, R. Jack.** Building Construction Specifications. Prentice-Hall, Inc., New Jersey, 1975.

**Govt. of Maharashtra.** Standard Specifications, Government Press, Nagpur, 1972.

## **AR17B5.1E WORKSHOP - VERNACULAR ARCHITECTURE (Elective – I)**

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*L/s: 3/Wk    Int:50    End Exam: Nil    Total: 50    End Exam: Nil    Cr:3*

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### **Course Overview:**

To expose the students to traditional architecture of various parts of the country.

### **Expected Skills / Knowledge Transferred:**

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

### **Introduction to Vernacular Architecture**

Approaches and concepts to the study of Vernacular architecture – A study of major typologies in various parts of the world.

### **Dravidian South**

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
- Telangana – Gadhis and forts

### **Western Region**

Planning aspects, Materials used, Constructional details, Climatic factors influencing the planning of

- Jat houses for farming caste, Bhungas(Circular Huts) and Havelis (Pukka houses) of Rajasthan
- Pol houses of Ahmedabad - Primitive forms, Symbolism, Colour, Folk art etc in the architecture of the
- Desert settlements and houses of Kutch & Gujarat state.
- Vernacular architecture of Goa.

### **Northern and Eastern India**

- Kashmir – Typical Kutcha houses, mosque, Dhoongas (Boathouses), Ladakhi houses, bridges
- Himachal Pradesh – Kinnaur houses
- 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

Studies to be taken up in groups in any one of the different regions indicated above. Field visits, documentations to be taken up and a Report to be prepared based on literature review and field visit. Reports should include factors influencing planning aspects, religious practices and beliefs, culture & climatic factors, materials of construction and constructional details. Field visits may be planned in the preceding vacation periods/clusters of holidays so as not to disturb class work.

### Appropriate Materials

Study of Appropriate Materials based on Vernacular techniques of construction from different parts of the country. A study of BMTPC technologies, Auroville Earth Institute

#### Text Books

1. Traditional buildings of India, Ilay Cooper, Thames and Hudson Ltd., London

#### Reference Books

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

### AR17B5.2E WORKSHOP - UNIVERSAL DESIGN (Elective – I)

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<i>L/s: 3/Wk</i>	<i>Int:50</i>	<i>End Exam: Nil</i>	<i>Total: 50</i>	<i>End Exam:Nil</i>	<i>Cr:3</i>
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**Course Overview:** The objective of this course is to acquaint the students of architecture regarding the various provisions and design issues for universal design

#### Knowledge Transfer /Expected Skills:

Multi sectoral collaborative approaches in design for persons

with disabilities and elderly persons / Inculcate skills required for designing for barrier free built environments for physically challenged persons. Techniques involved in making such provisions.

**Syllabus to be covered by a ‘learning by doing’ approach and seminars by faculty and students. It should be project oriented with a hands on approach for eg: detailing for making a public space universally accessible etc.**

#### Course Contents:

##### Unit – I

Introduction to Provisions of persons with Disabilities (Equal opportunities, Protection of Rights and Full Participation) Act, 1995, Type of disabilities - Orthopedic, Hearing, Visual Impairments, National Policy for provisions for elderly persons, Concept of equal opportunity, human rights, social justice and empowerment of physically challenged persons.

##### Unit-II

Introduction to similar efforts in other countries. Initiatives at global and International level for protection of rights of disabled and also elderly person. American disabilities Act 1990 etc.

##### Unit-III

Information on various types of national Institutes, agencies and professional bodies involved in disabled welfare, associated norms and standards thereof. The role of NGO's, professional and outreach.

##### Unit-IV

Principles of Universal Design; Design principles in Architecture for creating environments friendly for various types of physically

challenged persons. Barrier free concept Educational Institutions, Hospitals, Transportation terminals such as bus, railway stations and airports for barrier free spaces. Study of Standards as given in TSS, TCPO, CPWD, ADA etc., and others.

#### **Unit-V**

Provisions in public spaces and site planning – parks, play grounds, public transportation, parking lots, Details of sidewalks, road intersections, access to public toilets.

#### **Unit-VI**

Provisions in design of public buildings - Details in, ramps, guide rails, lifts, dimensions of wheel chairs, accessibility in public buildings, Signage, audio visual facilities etc. Design of Toilets and interiors spaces for use of physically challenged.

Exercises in design of user friendly spaces for physically challenged persons. Term paper on certain type of disability and requirements thereof for making environs barrier free or any other exercise appropriately framed by the subject faculty.

#### **Reference books:**

**Micheal J. Bednar. “Barrier Free Environments”, Dowden, Hutchinson and Ross, Ives 1977.**

**Ministry of Urban Affairs and Employment. Central Public Works Department, India, “Guidelines and Space Standards for Barrier Free Environment for Disabled and Elderly Person, 1998.**

**Unnati. “Design Manual for a Barrier – Free Built Environment”, Handicap International, December, 2004**

## SIXTH SEMESTER

### AR17B6.1C ARCHITECTURAL DESIGN –V

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L/s: 9/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr: 9

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#### Course Overview:

Course aims at teaching the design of buildings for passive recreation and large span buildings for public uses.

#### Expected Skills / Knowledge Transferred:

Design vocabulary, enhancement and sensitization of student in design preparation and its relation to structural systems

#### Course Contents:

Design issues should address the following:

- Environmental and micro climate.
- User behavior and requirements.
- Utility and space enhancement.
- Form and function.
- Circulation: horizontal and vertical.
- Site Planning and Landscape detailing.
- Structural details such as beam framing, Building Services / HVAC etc.
- Design detailing considering the barrier free environment.
- Socio-economic profile of user group.
- Parking details and standards.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

#### Topics considered for design are:

Passive Recreation buildings such as:

- Infotainment center.
- Civic Centre

- Convention Centre.
- Cultural Centre.
- Community Centre.

#### Public Buildings - Large Span structures:

- Bus terminals.
- Multiplex.
- Auditorium Complex.
- Museum and Art Gallery.
- Kalyana Mandapam.

At least two major exercises and one minor design / time problem need to be covered. Design proposal along with a scale model / digital model must be submitted for the two main problems.

Sufficient theoretical inputs need to be given highlighting the norms and standards of design parameters.

**Note:** For the end exam, which is a viva-voce, the students have to present the entire semester work for assessment.

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

#### Reference books:

**Chiara Joseph de and others. Time Savers Standards of Building Types. McGraw – Hill, 1980.**

**Dawes, John.** Design and Planning for Swimming Pools. The Architectural Press, London, 1979.

**Ruknitein, M. Harvey.** Central City Malls.

## AR17B6.2C WORKING DRAWINGS & DETAILS

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: Viva-voce    Cr:4*

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### **Course Overview:**

The focus of the course is to impart skills related to the preparation of drawings meant for construction work on the site and to improve the students' ability of detailing.

### **Objectives of the Course:**

To impart training in the preparation of working drawings for buildings with specific reference to code of practice as per IS Code No. 962 of 1969 and incorporating specifications as complementary to the working drawings.

To sensitize the students in preparing finer design details required for buildings.

### **Expected Skills / Knowledge Transferred:**

To prepare working drawings for a project and resolve complex aspects in the buildings with appropriate materials and design details.

### **Course Contents:**

#### **Unit - I**

Preparation of working drawings: Suitable scales of drawings, methods of giving dimensions: on plans, sections, elevations and other standards.

#### **Unit – II**

Preparation of Plans Building marking plan, excavation plan, centerline plan, foundation plan, column centerlines drawings, floor plans, terrace floor plan.

#### **Unit - III**

Elevation and Sections

Detailed elevations, detailed sections – at least one through staircase and one through toilet, typical wall profile sections and elevations.

#### **Unit - IV**

Details

Layout for Sanitation: and detailed plans, Electrical layout: plans and details, details of staircases, toilets and kitchens.

#### **UNIT – IV**

Detailing for walls, floors, ceilings through detail drawings to large scale in the form of plans, sections, elevations. Surface Treatment; Cladding, texture treatment.

#### **UNIT – V**

Detailing of architectural elements such as staircase, balcony, verandah, shading devices vertical and horizontal components of the building.

#### **UNIT – VI**

Detailing of Doors, windows, storage shelves for frames, shutters, joinery of frame to shutter, shutter to panelling etc. and other fixing details.

#### **UNIT – VII**

Design details appropriate for creating Barrier Free Environment.

**Note:** Students shall prepare at least two working drawing sets, one for a small residence and one for a large building. (Load Bearing and R.C.C. framed structure with part/basement, ground floor and first floor with lift/elevator including interior detail drawings)

*To give the learning in this subject a more practical orientation seminars by industry or trade related organisations or field/site visits should be organized. A weightage of 5% in the overall Internal Assessment in the subject should be reserved for students attending these seminars/site visits and maintaining the records/observations as required by the subject faculty.*

#### Reference books:

**Lerrs, Jack.** Engineering Construction Specification.  
**Liebing, W. Ralph and Raul, Ford Mimi.** Architectural Working Drawings, 2nd ed. John Wiley and Sons, New York, 1983.  
**Macey, W. Frank.** Specification in Detail, 5th ed. Technical Press Ltd, London, 1955.  
**Shah, M.G., and Others.** Building Drawing: with an integrated approach to build environment, 3rd ed. Tata McGraw Hill Pub., co. Ltd, New Delhi, 1996.  
**Standard Specification of Government of Andhra Pradesh State.**  
**Lewis, R. Jack.** Building Construction Specifications. Prentice-Hall, Inc., New Jersey, 1975.  
**Govt. of Maharashtra.** Standard Specifications, Government Press, Nagpur, 1972.  
**Datta, B.N.** Estimating and Costing in Civil Engineering: Theory and Practice, 23rd ed. UBS Pub. New Delhi, 1993.  
**Wakita, Osamu A. & Linde, Richard M.** The professional practice of architectural detailing, 2nd ed. New York: Wiley, 1987.  
**Robert, C. Mc Hugh.** Working Drawing Hand Book, New York: VNR, 1977.

### AR17B6.3C ARCHITECTURAL ACOUSTICS

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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#### Course Overview:

Acoustics to be studied as a determinant of built form and understand the behavior of sound.

#### Objectives of the Course:

To equip the students with tools for application of acoustical design in architecture.

#### Expected Skills / Knowledge Transferred:

The knowledge of specific acoustic requirements of different spaces

Skills to deal with acoustic problems within buildings

Knowledge that enables to deal effectively with specialists and consultants in acoustics

#### Course Contents:

##### Unit – I

Need to study acoustics; pioneers and their works. Acoustics examples from the past: methods used for good acoustics.

##### Unit – II

Basic theory: Generation, propagation, transmission; reception of sound; Frequency, wavelength and velocity of sound; sound intensity; inverse-square law; decibel scale, decibel addition, small numerical examples in intensity of sound.

##### Unit – III

Human ear characteristics, Binomial hearing, Loudness perception, subjective effects, characteristics of speech, music and hearing and music,- distribution of energy in speech and music frequencies, intelligibility of speech, high fidelity reproduction of music. A-weighted sound levels.

##### Unit – IV

Room acoustics: Behavior of sound in enclosed spaces. resonance, reverberation, echo, reverberation time, simple exercise using Sabine's formula. Ray-diagrams, sound paths, effect of geometry and shapes, sound adsorption, sound absorption coefficients, Sound insulation, materials and resonant panels.

##### Unit – V

Acoustic design process and requirements of different types of buildings: Auditoriums, concert halls, cinema halls, Seminar rooms, lecture halls, class rooms and open offices. Exercises involving reverberation time and absorption co-efficient.

Case study of an auditorium with a report containing drawings and calculations of reverberation time etc. Detailed acoustic design for any one type of building.

#### Unit-VI

Sources and types of noise in and around buildings, characteristics and effect of noise impact on human beings/behavior, noise curves, transmission of noise, noise control for buildings - laws and legislation, regulations.

Legislations related to transportation, examples- airports, railway stations, railway tracks, MRTS etc.

Noise reduction: Sound isolation, transmission loss TL, TL for walls, sound leaks in doors, noise reduction between rooms, Construction details for noise reduction. Noise reduction and built form, Noise reduction through landscapes elements, land use planning for noise control.

Noise reduction from mechanical equipment, Rubber mounts, vibration isolation guidelines, characteristics of duct system, noise in AC ducts, vibration isolation of pumps and generators.

#### Unit-VII

Acoustics in Building Design and Construction

Design: 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.

Insulating fittings and gadgets machine mounting and installation of machinery.

#### Unit-VIII

Speech privacy, annoyance, background noise. Communication in open plans, electronic sound systems, loud speaker's layout.

##### Reference books:

**Poella, L. Lestie.** Environmental Acoustics.

**Moore, J.E.** Design of Good Acoustics, The Architectural press, London, 1961.

**Burris, Harlod.** Acoustics for the Architect.

**Lord, Peter and Templeton, Duncan.** The Architecture of Sound: Designing Places of Assembly. Architectural Press Ltd., London, 1986.

**Egan, David.** Architectural Acoustics, MC Graw-Hill Book Company, New York, 1988

#### AR 17B6.4C BUILDING ECONOMICS AND SOCIOLOGY

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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##### Course Overview:

To introduce the economics and sociological aspects in architecture.

##### Course Contents:

##### Unit – I

Brief introduction of general economics through an introductory survey of concepts in micro and macroeconomics as applicable to building industry as follows.

Micro Economics: The market, budget constraint, choice, demand and supply, uncertainties, equilibrium, technological constraints, profit maximization and cost minimization, monopoly and oligopoly, production welfare and public good.

Macro Economics: GNP, NNP, demand and supply, inflation, interest rate, employment, saving and investment, monetary and fiscal systems and policies.

#### **Unit – II**

General discussions on various economic issues such as public versus private participation, equity, labour intensive versus capital intensive projects.

#### **Unit – III**

General economics of the basic inputs into building construction- land, labour, capital and materials. Market Demand and Supply – Choice of Technique in production – Laws of returns governing production.

Urban land values, land utilization, factors involved in development of urban land. Cost and cost indices, preliminary for building. Concepts of life cycle costing with reference to buildings. Time value of money-present worth and inflation.

#### **Unit – IV**

Financing for projects, sources costs and utility in financing. Agencies and institutions directly and indirectly influencing economic aspects of project.

### **SOCIOLOGY:**

#### **Unit – V**

Family as the basic unit of 'Society'. Differences in lifestyles due to regional background, religion, caste, income group, etc. and their implication in Architectural design of the housing units.

Sociological aspects in the history of the evolution of housing / shelter forms.

#### **Unit – VI**

Urban and Rural Society: Sociological problems of interaction, isolation, privacy, accessibility, conflict, alienation related to the planning and design of different buildings with the references to the people of different age group/population groups.

#### **Unit – VII**

Power structures in society – local self-government, administrative structures – structure of decision making processes related to building projects at various government and private organizations levels.

#### **Reference books:**

**Amos Rappoport**, House Form and Culture

**Wallis, Wilson D and Willey, M.M.**, Text book of Sociology, 1st ed., Khel Sahitaya Kendra, New Delhi, 2001.

**Charon, Joel M.** The Meaning of Sociology, 6th ed., Prentice Hall, New Jersey, 1999.

**Thio, Alex.** Sociology: a brief introduction, 4th ed. Allyn and Bacon, Boston, 2000.

**Schaefer, Richard T.** Sociology: a brief introduction, 4th ed. McGraw Hill, Boston, 2002.

**Bilton, Tony and Oth.** Introductory Sociology, 3rd ed. Palgrave, New York, 1997.

**Stone, P.A.** Building Economy: Design Production and Organisation a synoptic view, 2nd ed., Pergamon Press, Oxford, 1976.

**Koutsoyiannis, A.** Modern Microeconomics, 2nd ed., ELBS with MacMillan Press, 1994.

**Nobbs, Jack and Hopkins, Ian.** Economics: a core text, 4th ed. McGraw-Hill, London, 1995.

**Teck, HoonHian and Oth.** Economics: theory and applications, McGraw-Hill, Taiwan, 1998.

**Dewett, K.K.** Modern Economic Theory, Shyam Lal Charitable trust, New Delhi, 2005.

### **AR 17B6.5C HUMAN SETTLEMENTS AND TOWN PLANNING**

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<i>L/s: 4/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 3 hrs</i>	<i>Cr:4</i>
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**Course Overview:**

This course focuses on the review of origin of Human Settlements to the level of understanding the various Town Planning problems.

**Objectives of the Course:**

To make the student understand about various planning related issues.

**Expected Skills / Knowledge Transferred:**

Should be in a position to make a neighbourhood plan for 5000 people.

**Course Contents:****Unit - I**

Historic Evaluation: Brief review of the origin of early human settlements, factors responsible. Development of various settlement forms. Types of settlements (urban and rural) classification of areas within the urban settlements in terms of types of land uses, densities, administrative division, building types etc. Land use and factors influencing it in urban and rural settlements.

**Unit - II**

Sociological aspects: Essential elements of society Rural and Urban Communities, Growth of Socio-cultural thought through the ages. Influence of religion and culture on domestic and civil architecture.

**Unit - III**

Urbanization: Facts, Theories. Socio-spatial problems of migrants, slums, high and low density housing; high rise living such as isolation, alienation, accessibility, conflicts etc as

related to planning and design of buildings in different areas of the city. Social Survey and social research.

**Unit - IV**

Transportation and communication: potential and limitations of roadways, railways, airways and waterways in the development of a settlement.

**Unit - V**

Principles of Ekistics: Brief introduction to the theory of "Ekistics". Introduction to the concepts of green belts, satellite towns, neighbourhood, roads in solving some of the problems in urban development. Indian context: Growth pattern of urban and rural settlements; problems and potentials.

**TOWN PLANNING****Unit - VI**

A brief introduction to the implication of town forms in urban planning and development processes. National, regional, urban, rural, local etc. emphasizing the difference and relationships among them.

**Unit - VII**

A general and introductory study of inputs, objectives, preparation and outputs of Master plan for a city; land-use classification, features and relationships with transportation. Meaning and use or implication of O-D surveys, desire line diagrams trip generation, attraction, distribution and modal split.

**Unit - VIII**

Introduction to housing and community facilities; role of F.S.I, densities in housing.

## Unit - IX

Basic methodology for planning of industrial areas and recreation areas.

## Unit - X

Brief introduction to redevelopment schemes and urban renewal, problem of slum and shanty areas and a review of the concepts regarding solutions: clearance, rehabilitation and improvement.

At least one exercise related to the preparation of a layout for a residential neighbourhood of about 5000 populations.

### Reference books:

**Bhagiratha Rao, E.L.** Land Acquisition Manual in Andhra Pradesh.  
**Buch, N. Mahesh.** Planning the Indian city.  
**Chand, Mahesh & Puri, Vinay Kumar.** Regional Planning in India. Allied Pub. Ltd., Bombay, 1990.  
**Doxiadis, C.L.** Ekistics: Introduction to the science of Human Settlement.  
**Gallion, B. Arthur & Eisner, Simon.** Urban Pattern: City Planning & Design, 5<sup>th</sup> ed. Van Nostrand Reinhold, New York, 1986.  
**Hyderabad Urban Development Authority.** Hyderabad Urban Development Authority, HUDA, 1981.  
**Khosla, R.K.** Urban and Rural Development in India.  
**Patterson, T. William.** Land-use Planning Techniques of Implementation.  
**Rama Reddy, Padala & Srinivas Reddy, Padala.** Commentaries on Land Reforms Laws in Andhra Pradesh.  
**Rame Gowda, K.S.** Urban and Regional Planning. Univ. of Mysore, Mysore, 1972.  
**Rangwala, S.C. & Others.** Town Planning, 18<sup>th</sup> ed. Charotar Pub. House, Anand, 2003.  
**Rappoport, Amos.** House, Form and Culture.  
**Singh, Alok Kumar, & Others (ed).** Strategies in Development Planning.

## AR17B6.6C ENVIRONMENT RESPONSIVE DESIGN

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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## Course Overview:

The course focuses on developing an understanding regarding environmental sustainability and environmentally responsible green buildings. It addresses the design concerns in architecture to develop resource-efficient buildings that have minimum adverse impact on the natural environment.

The emphasis is to gain an understanding regarding the existing concepts, ideas and processes in Architecture and built environment and also recognize rapidly emerging building solutions and technological initiatives that complement current practices in order to attain human health and environmental goals.

## Objectives of the Course:

Develop skills to promote eco-friendly characteristics in the area of architecture and buildings and identify crucial technologies, facilities and applications that help in developing green buildings.

## Course Contents:

### Unit - I

Introduction to Macro Environment: Elements of climate, weather, Water cycle, Carbon cycle, Environmental quality, Deforestation, climatic change, Ozone depletion and implications.

### Unit - II

Micro-environment: Natural environment Vis a vis built environment. Living environment Characteristics and components of Urban Ecosystem solar radiation, heat flow, air-movement, Land use, drainage and sanitation.

### Unit - III

Concepts of green field development: Brown field development, environmental impact and ecological balance,

FAR, layouts, sustainable Site development, vegetation, landscape elements, alternative services and technologies, rain water harvesting, on site sewerage retention, treatment, recycle and reuse

#### Unit - IV

Building Resources: Passive energy system design, Building envelope, orientation and components of building fabric and Shading, High rise buildings, modular building Construction, curtain walls, Sourcing and recycling of building materials, alternative Calcareous, metallic and non-metallic, materials

#### Unit - V

Building Infrastructure: Active Energy Systems in buildings, Utilities and services, building automation. electro-mechanical systems, lifts and transportation, captive power plant and equipment, operation & maintenance

#### Unit - VI

Indoor air quality: fresh air requirements standards, Sick Building Syndrome, VOC and pollutants.

#### Unit - VII

Introduction to building rating systems: building auditing, points system, components, and weight age, agencies and institutions, GBC, TERI etc, green buildings in the contexts of Indian sub-continent,

#### Reference books:

**Green Building Technologies** - Godrej Centre CII a Madhapur, Hyderabad.

**Greening Building** – Green Congress, US.(web).

**HSMI. Sustainable Building Technology** – HUDCO, HSMI (Human Settlement Management Institution, New Delhi.

**Koenigsberger, O.H. and Others.** Manual of Tropical Housing and Building. Orient Longman, Chennai, 2003.

**Odum, P. Eugene.** Ecology and Environments, 2nd ed. Oxford and IBH Pub., New Delhi.

**TERI, The Building Energy Audit** – TERI (Tata Energy Research Institute).

**HMDA Hyderabad-** Green building guidelines

### AR 17B6.1E THEORY OF DESIGN AND ARCHITECTURE (Elective – II)

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<i>L/s: 3/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 3 hrs</i>	<i>Cr:3</i>
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#### Course Overview:

To provide the student of architecture a foundation in the conception of forms, spatial aspects, compositions and their analysis in buildings

Expected

To develop understanding of the philosophy, basic principles of space and mass, and architectural composition in the various periods studied in History courses in previous semesters

#### Unit I

Design process –Integration of aesthetics and function - Understanding of formative ideas, organization concepts

An understanding of design activity and how designers think; categories of design;

Design as problem solving and decision making, uncertainties in design process, multi- faceted nature of design; as a mixture of creativity and analysis, other design methods and processes

: Iterative design process, waterfall process, classic approach by analysis- synthesis, evaluation;

Empathy, integrative thinking, experimentalism, collaboration, intuitive thinking, types of reasoning

Position of design and its relation to science, art, technology

## Unit II

Architectural Space and Mass: Definitions of architecture; Architecture as space, structure and enclosure; Spatial qualities imparted by shape, density etc. size, degree of enclosure; Materialization in terms of enclosing planes, articulation of planes, openings, elements of structure; spatial relationship, spatial organization, Primary forms, properties of form, transformation of forms - dimensional transformation, subtractive, additive forms, organization of additive forms - Articulation of forms- Interplay between physical elements and space

**Understanding architecture as an expression of the primary design elements:** point, line, plane, volume; Exploration of buildings in terms of basic principles of design and composition such as Unity, Proportion, scale, Harmony, Balance, Contrast, balance, rhythm, symmetry, hierarchy, axis with building examples; Accentuation, Restraint, Definition, Repose, Vitality, Strength, fluidity, etc. etc. - with the help of illustrations of buildings both historical as well as contemporary.

Expression of form and spatial organization in various periods and styles - Linear, Centralized, Radial, Clustered, Grid organization; Circulation: The building approach, the building entrance, Configuration of path, Path space relationship, Form of circulation space

## Unit III

Design and use of technology - Use of different materials and technology for aesthetic and structural purposes.

Design to accommodate a programme: Fits between use/ user and design

Design and relation to context: site and cultural milieu

Style in architecture - basis for classification of styles - evolution of styles.

## Unit IV

Use and need of ornament in architectural design- Different types of ornamentations in buildings

Historical perspective of the use of ornament in buildings.

## Unit V

Values defining traditional and modern buildings; Metaphors in Design: Order, mystery; relation between parts and whole; Linkages between inside and outside; Architectural theory and architectural practice

### Reference books:

1. "Form Space and Order" by Francis D K Ching
2. "Design Fundamentals in Architecture" by Parmar V S

## AR17B6.2E ADVANCED CONSTRUCTION TECHNOLOGY & STRUCTURAL SYSTEMS (Elective – II)

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<i>L/s: 3/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 3 hrs</i>	<i>Cr:3</i>
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### Course overview:

The course supplements the previous courses on theory of construction and structures, and introduces the advanced developments in Building Construction and structures. . The students are expected to understand the systems of advanced construction and structural systems but not to solve numerical problems.

### Objectives of course:

To introduce the students to the latest developments in construction, building materials and structures. Students should be able to grasp the construction techniques and structural forms available for adopting to architectural forms.

### Expected Skills / Knowledge Transferred:

Gain knowledge about the recent developments and advanced

concepts in construction and structures and analyse and understand the nature of stresses that are developed in the major elements of advanced types of structures.

### **Course contents:**

#### **Unit I**

Relation between structure and architecture; Geometry of form and structural function; Aesthetic theories of the expression of structural function in architectural form.

Construction and form; Structure and Form

#### **Unit II**

Equilibrium under simple tension or compression; Structural elements: Beams and slabs Arches and catenaries; vaults, domes and curved membranes; Trusses, Portal frames and space frames.

Advanced construction methods in RCC, pre-stressed concrete beams slabs frames, lift slab construction post tensioning, multi-storied building frames, circular slabs and beams. Uses of rapid-hardening cement, ready mix concrete [RMC], light weight concrete surface finishes of cement.

Pre-fabrication and Modular Construction:

A review of industrialised building: Basic principles, elements, assembly; Case studies.

#### **Unit III**

Folded plates like prismatic, V-type, trough type, pyramidal, prismatic and RCC folded plate and geometrical staircases, Shell structures, cyclonical shells, hyperbolic paraboloids,

#### **Unit IV**

Space frames: Folded plates, shells, cyclonical shells, Hyperbolic paraboloids, free forms.

Cable structures: Simply curved suspended roofs, membrane structures, cable structures, combination of cables and struts.

Structural Systems: single and double layer grids; braced domes, ribbed domes, plate type domes, Network domes, Lamella domes, Geodesic domes, Grid domes. Braced and folded structures.

#### **Unit V**

Curtain walls: types of curtain walls, components, structural solutions, construction and erection. glass wall system-glass; sheet metal wall systems sheet metal cladding.

#### **Unit VI**

Advanced Building Materials plastic, PVC, metals, synthetic boards, fire proof/ resistant boards/tiles, acoustic materials, glass, composite panels and their applications, non- load bearing gypsum blocks

#### **Reference books:**

**James Ambrose**, Building Construction Enclosure System 1990

**Andrea deplazes (ED)**, Constructing Architecture: Materials processes structures-A hand Book Second Extended edition

**Robert E Fischer**, Engineering for Architecture 1989

**R Barry**, The construction of Buildings Volume 4 4<sup>th</sup> Edition

**Schall, Rolf**. Curtain Walls: Design Manual. Reinhold Pub., New York, 1962.

**Sandela, Felix**. Architecture and Structuralism. 1963.

**Lane, Allen**. Developments in Structural Form. Penguin Books Ltd, London, 1975.

Macdonald, J. Angus. Structure and Architecture, 2nd ed. Architectural Press, Oxford, 2003.

**Michaels, Leonard**. Contemporary Structures in Architecture. 1950.

**Schall, Rolf**. Curtain Walls: Design Manual. Reinhold Pub., New York, 1962.

**Siegel, Curt**. Structure and Form in Modern Architecture. Crosby Lockwood and Son Ltd., London, 1962.

**Subramanian, N**. Principles of Space structures. Wheeler and Co., Allahabad, 1983.

**Zannos, Alexander**. Form and Structure in Architecture: The role of statical function. Van Nostrand Reinhold Co., New York, 1987.

## SEVENTH SEMESTER

### AR17B7.1C ARCHITECTURAL DESIGN -VI

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*L/s: 9/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr:10*

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#### Course Overview:

This Course deals with the design of large scale, multistorey, complex projects and aims to develop skills for a comprehensive design approach in the areas of Housing Design and Campus Design.

#### Objectives of the Course:

To develop skills for a comprehensive design in areas of housing and campus design for making a complete design portfolio.

**Expected Skills / Knowledge Transferred:** To develop skills for comprehensive understanding and dealing with Architecture of a group of buildings.

#### Course Contents:

**I. Housing Design:** Issues to be addressed for the design project pertaining to housing design:

- Density, mixed land use, ground coverage, development controls.
- Urban systems, services and their integration with the project.
- User requirements (derived from surveys)
- Issues in appropriate technology and costs.
- Issues of hierarchy, identity of space, public and private scales of space. Integration of community institutions etc.
- Detailing for the disabled and the elderly.

- Indian / local architectural responses to climate, culture, traditional values, building elements, symbols motifs and special character.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

Design exercise related to housing design for specific target groups.

**II. Campus Design:** Issues to be addressed for the design project pertaining to campus design:

- Issue in preparation of Master Plan for Institutions: academic, administrative, staff housing, student hostels etc.
- Environmental considerations.
- Phases of development.
- Scope for expansion for future developments
- Safe and comfortable vehicular and pedestrian movement.
- Issues of character and landscaping.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

Students would need to undertake one of the design subjects for the studio exercise. Students may be required to develop a brief, translate it into requirements and design.

One Major design exercise and one Time problem/minor design exercise should be given

The evaluation shall be through periodic internal reviews. The final submission will include a brief report of about 1000 words explaining the concept and design proposals for main portfolio.

It will also include a model.

Note: In end exam, which is a viva-voce, the students have to present the entire semester work for assessment.

**Reference books:**

**Alexander, Christopher.** Pattern language: Towns, Buildings, Construction. Oxford University Press, New York.  
**Richard. D. Dober.** Campus Architecture: Building in the Groves of Academy. McGraw Hill, New York, 1996.  
**Chiara, De Joseph and Others.** Timesavers standard for Housing and Residential development, 2nd ed. McGraw Hill, Inc, New York.  
**Newman, Oscar and Others.** Defensible space: People and Design in the Violent City. Architectural Press, London, 1972.

**AR17B7.2C ADVANCED SERVICES**

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<i>L/s: 5/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: 3 hrs</i>	<i>Cr:5</i>
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**Course Overview:**

Study of services and facilities used in special type of buildings. The emphasis is laid on operation of services, working of different equipment employed for carrying out building function in specific different building types

**Objectives of the Course:**

To develop understanding of special services, definitions and terms used, working of equipment, installation of facility, special provisions to be made in building design.

**Expected Skills / Knowledge Transferred:**

Principles and installations of specialized services in buildings and building complexes and NBC standards.

**Course Contents:**

**Unit - I**

Elevators and escalators –

Types of Elevators like traction, Hydraulic etc., Double-decker, sky lobby, lift lobby, lift interiors etc., Passenger, Capsule, Hospital bed lift; goods lift etc. Components; Working and operation of lifts, parts of lifts; industry standards

Planning for Elevators in a building: location in building, serving floors, grouping, size, capacity calculations. shape of passenger car, door arrangement etc., Provisions to be made in buildings for installation,

Service requirements: Quality of service, quantity of service, time, passenger handling capacity, space and physical requirements, machine room spaces and their typical layout

Escalators – Definition, Application. Location and arrangement in buildings. Space requirement, Introduction to working and design of escalator.

Escalators V/S Elevators, Conveyor belts - movement of passengers and goods

**Unit - II**

Electronic Systems in Buildings: Telephone and communication, networks in buildings EPABX, Security systems, Burglar alarms, video surveillance, access control, design of computer labs, access flooring, server rooms.

**Unit - III**

Fire Fighting Services: Behaviour of fire – ignition, igniter, Combustible contents, causes of fire, Mechanism of fire spread in building

and prevention – fire safety standards – concepts in fire protection

High temperature effect and combustibility: High temperature effects and combustibility of building

materials and structure – Fire resistance of buildings – Classification of buildings based on occupancy – fire fighting installation and requirements .Passive and active fire precautions – site planning and fire brigade access – Roof covering – control of fire spread.Portable firefighting equipment, Heat sensitive detectors – smoke detectors – Automatic water system.built in wet riser system, dry standpipe, sprinkler system, fire hydrant  
Fire safety, fire & human behaviour – Means of escape, design and planning of escape halts and corridors to final exit. Psychological aspects – concept of panic – domestic, Multiple occupancy and Hospital fires.  
NBC standards

Cooking gas distribution in buildings, piped gas supply, bottled gas supply.

#### **Unit - IV**

Swimming Pools: Pool and tank design, patio, finishes, Water circulation, cascades, channels, filtration and water treatment, Water quality and disinfection, balancing tank.

#### **Unit - V**

Hotel services: Specialty services required for hospitality industry, Laundry services, Kitchen services, Channeled Music, Internet,

#### **Unit – VI**

Environmental services: waste generation in Industrial buildings, various types of waste, solid, liquid, gas, treatment and disposal facilities, waste generation in hospital buildings, design provision for its disposal,

#### **Unit - VII**

Alternative energy sources for buildings: hot water solar energy system, applications of photo voltaic cells, biomass digesters, wind energy.

#### **Reference books:**

**Faber, Oscar and Kell, J.R.** Heating and Air-Conditioning of Building. Architectural Press, Surrey, 1945.

**Prasad, Manohar.** Refrigeration and air-conditioning, 5<sup>th</sup>Ed. New Age Intl. Pub., New Delhi, 1996.

**Tiwari, Satish.** Water and Energy resources.

### **AR17B7.3C ENERGY CONSERVATION BUILDING CODE**

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*L/s: 5/Wk    Int: 50    End Exam: 50    Total: 100    EndExam: Practical    Cr:5*

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**Course Overview:** This will give an overall understanding and importance of Energy Conservation in built environment and will also help students to design buildings which are ECBC compliant.

**Objective of the Course:** To enable students to design and evaluate code compliant buildings.

**Expected Sills/Knowledge Transferred:** Basic understanding of building energy codes, compliance methods, day lighting, and whole building energy simulations.

#### **Course Contents:**

#### **Theoretical Sessions**

## Unit I

**Building Physics and Energy in built environment:**  
**Physics of Heat** – Heat and temperature, Types of Heat flow, Laws of thermodynamics, **thermal behaviour of buildings** – Solar control, ventilation, Steady State heat flow, Dynamic response of buildings, **Thermal Comfort** – Thermal balance and comfort, factors of Comfort, adjustment mechanisms, comfort indices, comfort zone, HVAC, **Thermal properties of materials** – Glass (SHGC, VLT, U value), walls, other building materials.

## Unit II

**International Practices** - Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings, General status in regions in Europe, North America, Japan, New Zealand, Australia, China, Energy Codes in Singapore, Malaysia, Duabi and Middle east, ASHRAE 90.1, ASHRAE 90.2 IECC, Title 24.

## Unit III

**ECBC Scope, Compliance and approach:** Energy efficiency performance levels, building systems, precedence, building classifications, energy performance index, compliance approaches and requirements, approved analytical tools, administrative requirements, compliance documents, Benchmarking and Star Labelling.

## Unit IV

**ECBC Building Envelope: Mandatory requirements** – Fenestration, opaque construction, daylighting, building

envelope sealing, **Prescriptive requirements** –roof, opaque external walls, vertical fenestration, skylights, **Building Envelope trade –off method**, standard building EPF calculation.

## Unit V

**Comfort Systems and Controls: Mandatory requirements** – ventilation, minimum space conditioning equipment efficiencies, controls, additional controls for ECBC + and super ECBC, additional controls for super ECBC buildings, piping and duct work, system balancing, condensers, **Service water heating** –solar water heating, heating equipment efficiency, other water heating systems, piping insulation, heat traps, swimming pools, **Prescriptiverequirements** – pumps, cooling towers, economisers, variable flow hydronic systems, boilers, energy recovery, **total system efficiency** – alternate compliance approach, low energy comfort systems.

## Unit VI

**ECBC Lighting and Controls: Mandatory requirements – lighting controls** –automatic lighting shut off, space control, control in daylight areas, centralised controls for ECBC + and super ECBC buildings, Exterior lighting controls, additional controls, exit signs, **Prescriptive requirements** – interior lighting power, building area method, space function method, Installed interior lighting power, Exterior lighting power.

## Unit VII

**ECBC Electrical and renewable systems: Mandatory Requirements** – Transformers, energy efficient motors, Diesel generators sets, check metering and monitoring, power factor

correction, power distribution systems, uninterruptible power supply, renewable energy systems.

### **Unit VIII**

**Daylighting** – Daylighting simulation, manual daylighting compliance method.

### **Unit IX**

**Whole building performance method and Energy Simulation-** General Scope, compliance, annual energy use, trade-off limited to building permit, documentation requirements, Mandatory requirements, **Simulation requirements** – energy simulation program, climate data, compliance calculations, **calculating energy consumption of proposed design and standard design** –energy simulation model, HVAC systems, compliance thresholds for ECBC Compliant, ECBC + and super ECBC Buildings, maximum allowed EPI ratios, Schedules.

### **Practical Sessions**

### **Unit X**

How simulation software works, geometry of buildings, material and construction, openings and shading, lighting and controls.

Recommended software for whole building: Design Builder/Open studio/Synergy.

**Unit XI** Heating and cooling design, Unitary HVAC Systems, Central HVAC System, simulation parameters natural ventilation.

**Unit XII** Building energy code compliance, project: small office, large office, single family residence.

**Unit XIII Daylight Simulation:** Recommended Software: DIVA for RHINO/DAI LUX EVO 6/Open Studio.

### **References:**

1. Steven V Szokolay. Introduction to Architectural Science: The Basics of Sustainable Design. Architectural Press, Second Edition, 2010.
2. Vishal Garg, Jyothirmay Mathur, Surekha Tatali, Aviruch Bhatia. Building Energy Simulation: A workbook using Design Builder. CRC Press. 2017.
3. Energy Conservation Building Code 2017. Bureau of Energy Efficiency. New Delhi. 2017
4. American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.1 –Energy Standards for Buildings except Low-rise residential buildings. 2016.
5. American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.2 –Energy Standards for Low-rise residential buildings. 2016.
6. Jens Lausts. Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings. International Energy Agency (IEA) Information paper. March 2008.

## AR17B7.1URBAN DESIGN (ELECTIVE – III)

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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### Course Overview:

The course focuses on creating awareness in students in the subject 'Urban Design' as a specialization in the area of architecture and urban planning.

### Objectives of the Course:

To give an overview of urban design as an interface between the fields of architecture and urban planning.

To import the knowledge about various developments in the field of urban design.

### Course Contents:

#### Unit - I

Discussion on Architecture, Urban design, Town Planning Interface. Urban Morphology and Elements of Urban Design. Nature of urban design projects in public and private developments.

#### Unit - II

Classical cities, medieval towns, neoclassic cities, and industrial towns. Characteristics of towns built by Hindu and Muslim rulers in India. Colonial inheritance, growth of post towns, civil lines, cantonments, railway and resort towns and Design in New Delhi.

#### Unit - III

Modern movements in city design such as 'city- beautiful' and 'Garden city' movements, utopian model Towns in the west. Changing structure of cities: sectors, blocks, streets, squares, buildings and open spaces.

#### Unit – IV

Role of planning agencies such as development authorities, Urban Arts Commission in the design of cities. Influence of city development policies namely Master plans, zoning regulations, on Urban Design. Built-form and space requirement in residential, commercial industrial and recreational land uses, activities. Patterns of subdivision and land-development.

#### Unit – V

Elements of urban spaces: squares and streets. Use of landscape in urban design, such as tree avenues, street fencing, side walks etc.

Lighting and illumination of cities, methods of lighting, signage and elements of utility services in the city.

#### Unit – VI

Urban conservation and its role in urban design. Past and present trends in urban conservation. Role of architectural control in urban conservation and city character and style.

### Reference books:

**Bacon, N. Edmund.** Design of Cities. Penguin Books, New York, 1976.

**Benevolo , Leonard.** History of the City.

**Krier, Rob.** Urban Space, 3<sup>rd</sup> ed. Academy Editions, London, 1984.

**Moughtin, Cliff and Others.** Urban Design: Ornament and Decoration. Butterworth-Heinemann, London, 1995.

**Moughtin, Cliff.** Urban Design Street and Square.

**Mumford, Lewis.** City in History: Its origin transformation and its prospects.

**Sprelregen, Paul.** Urban Design: The Architecture of Towns and Cities.

**Lynch, Kwin,** the Image of the city Cambridge mass: MIT press, 1965

## AR17B7.2E HOUSING (Elective – III)

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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### **Course Overview:**

The course introduces the basic concepts and issues related to urban and rural housing.

### **Objectives of the Course:**

To give an understanding and appreciation of housing in terms of issues, problems and directions.

### **Course Contents:**

#### **Unit – I**

##### **Evolution of Housing:**

Brief review of the historical development of housing in various contexts.

#### **Unit – II**

##### **Housing situation in India**

Housing need and Demand: Housing and Habitat policy and perspective at the national level. Problems and Issues in urban & Rural Housing, Housing Agencies and their role in housing development.

#### **Unit – III**

##### **Housing Standards**

Issues involved in formulating housing standards for rural and urban areas, desirable and minimum standards. Residential Densities

#### **Unit – IV**

##### **Housing Strategies**

Review of different forms of housing globally – particularly with reference to the third world countries.

Brief acquaintance with some strategies such as sites and services upgrading existing shelter, stimulating private – sector production, developing building materials and alternative technologies, improving architectural design., protecting inner-city renters, land sharing, resettlement etc.

#### **Unit – V**

##### **Housing Layouts and Design**

Traditional pattern of housing design, Row Housing, Cluster Housing Apartment housing, low rise versus high rise housing, Incremental housing, neighborhood unit. Case studies of housing Projects

#### **Unit – VI**

##### **Housing Process**

Managing and financing of housing projects. People's participation, Technology Transfer, development control rules and environmental aspects

##### **Reference books:**

**Alexander, Christopher.** Pattern language: Towns, Buildings, Construction. Oxford University Press, New York.

**Chiara, De Joseph and Others.** Timesavers standard for Housing and Residential development, 2<sup>nd</sup> ed. McGraw Hill, Inc, New York.

**Desai, A.R. and Pillai, Devadas.** Slums and Urbanization, Popular Prakashan Pvt. Ltd.

**HUDCO.** Housing for the Low Income. HUDCO.

**Poulose, K. Thomas.** Reading Material on Housing. Institute of Town Planners, New Delhi.

Cedric Prgh (1990) Housing and Urbanisation, Sage Publication New Delhi

## **AR17B7.3E BUILDING CONSTRUCTION MANAGEMENT (Elective – III)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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### **Course Overview:**

To introduce the importance of construction management in the field of architecture.

### **Course Contents:**

#### **Unit – I**

Introduction

Construction in India; its role in development, importance of Management in Construction, role of Construction Manager, Construction team, responsibilities and authorities of Construction Manager Organization.

#### **Unit - II**

##### **Management Techniques:**

Planning for Construction Projects: Principles, objectives, advantages of planning, stages of planning.

Scheduling: Definition, advantages

Methods of Scheduling: Bar chart, Milestone chart, Controlling, Life cycle curves. Job layout, work break down structure

##### **Project Management through Networks**

Introduction, objectives, advantages, terms and definitions, types of networks, rules for drawing a network, Fulkerson's Rate of numbering the events.

Introduction to PERT, CPM, difference between PERT and CPM, finding critical path.

#### **Unit – III**

Introduction to construction equipments, performance, characteristics and usage of equipment used in large scale projects.

Human Resource management: manpower estimation at various stages, recruitment, training, under and over manning.

Materials Management: Materials of construction, classification codification, ABC analysis, estimation of materials procurement, inventory / stock control, purchase procedure, stores management.

Quality control in Construction: Importance of quality, elements of quality, organization for quality control, quality assurance techniques.

#### **Unit – IV**

Labour Legislations pertaining to construction industry, payment of wages act, migration Act, Factories Act, Contract Labour Act, Labour Welfare Fund Act, Workmen's Compensation Act.

Construction Safety Management: Importance of safety causes of accidents, safety measures, safety benefits to employees, employees and customers.

#### **Unit – V**

**Economics of Project Management:** Economic analysis of projects, economic studies, sensitivity analysis. Cost estimating principles, parameter estimation, detailed estimates, cost concepts, classification of costs, elements of costs, and cost analysis for control.

## Unit – VI

Budgetary Control Systems: Types of budgets, new approaches for budgeting, responsibility of accounting, profit centre approach.

Financial Management: Meaning and scope, financial statement analysis, ratio analysis, funds flow analysis.

Working Capital Management: Meaning, policy for working capital, estimating working capital needs. Capital investment decision, long term financing working of financial institutions in India and abroad, self-financing, financing mechanisms.

Value engineering: Definition, value engineering job plan, life cycle costing, value engineering applications.

## Unit – VII

Introduction to Linear programming, Transportation problem, Sensitive analysis.

### Reference books:

**Gupta, B.L. and Gupta, Amit.** Construction Management, Machinery and Accounts, 3<sup>rd</sup> ed. Standard Pub, 2005.

**Loraine, R.K.** Construction Management in Developing Countries. Thomas Telford, London, 1993.

**Srinath, L.S.** PERT and CPM Principles and Applications, 3<sup>rd</sup> ed. Affiliated East-West Press, New Delhi, 2003.

**Singh, Harpal.** Construction Management and Accounts 14<sup>th</sup> ed. Tata McGraw-Hill Pub., New Delhi, 1981.

**Gould, E. Frederick and Joyce, E. Nancy.** Construction Project Management. Prentice Hall, New Jersey, 2000.

**Shrivastava, U.K.** Construction Planning and Management, 3<sup>rd</sup> ed. Galgotia Pub., New Delhi, 2004.

## AR17B7.4EINTERIOR DESIGN(Elective – III)

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L/s: 4/Wk	Int: 50	End Exam: 50	Total: 100	End Exam: 3 hrs	Cr:4
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### Course Overview:

The course provides a frame work of the discipline by addressing to the theoretical, social, historical, technological, professional aspects of Interior Design.

### Course Contents:

#### Unit - I

The profession of Interior Design; Role of an Interior Designer- past and present; Scope of services; Interior Design Process. Interior Design and Concepts: Elements and Principles of design- an overview and their applications in interior designing.

#### Unit - II

Interior Space planning and human dimensions. Focuses on physical, psychological Behavioural and human factors, study of Proxemics, Behavioural settings.

#### Unit - III

Introduction to the fundamentals of Interior Design such as Lighting, Furniture, Space, Materials, Furnishings, Art etc.

#### Unit – IV

Colours in interiors – Colour Theory, Effect of light on colour, various colour schemes like analogues, complementary, triadic etc. Colour symbolism. Psychology of colour, Industrial colour codes. International standards.

#### Unit – V

Introduction to Furniture and Accessories: An overview of historical perspective of furniture and styles, accent pieces and accessories from Egyptian period to the present. Basic Furniture vocabulary. Styles of Interiors – Italian, English, French, Japanese styles etc.

### Unit – VI

Interior lighting – direct and indirect lighting, location and light grid systems, types of luminaries, quality of lighting. Ambient, task and accent lighting. Exposure to eminent interior designers' works- Indian and international

### Unit – VII

Business perspectives of Interior design – an overview of practice of interior design in India.

#### Reference books:

Archi World. Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.  
Friedmann, Arnold and Others. Interior Design: An Int. to Architectural Interiors. Elsevier, New York, 1979.  
Miller, E. William. Basic Drafting for Interior Designers. Van Nostrand Reinhold, New York, 1981.  
Kurtich, John and Eakin, Garret. Interior Architecture, Van Nostrand Reinhold, New York, 1993.  
Rao, M. Pratap. Interior Design: Principles and Practice, 3<sup>rd</sup> ed. Standard Pub., 2004.

## AR17B7.5E LANDSCAPE ARCHITECTURE (Elective – III)

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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### Course Contents:

#### Unit - I

Study of landform its technical expression through grading plan, section, profiles layout plans and earthwork computations.

Principles of soil mechanics and landscape drainage and their application to surface and subsurface drainage of small scale projects.

### Unit –II

Basic principles of outdoor lighting, types of fixtures and their use in varying situations.

Introduction to irrigation systems – sprinkler trickle irrigation, drip irrigation and laying irrigation networks.

### Unit -III

Factors related to construction; of structures and systems.

Materials and techniques of landscape construction with emphasis on appropriateness for intended use.

Construction of structure in landscape

Circulation roads, parking, paths; Level changes – walls, steps, ramps; Construction of Garden, landscape feature Such as screens, trellis, wall fences gates decks; fountains and pool construction.

### Unit -IV

Planting and establishment of woody plants, installing time, covers and herbaceous plants.

Planting principles – Bed preparation, mounding, application of fertilizers, roll preparation, pruning and maintenance.

#### Reference books:

**Landphair, C. Harlow.** Landscape Architecture Construction, 2<sup>nd</sup> ed. Elsevier, New York, 1988.

**Motloch, L. John.** Int. to Landscape Design, 2<sup>nd</sup> ed. John Wiley and Sons, Inc., New York, 2001.

**Moorhead, Steven (Ed.).** Landscape Architecture. Rockport Pub, Massachusetts, 1997.

Pregill, Philip and Volkman, Nancy. **Landscapes in History: Design and Planning in the western Tradition.** Van Nostrand Reinhold, New York, 1993

## GN17B7.1A PERSONALITY DEVELOPMENT

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*L/s: 3/Wk    Int: 50    End Exam: Nil    Total: 50    End Exam: Nil    Cr:3*

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### Course Overview:

The purpose of this course is to build confidence and inculcate various soft skills and to help Students to identify and achieve their personal potential.

### OBJECTIVE:

To help the students achieve effectiveness in their professional activities, harness skills and develop qualities suited for the profession.

### Course Content:

#### Unit I

**Personality:** Nature of personality; Theories of personality- Type, Trait, Social Learning. Determinants of personality, Personality traits.

#### Unit II

Attitude Building  
Importance of attitude, factors that determine our attitude, types of attitude, building positive attitude, developing optimism and discipline.

#### Unit III

Group and Team Work  
Group and Team dynamics, Group Structuring- Leadership, role, Tasks, effective team work  
Exercises to understand the nature of a team, team building, members and achieving a given task. Panel discussions.  
Public speaking: Planning a speech, using presentations, speech outline, research for public speaking, language and

style, analyzing audience, types of speeches, preparing for impromptu speech.

#### Unit IV

Stress Management Importance, Causes, Stress relief mechanisms

#### Unit V:

Class room activities planned to ensure full student participation. The group and individual activities are planned to develop the skills and talents of the students which they will need in various occasions in their careers.

Time management; Critical Thinking; Lateral Thinking (Situational); Leadership Qualities; Motivation  
Business situation; Business plan presentation  
Vocabulary games; Presentation Skills  
Event Management  
Goal Setting; Analytical Thinking; Problem Solving;  
Emotional Quotient; Assertiveness; Stress Management

### Reference books:

1. **Krishna Mohan & Meera Banerji.** Developing Communication Skills, Macmillan India
2. **C S Rayudu.** Principles of Public Relations, Himalaya Publishing House
3. **K. Ashwathappa,** Organizational Behavior, Himalaya Publishing House
4. **Daniel Colman.** Emotional Intelligence

## **OPEN ELECTIVE -1**

Open Electives will be announced by the Department/s before start of the Semester. If a student wishes to take any online course as Open Elective due permissions must be taken as prescribed.

## EIGHTH SEMESTER

### AR17B8.1C DESIGN STUDIO

#### AR17B8.1.1C ARCHITECTURAL DESIGN - VI (DESIGN STUDIO)

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*L/s: 11/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr:11*

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##### Course Overview:

The course deals with the design of large, multi-storeyed complex projects.

##### Objectives of the Course:

To develop skills for a comprehensive design in urban context (Ex; Housing project, Shopping Malls etc.) for making a complete design portfolio.

##### Expected Skills / Knowledge Transferred:

To develop skills for comprehensive understanding and dealing with Architecture of a group of buildings interconnected with elements of urban design.

##### Course Contents:

**Urban Design:** issues to be addressed:

- Issues of urban structure, urban space and form.
- Issues of conservation.
- Issues in zoning, land use, density, development control.
- Issues of building in context, urban infill
- Integration of diverse functional needs, access systems, parking, services etc.
- NBC and other relevant building codes as applicable.
- Relevant design considerations for barrier free design for the differently abled.

Design portfolio shall include (at least one example each) using

1. 'Hi-tech' materials / construction.
2. Conservation related materials / construction.

Students would need to undertake all of the above design subjects for the studio exercise.

The evaluation shall be through periodic internal reviews. The final submission will include a brief report of about 1000 words explaining the concepts and design proposals along with the main portfolio. It will also include a model.

Note: In end exam, which is a viva-voce, the students have to present the entire semester work for assessment.

##### Reference books:

**Alexander, Christopher.** Pattern language: Towns, Buildings, Construction. Oxford University Press, New York.

**Lynch, Kevin.** Image of the City

**Newman, Oscar and Others.** Defensible space: People and Design in the Violent City. Architectural Press, London, 1972.

**Watson, Donald & Others (Ed.)** Time Saver Standards for Urban Design. McGraw Hill, New York, 2003.

### AR17B8.1.2C BUILDING CONSTRUCTION MANAGEMENT (DESIGN STUDIO)

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*L/s: 11/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr:11*

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##### Course Overview:

Major studio work, focusing on construction management of large scale projects for effective and efficient implementations.

##### Objectives of the Course:

To equip students of Construction Management specialization with various techniques of project implementation.

**Expected Skills / Knowledge Transferred:** The skills related to construction management of large building projects.

**Course Contents:**

Preparation of working drawings in detail for large building project (building more than 5000 sq. mtrs.) covering the following aspects Implementation scheduling –Resource planning-time, labour, material, equipment and personnel requirements, estimation-scheduling, control and procurement. Preparation of network charts and flow charts with control mechanism in place, including quality and cost control – sticking to budgetary estimates and foreseeing any disturbances in scheduling, devise resilience and adaptive measures.

Report of Construction Management: Preparation of Project report on any live, ongoing or completed-large scale project.

**Reference books:**

**Gupta, B.L. and Gupta, Amit.** Construction Management, Machinery and Accounts, 3<sup>rd</sup> ed. Standard Pub, 2005.  
**Loraine, R.K.** Construction Management in Developing Countries. Thomas Telford, London, 1993.  
**Srinath, L.S.** PERT and CPM Principles and Applications, 3<sup>rd</sup> ed. Affiliated East-West Press, New Delhi, 2003.  
**Singh, Harpal.** Construction Management and Accounts 14<sup>th</sup> ed. Tata McGraw-Hill Pub., New Delhi, 1981.  
**Gould, E. Frederick and Joyce, E. Nancy.** Construction Project Management. Prentice Hall, New Jersey, 2000.  
**Shrivastava, U.K.** Construction Planning and Management, 3<sup>rd</sup> ed. Galgotia Pub., New Delhi, 2004.  
**Chitkara, K.K.** Construction Project Management: Planning, Scheduling and Controlling. Tata McGraw-Hill Pub., New Delhi, 1999.  
**Sharma, S.C.** Construction Equipment and its Management, 4<sup>th</sup> ed. Khanna Pub., New Delhi, 2004.

**AR17B8.1.3C LANDSCAPE ARCHITECTURE (DESIGN STUDIO)**

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*L/s: 11/Wk    Int: 200    End Exam: 200    Total: 400    End Exam: Viva-voce    Cr:11*

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**Course Overview:**

This course will focus on design and development of small to medium scale projects and aims to develop skills for design of comprehensive landscape proposal for simple residential landscape, community level open spaces and campus design.

**Objectives of the Course:**

To expose students to issues concerned with landscape design and site planning.

To expose students to wide range of design alternatives and preparation comprehensive designs for landscape projects.

**Expected Skills / Knowledge Transferred:**

Basic skills in design and orientation in landscape design are prerequisites for the students. The student is expected to obtain skills in development of concepts based on perceptual evaluation of site and propose design alternatives. Solutions to small and medium scale landscape design projects

**Course Contents:**

- Emphasis on form and spatial relationships leading to open space order and frame work.
- Concerns for Social, Psychological considerations of the individual and large groups of people, their interaction and resultant forms of environment.
- Issues related to functional requirement and design strategies.
- Microclimate and environmental consideration.
- Issues related to health, welfare, safety and enjoyment.
- Issues related to zoning, density and develop controls.
- Issues related to services and site development.
- Issues related to visual and aesthetic and contextual consideration.

Students would need to undertake one small and one medium scale designs in site planning.

The exercises taken up shall deal the issues comprehensively from general understanding to providing complete landscape design solutions. The exercise can be split into different stages such as Data collection, Case studies, Synthesis and Design development.

#### Reference books:

**Southerland**, Designing the new landscape.

**Hacket, Brian**. Planting Design.

**Laurie, Michael**. An Introduction to Landscape, 2<sup>nd</sup> ed. Prentice Hall, New Jersey, 1986.

**Lynch, Kevin**. Site Planning. MIT Press, Massachusetts, 1962.

**Jellico**, Man and Landscape.

### AR17B8.1.4C INTERIOR DESIGN (DESIGN STUDIO)

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<i>L/s: 11/Wk</i>	<i>Int: 200</i>	<i>End Exam: 200</i>	<i>Total: 400</i>	<i>End Exam: Viva-voce</i>	<i>Cr:11</i>
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#### Objectives of the Course:

To enable the students to demonstrate design ideologies in the field of interior design

#### Course Contents:

Interior requires that students have a full understanding of the interior design field and have mastery of the design process, presentations, project administration and business skills.

Two interior schemes of different functional types: Residential / commercial at different scales will form the major design assignments.

Focus is on Portfolio creation by producing a complete and correct set of working drawings, from plans through details and specifications and sample boards

Portfolio preparation

The student will create a portfolio that clearly expresses his/her ability to design by using detailed drawing, rendering and Model Making. Usage photography and graphic design in preparing a professional portfolio is also encouraged.

#### Reference books:

**Archi World**. Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.

**Friedmann, Arnold and Others**. Interior Design: An Int. to Architectural Interiors. Elsevier, New York, 1979.

**Miller, E. William**. Basic Drafting for Interior Designers. Van Nostrand Reinhold, New York, 1981.

**Kurtich, John and Eakin, Garret**. Interior Architecture, Van Nostrand Reinhold, New York, 1993.

**Rao, M. Pratap**. Interior Design: Principles and Practice, 3<sup>rd</sup> ed. Standard Pub., 2004.

### AR17B8.2C PRE-THESIS SEMINAR

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<i>L/s: 4/Wk</i>	<i>Int: 100</i>	<i>End Exam: 0</i>	<i>Total: 100</i>	<i>End Exam: NIL</i>	<i>Cr:4</i>
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#### Course Overview:

The course provides students with a framework to understand some emerging concepts in architecture and projects of design complexity and equip the student with adequate architectural design research methods for the realization of thesis concept. During the course of study, the subject of the thesis is developed and the project articulated.

**Objectives of the Course:** To impart knowledge to students, on the tools and methods needed to handle a design project of reasonable complexity individually,

**Expected Skills / Knowledge Transferred:** The skills required to collect, assimilate and synthesis data relevant to handle a design thesis project independently.

### Course Contents:

#### UNIT - I

Introduction to architectural thesis Project: Difference between design thesis and design studio, selection of topics for architectural design thesis, design thesis topics based on building typologies, preparation of synopsis, Methodology of design thesis

#### UNIT - II

Emerging concepts in architecture due changes in social, economic, technological variables. Review of design projects related to real world instances and relevant to community at large. Review of projects of design complexity, involving themes, sub themes and architectural expression.

#### UNIT - III

Research in architecture: Tools and Methods required to handle a design project. Scientific methods of research with special emphasis on architectural research methods. Architectural enquiry visual, observations, questionnaire formats of enquiry, Literature Review and case studies. Data analysis techniques interpretation of data.

#### Unit IV

Thesis report writing and presentation:

- Formats for presentation of data, case studies and analysis.
- Formats for presentation of thesis design- media appropriate in the architectural profession such as two dimensional drawing, physical models, three dimensional

computer models.

- Report Writing: Techniques in report writing, presentation of contextual information relevant to interpretation of the data collected and design; reporting the design development from concept to design solution, explain the relation of the design to existing knowledge on the topic in the form of coherently written thesis report.

The inputs to the students on various design thesis topics would be in the form of Expert /Guest Lectures

Each student in consultation with the faculty shall choose a thesis topic, collect necessary data, review literature on the chosen topic and present a written paper and seminar at the end of the semester.

#### Reference books:

**Mukhi, H.R.** Technical Report Writing: Specially prepared for Technical and Competitive Examinations, New Delhi: Satya Prakashan, 2000.

**Barrass, Robert.** Writing At Work \b a guide to better writing in administration, business and management, London: Routledge, 2003.

**Seely, John.** The Oxford guide to effective writing and speaking, 2<sup>nd</sup> ed., Oxford ; New York : Oxford University Press, 2005.

**Jo Ray McCuen, Anthony Winkler.** Readings for writers, 9<sup>th</sup> ed., Fort Worth : Harcourt Brace College Publishers, 1998.

**Treece, Malra.** Effective reports, 2<sup>nd</sup> ed., Boston: Allyn and Bacon, 1985.

### AR17B8.1E ARCHITECTURAL ILLUMINATION (Elective IV)

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### Objectives of the Course:

The course is intended to give an in depth understanding of the scientific and design aspects of lighting in Architecture

#### Course Contents:

### Unit – I

Light and vision, basic units, photometry and measurement, quality and quantity of light of different sources of light. Daylight, incandescent lamps, halogen lamps, electric gas discharge lamps, fluorescent lamps, high discharge lamps. A market survey of lamps with cost and technical specifications.

### Unit – II

Design of lighting; lumen method, point by point method, design tools, design documentation, simple numerical.

### Unit – III

Specific lighting design requirement of different buildings such as homes, offices, industrial, hospital, art galleries, museums and exhibitions, case study of at least one type of the building by each student.

### Unit – IV

Outdoor lighting: road lighting, high-mast lighting, tunnel lighting, landscape lighting, decorative lighting, facade lighting, spot lighting.

### Unit – V

Lighting as determinant of form for architecture with graphic examples.

### Unit – VI

Daylighting, advantages of daylighting; design tools in daylighting. Case studies and various examples, behaviour of daylighting in interior spaces. Potentials of daylighting as an energy resource.

### Unit – VII

Integration of daylighting with artificial lighting; lighting controls, intelligent building systems for lighting.

### Unit – VIII

Conservation of energy in lighting use of daylight, optical fiber lighting, LED in lighting and the emerging trends in lighting.

#### Reference books:

**Moore, Fuller.** Concepts and practice of Architectural Day Lighting. Van Nostrand Reinhold co., New York, 1985.

**Valia, Anil.** Designing with light: A Lighting H.B. International Lightning Academy, Mumbai, 2002, Architectural Physics: Lighting.

**Hopkinson R.G.** Her Majesty's Stationery Office, London.

**David Egan. M.** Concepts in Architectural Lighting McGraw Hill Book Company, New York, 1983

### AR17B8.2E ARCHITECTURAL JOURNALISM (Elective IV)

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### Course Overview:

The Course prepares ground for the students to gain an understanding into the fundamental issues in architectural Photography and develop the skill to create Articles/presentation capturing the essence through the photographs.

#### Course Contents:

##### Unit – I

Analysis of historical and contemporary examples of writings on architecture, including selected writings by Indian and overseas critics;

Discursive techniques; analysis of major critical themes, thematic categories in architectural writing from the past.

Works of Indian and international writers and critics to be presented and discussed. Seminars on Indian architectural writers, journalists and critics  
Awards for Architectural Journalism

### Unit - II

Development of writing skills: Usage of language and Vocabulary and grammar- introduction to methodology of writing essays, news writing, precis writing, writing in architectural blogs; listening comprehension, analyze talks and information gathered and to edit gathered information to build an article.

Collecting clippings from articles, blogs and books.

### Unit -III

#### INTRODUCTION TO PHOTOGRAPHY

Visual awareness – visual survey - General introduction to the art of photography; ; concept of color; concepts of lighting, distance, visual angle, frames; media;

#### PHOTOGRAPHIC TECHNIQUES

Types of camera, properties and priorities;  
Exposure, Aperture, Speed; EDFAT methods in using the camera

### Unit - IV

Photo Journalism in perspective - Brief History - Photographs as social Documentaries - Birth of modern Photojournalism; Equipment required for Photo Journalism; Public relations News Papers and Magazine Design elements: Page Layouts - color scheme - Font - Blurb - Pictures - Ads etc- Other magazines  
Documenting of Places - Rural- Urban.

### Unit – V

People journalism and law-legal boundaries-libel and invasions of privacy – ethics-the photo journalist on scene

### Unit - VI

Production of contemporary architectural journalism; Building pictures - Instant, Report - Editing - Editorial thinking – the picture Editor - Editing practices, creating drama - Photo editing -Documentary-evolution of the word document-methods and techniques.

Assignments should include an article based on ability to originate, plan, research, present and produce a piece of architectural journalism, integrating photography .

#### Reference books:

**Kopelow, Gerry.** How to photograph buildings and interiors, 3<sup>rd</sup> ed. New York: Princeton Architectural Press, 2002.

**De Mare, Eric Samuel.** Architectural photography, London: Batsford, 1975.

**Busch, Akiko.** The photography of architecture: twelve views, New York: Van Nostrand Reinhold Co., 1987.

**Mehta, Ashvin.** Happenings: \b a journal of luminous moments, Vapi, Gujarat: Hindustan Inks, 2003.

**Mohd, Al Asad.** Architectural Criticism and Journalism

**Sommer, Robert.** Tom Wolfe on Modern Architecture

### AR17B8.3E STRUCTURES PROJECT (Elective– V)

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<i>L/s: 4/Wk</i>	<i>Int: 50</i>	<i>End Exam: 50</i>	<i>Total: 100</i>	<i>End Exam: Viva</i>	<i>Cr:4</i>
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#### Course Overview:

To understand the structural design concept and detailing for buildings up to G + 3 Floors

#### Objectives of the Course:

To provide knowledge and capability in structural concepts and design of framed RCC and steel structures

#### Course Contents:

Students have to design any structure, either in RCC or steel, which has been designed by them in the previous semesters. The project should be at least G + 3 Floors. It may be either RCC framed structure or steel structure and should include all basic structural elements.

**Reference Books:**

**S. Ramamrutham**, Design of RCC Structures, Delhi, Dhanpati Rai Publishing

**Dayaratnam**, Design of RCC Structures, Allahabad, Wheelers Publishers

**Ramachandra**, Design of Steel Structures Vols. 1 and 2, Standard Publications, New Delhi

**Vazirani and Raywani**, Design of Steel Structures, Khanna Publishers, New Delhi

**AR17B8.4E WORKSHOP –TALL BUILDINGS (Elective - V)**

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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**Course Overview:**

To impart knowledge about the design approach to multi-storeyed buildings and the special service requirements of tall buildings; and to create awareness about the systems, equipment and materials commonly employed in high rise buildings.

**Objectives of the Course:**

Understanding the special systems required in mechanical, electrical and Fire safety services.

The ability to design vertical transportation systems, HVAC systems and Fire protection systems in line with the various standards, building codes and safety requirements.

**Course Contents:**

**Unit I**

Design and Structure

Design approaches to Tall buildings; Studying some famous examples as case studies; structural concepts of tall structures.

**Vertical Transportation**

Introduction to passenger elevator codes – Express & Local Elevators, Sky lobbies etc., - Study of elevator equipments, control systems and spatial requirements – Escalators and Capsule elevators – Stairways & Ramps

**Fire Protection**

Designing for fire safety – NBC – Fire alarm systems – Smoke detectors – Firefighting support systems – Fire rating of materials - Fire escape stairs & Safety regulations – Lightning protection.

**Thermal Control Systems**

Calculation of Heating and Cooling loads – Selection of suitable HVAC system – Special equipments and systems for heating and cooling – Spatial requirements for HVAC plants – Design of duct layouts etc.,

**Water Supply and Sewage Disposal**

Basic planning for water supply – Calculation of capacity for sumps and water tanks –Skip stage pumping etc., - Rainwater harvesting methods – Sanitation arrangements in high rise structures – Service floors – Ducts and vertical shafts – Waste treatment etc.,

**Electrical Systems**

Planning transformer & generator rooms, Preparation of electrical layouts for tall buildings – Spatial requirements of electrical rooms and ducts – Intelligent systems for electrical and illumination.

**Text Books**

1. Stein Reynolds Mc Guinness – *Mechanical and Electrical equipment for buildings – vol 1 & 2* – John Wiley & sons

#### Reference Books

1. Francisco AsensioCerver – *The architecture of Skyscrapers* – Hearst Book International - New York, 1997
2. Bennetts Ian & others – *Tall building structural systems*
3. Proceedings of the council for tall buildings – vol 1 & 2

### AR17B8.5E FURNITURE AND PRODUCT DESIGN (Elective -VI)

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L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: Viva    Cr:4

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#### Course Overview:

The course provides a framework in understanding the Theoretical, historical functional and human issues of the subject.

#### Objectives of the Course:

To impart a comprehensive understanding of the general theory and practice of the subject.

To inculcate in student a natural curiosity in allied discipline of design

#### Course Contents:

##### Unit – I

Understanding of the functional and formal issues in design – study and evaluation of popular dictums such as “Form follows function”, form and function are one”, “Less is more”, “God is in details” etc.

Evaluation of visual design for functional objects.

Gestalt theory of design: Law of closure, law of proximity, law of continuity etc.

##### Unit – II

Evolution of furniture through ages till present day

##### Unit – III

Human factors engineering and Ergonomic considerations; Principles of Universal Design and their application in furniture and product design.

##### Unit – IV

An introduction of various manufacturing processes most frequently adopted in furniture and product design such as, Injection Moulding; investment casting, sheet metal work, die-casting, blow-moulding , vaccum – forming etc.

##### Unit – V

Signage and Graphics – Environmental graphics: signage categories and materials.

##### Unit – VI

A detailed study involving the design aspects of any on of the following: Lifestyle accessories, Luminaire design, a piece of furniture, Point of Purchase design, Signage.

#### References:

**HéctorRoqueta.** Product design, London: teNeues, 2002.

**Morley, John.** The history of furniture: twenty-five centuries of style and design in the Western tradition, Boston: Little, Brown and Company, 1999.

**Aronson, Joseph.** The Encyclopedia of Furniture, 6<sup>th</sup> printing, New York: Crown Pub. 1944.

**Saville, Laurel.** Design secrets: furniture, Gloucester, Mass. : Rockport Publishers, 2006.

**Datschefski, Edwin.** The total beauty of sustainable products, Hove: Rotovision, 2001.

**Papaneke, Victor J.** The green imperative: natural design for the real world, New York: Thames and Hudson, 1995.

### AR17B8.6E ARCHITECTURAL DOCUMENTATION (Elective -VI)

**Course Overview:**

To train the students in conducting detailed building measurements including the application of surveying techniques.

**Objectives of the Course:**

To impart skills of planning a detailed measured drawing of an existing building/cluster of buildings (historical /contemporary/rural) and also to understand the background of the building design, construction, design concept.

1. Measurement of a modern building using plane table/TS
2. Village or neighbourhood study, preparing settlement plans, socio economic studies and conservation studies etc.
3. Documentation of any Historical/Heritage Building / Architectural landmark

Any one of the above to be taken up as groupwork during the Semester. The study should include a detailed understanding of the reasons for constructing the building, design concept, source of finance, building material and technology, socio-economic-cultural factors affecting the design and also the environmental factors impacting it. Wherever relevant and possible an interview with the architect of the building is to be undertaken.

The final submission to include a written report of at least 10000 explaining all aspects studied, Site plans, Building Floor Plans, Elevations and Sections.

**AR17B8.7EBUILDING INFORMATION MODELING  
(Elective -VI)**

**Aim:** The course shall impart theoretical and practical knowledge on BIM for building and infrastructure design, for preconstruction (- Estimating, Building analysis and optimization), for construction management (clash detection, constructability, trade coordination and scheduling), for IPD Integrated project delivery, and facility management.

**1. Introduction**

- History; building design process with purely drafting & modelling software and its limitations and disadvantages
- Difference between a purely drafting & modelling software and BIM software.

**2. Basics of producing building design using BIM software.**

- Introduction to Parametric 3D modelling and exploration of its advantages (Shall include Architectural, Structural, Electrical, Mechanical and all specialist consultant's elements) using any of the popular BIM software, preferably Revit 2018, Autodesk – the most popular software.
- Project Elements Planning – Creation of Project Tree. Hierarchical Identity creation of the project elements and intelligent internationally recognisable naming system.
- Building design – Creation of Digital Model of a building and its geo-physical location; creation of elemental details.
- Creation of Elements' families.

- Import of elements of all related trades. Format of digital model (IFC; acceptable formats and its advantages)
- Preparation of Project Documentation and Rendering
- Preparation of Schedules and BOQ (quantity take-off).
- Solar Studies – Daylighting simulation

### **3. BIM Information Sharing**

- Concept of Central Model ownership of the digital model and interoperability.
- Location of the Central Model
- Access to model for the projects various stakeholders – The Client, Architect, Project Managers, Contractor, Structural Engineer, Electrical Engineer, Mechanical Engineer, all specialist consultants and Vendors in some cases.
- Other ways of exchange of information, in case of non-availability of common platform like the internet.

### **4. BIM as Project Design and Management Tool**

- Introduction to 4D and 5D.
- Project Estimate and Scheduling; Linking of software like MS Project, Primavera, MS Excel to BIM. Exchange and Analysis of information
- Preconstruction study; project optimization
- BIM as tool to integrate Sustainability issues to building design and construction process; linking of various sustainability related applications, output and Analysis.
- Construction process and Constructibility

### **5. BIM Execution Plan**

- Formats being used in different parts of the world to prepare a BIM execution plan.
- Need to prepare a project specific BIM Execution plan.
- LOD (Level of Development) for project specific requirement – production of Design Drawings, production of Working Drawings, coordination of various trades plus Clash Detection, production Shop Drawings, as-built drawings and compilation of information for Facility Managements (COBIE etc.).

### **References:**

- Revit 2018 Suite \_ Complete Reference Series, Mc Graw Hill Publication
- Mastering Revit Architecture - Demchak, Dzambazova&Krygiel
- BIM Handbook / Eastman, Teicholz, Sacks, Liston / Wiley
- Optional: BIM and Construction Management: Proven Tools, Methods, and Workflows / Hardin / Sybex — A BIM reference with a focus on construction management
- BIM – WillernKymmell

### **OPEN ELECTIVE - II**

Open Electives will be announced by the Department/s before start of the Semester. If a student wishes to take any online course as Open Elective due permissions must be taken as prescribed.

## NINTH SEMESTER

### AR17B9.1C DESIGN THESIS

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*L/s: 23/Wk    Int: 300    End Exam: 300    Total: 600    End Exam: Viva-voce    Cr: 23*

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#### Course Overview:

Thesis should reflect the knowledge gained from all the courses undertaken by the student in all the previous semesters.

#### Objectives of the Course:

To develop assimilation, synthesis and application of research in Architecture

#### Expected Skills / Knowledge Transferred:

Student should be in a position to comprehend the design philosophy, theories, data analysis and application in a chosen area of study.

#### Course Contents:

Each student is expected to prepare a design thesis based on the preliminary work undertaken in the Pre Thesis Seminar, under an approved guide/adviser by the department.

The design Thesis shall comprise of Architectural Design proposals,

Thesis should reflect the knowledge gained from the course learnt in the previous semesters

The particulars of schedule, content, presentation, format etc., is to be decided by the department, from time to time and shall be strictly followed.

At the end of the semester, each student is expected to submit all original drawings prepared as per the department's specifications.

Three copies of the report in the specified format along with a model submitted to the department, after obtaining the approval of the respective guides / advisers.

The department shall schedule the final viva-voce, at its convenience, only after the receipt of the thesis submission by a student. The performance sheet submitted by the advisor and the thesis committee should be the basis for allowing the student to appear for the final viva-voce.

For End exam, viva-voce is to be conducted by a jury comprising of an external examiner, one internal examiner and head of the department or his nominee.

#### Reference books:

**Mukhi, H.R.** Technical Report Writing: Specially prepared for Technical and Competitive Examinations, New Delhi: Satya Prakashan, 2000.

**Barrass, Robert.** Writing At Work \b a guide to better writing in administration, business and management, London: Routledge, 2003.

**Seely, John.** The Oxford guide to effective writing and speaking, 2<sup>nd</sup> ed., Oxford ; New York : Oxford University Press, 2005.

**Jo Ray McCuen, Anthony Winkler.** Readings for writers, 9<sup>th</sup> ed., Fort Worth : Harcourt Brace College Publishers, 1998.

**Treece, Malra.** Effective reports, 2<sup>nd</sup> ed., Boston: Allyn and Bacon, 1985.

### AR17B9.2C PROFESSIONAL PRACTICE& BUILDING CODES

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*L/s: 4/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:4*

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#### Course Overview:

The course provides overview and specific conditions of COA regulations, Architects Act 1972 in Architectural practice.

#### Objectives of the Course:

To impart awareness and technicalities of code of conduct, and the significance of Architects Act 1972 in Professional Practice.

**Expected Skills / Knowledge Transferred:** Legal, Technical and Financial aspects of Architectural practices and management

skills for professional practice.

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

## **Course Contents:**

### **Unit - I**

Professional Role of an Architect: Role and responsibility of architect in society; architectural profession as compared to others professions; difference between profession and business;.

Architects approach to works; ways of getting works; types of works, works partly executed by other architect; various precautions to be taken before taking up the work; conditions of engagement between the architect and client; commencement of work.

Architect's Act 1972, registration of architect, COA, IIA and other organizations related to architectural profession. Professional Practice Regulations 1989 and Minimum Architectural Education Regulations under the Architect's Act. IIA Code professional conduct;

### **Unit - II**

**Architectural Services Rendered:** Architect's duties; drawings to be prepared; Architects relation with other parties connected with works such as client, contractor, sub-contractors, consultants, municipal and public authorities.

Architectural services - conditions of agreement - scope of work, comprehensive architectural services and architectural competitions, remuneration, professional fees and charges as per IIA norms.

Architectural Competitions & Legislations

Regulations governing the conduct of competitions, open & closed competitions, appointment & duties of Assessors, instructions to participants, award of premium.

Units and mode of measurements - clerk of work and his duties;

Inspection of work during construction; certification of contractor's bills; bill of quantities; defects liability; Schedule of rates, tenders; public, limited and negotiated tender documents and allied formalities.

### **Unit – III**

Tender and Contract: Calling for Tenders, tender documents, open & closed tenders, labour & demolition tenders, conditions of tender, submission, scrutiny, recommendations & award of contract.

Contracts; types of contracts such as item rate, lumpsum, cost plus percentage etc.

General principles of Indian Contract Act; Building contracts, conditions and forms of contract, study of standard contract of the Indian Institute of Architects. Articles of Agreement. Administration of contract.

**Arbitration:** Principle of Arbitration, Indian Arbitration act 1940, Powers and duties of arbitrators, revoking authority; umpire, award cost fixed fee, cost with penalty, labour day work, piece work daily

**Easements:** definition; various types of easements; Dominant, and servient owners; essential conditions for enjoyment of easement; Fire insurance's definition, cover note; insurance for new work and additions; insurable value of property, claim for damage due to fire. Insurance of completed and occupied building

### **Unit - IV**

Preliminary knowledge of transfer of property Act; registration, stamp duty under registration and Govt. Power. Income tax, wealth, land acquisition Acts; general information about land acquisition procedures.

Accidents during progress of work and after completion, damage to persons and properties affected; Workmen's Compensation Act with regards to the affected persons and properties.

Consumer Protection Act and related acts on architects

## Unit - V

Types of Architectural firms: Architects' Offices Proprietorship firms & Partnership firms combined concerns; Comparison between partnership and Proprietorship firms. Staff structure; filing of records; correspondence and drawings; maintenance of accounts; presentations in meetings, recording minutes of meeting.  
A small report to be prepared by each student after visiting an architect's office.

Role of consultants and Co-ordination between different consultants on a big project.

## Unit VI

**Valuation** – purpose of valuation, types of valuation- terms: market value, book value, capital cost, capitalized cost, – salvage/scrap value- various methods of estimating the depreciation of building properties,- sinking fund- land valuation- mortgage and lease- Annuity- definition; problems to calculate the value of the property by different methods.  
Fixation of rent- out going- gross and net income – year's purchase- capital cost-standard rent- market rent -economical Rent.

## Unit VII

**Building Codes (National Building Code, and Local Codes):** Study of building byelaws to enable to design and prepare drawings for submission to concerned bodies and an understanding of the administrative processes for obtaining building permission.  
General Land-use, building classifications and permissible uses; Norms for exterior and interior open spaces, Setbacks and margins, norms for building projections in open spaces, considerations in FAR, guidelines for open green areas.  
Requirements for various parts of buildings, building height regulations, multi-storey regulations

Requirements of parking spaces and vehicular movements, Nature of building codes in special regions like heritage zones, air funnels, environmentally sensitive zones, disaster prone regions, coastal zones, hilly areas, etc.

Norms for Fire Protection for various building classifications, norms for fire-exit ways and building materials, concept of fire zoning, doorways, stairways, passages and corridors, fire escapes etc.

### Reference books:

- Banerjee, D.N.** Principles and Practice of Valuation, 5<sup>th</sup> ed. Eastern Law House, Calcutta, 1998.  
**Dalton, J. Patrick.** Land Law, 4<sup>th</sup> ed. Pitman Pub., London, 1996.  
**Indian Institute of Architects.** H.B. Professional Practice. The Architects Pub. Bombay.  
**Indian Standards Institution.** National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.  
**Namavati, H. Roshan.** Professional Practice, 8<sup>th</sup> ed. Lakshani Book Depot, Bombay, 2001.  
**Namavati, H. Roshan.** Theory and Practice of Valuation, 2<sup>nd</sup> ed. Lakshani Book Depot, Bombay, 1991.  
**M.Dedbhkth** Architectural practice in India by Prof.M.Deobhkta  
**V.SApte:** Architectural Practice Procedures  
**Hyderabad Municipal Bye laws.**  
**Indian Standards Institution.** National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.  
**Scott, G. James.** Architectural Building Codes, New York: Vanstrand Reinhold.

## AR17B9.1E DISASTER RESISTANT ARCHITECTURE (ELECTIVE – VII)

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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### Course Overview:

This course introduces and explains disaster resistant methods of construction

### Objectives of the Course:

To develop understanding about the nature of disasters and their effects on built environment.

To develop understanding about the ways of building that would resist disasters.

### Course Contents:

#### Unit - I

##### Building safety from Natural Hazards:

Earthquake, Fire safety in buildings, Cyclone effects: High winds, storm surge and safety aspects in buildings, related to Cyclones, Floods, Landslides.

##### Elementary Seismology:

Occurrence of earthquake in the world, plate tectonics, faults, earthquake hazard maps of India and the states.

Causes of earthquake, seismic waves; magnitude, intensity, epicenter and energy release, characteristics of strong earthquake ground motions. Seismological Instruments: Seismograph, Accelerograph, Seismoscope / Multi SAR.

#### Unit - II

### Introduction to Theory of Vibrations:

Single degree undamped and damped systems, resonance, response to earthquakes, elastic response, concepts of response spectrum. Flexibility of long and short period structures.

#### Unit - III

Site Planning, Building Forms and Architectural Design Concepts for Earthquake Resistance:

Historical experiences, Site Selection, Site Development.

**Building forms:** - Horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc.; Seismic effects related to building configuration. Plan and vertical irregularities, redundancy and setbacks, Special Aspects:- Torsion, appendages, staircases, adjacency, pounding; Contemporary international approaches.

#### Unit – IV

##### Performances of Ground and Buildings in Past Earthquakes:

Earthquake Effects:- On ground, soil rupture, liquefaction, landslides; Behavior of various types of buildings, structures, power plants, switch yards, equipments, lifelines and collapse patterns; Behavior of Non Structural Elements like services, fixtures, mountings. Social and Economic Consequences of earthquakes, Lab simulations of models.

##### Seismic Design Principles:

Concept of seismic design, stiffness, strength, period, ductility, damping, hysteric energy dissipation, center of mass, center of rigidity, torsion, design eccentricities; Ductility based design: Design of energy absorbing devices, Seismic base isolation and seismic active control.

#### Unit – V

##### Structural Detailing:

Innovations and Selection of appropriate materials; IS Code provisions for the buildings:-IS:1893-2002, IS:4326-1993; Horizontal and Vertical seismic coefficients, valuation of base shear, distribution of shear forces in multi-storey building; Seismic

Detailing Provisions: Masonry and Wooden Buildings (IS: 4326, IS: 13828), Adobe houses (IS: 13827); Seismic Designs and Detailing of RC and Steel Buildings: IS: 1893 – 2002; IS: 13920 – 1993; IS: 456 – 2000; IS: 800 – 2004; Special reinforcing and connection details in structural drawings.

#### **Unit – VI**

##### **Earthquake Resistance Construction Details:**

Various Types and Construction details of: Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, underground and overhead tanks, staircases and isolation of structures; Local practices: traditional regional responses.

#### **Unit – VII**

##### **Construction Quality Control:**

Sequences of Construction: Good supervision practices, Critical check points and certification at certain stages, reporting, maintenance of records, testing.

##### **Vulnerability Assessments and Seismic Strengthening of Buildings:**

Seismic vulnerability evaluation of existing buildings; Weakness in existing buildings, aging, weathering development of cracks; Concepts in repair, restoration and seismic strengthening, materials and equipments for restoration of masonry and concrete structures. Methodologies for seismic retrofitting.

##### **Reference books:**

**Abbott, L. Patidc.** Natural disasters.

**Arhold, Christopher and others.** Building configuration and Seismic Design. **Disasters and Development -**

**National Geographic.** Restless Earth: Disaster of nature.

**Singh, P.P. and Sharma, Sandhir.** Modern dictionary of natural disasters.

## **AR17B9.2E INTELLIGENT BUILDINGS (ELECTIVE – VII)**

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*L/s: 3/Wk    Int: 50    End Exam: 50    Total: 100    End Exam: 3 hrs    Cr:3*

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**Course Overview:** To provide an elementary understanding of Intelligent Buildings and the applications therein

**Expected Outcome:** To make the student familiar with the various applications of IT in building services and their advantages and risks

The inputs shall be provided in the form of lectures, field visits and seminars by various service providers. Reports and documentations to be prepared for various aspects of IT applications in buildings.

#### **Unit I**

Definitions of Intelligent Building and different areas of emphasis in various countries; Organisations associated with intelligent buildings; Advantages of Intelligent Buildings; Relation between intelligent buildings and energy efficiency and sustainability

Intelligent buildings as: the achievement of productive and cost-effective environment through optimization of four basic elements: structure, systems, services and management, and the interrelationship between them. As an environment which maximizes the effectiveness of the building's occupants while enabling efficient management of resources with minimum life-time costs of hardware and facilities,

Relation between traditional Building Automation Systems (BAS) and BloT (Building Internet of Things) BloT technologies and applications

Major recent shifts in building designs, operations and use. Challenges of space optimization, energy efficiency and connectivity vs. increasing occupant expectations of modern and

flexible space design, improved comfort, productivity, and pervasive connectivity.

Integrated communications infrastructure that supports wired and wireless networks and applications. Person-to-person, person-to-machine and machine-to-machine communications within the building and with the outside world using a state of the art intelligent, flexible, wired and wireless platform. Use of wired LAN, Wi-Fi, in-building wireless, audio/visual, sensors, lighting, cloud connections and building management applications.

Applications and Integration of information technology (IT) into design and construction in HVAC, lighting and metering, Hot water system, Alarms and security

Risks in generational skills gaps, increasing capital expenses, project delays and rising operational and maintenance costs.

New Operational procedures: system interoperability, remote monitoring, centralized command & control, building system analytics, unified user interfaces and other big data tools for making data driven decisions and operational efficiency. Reliability and security of these and failure due to skills gaps, mismanagement or malicious intent. Cyber security implications for Building Automation Systems

## TENTH SEMESTER

### AR17B10.1C PRACTICAL TRAINING

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L/s: 30/Wk    Int: 150    End Exam: 150    Total: 300    End Exam: Viva -Voce    Cr:30

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#### Course Overview:

Internship with training in an architect's office for a period of not less than 20 weeks excluding the examination/viva-voce etc. .

#### Objectives of the Course:

To provide experience in Architectural Practice.

**Expected Skills / Knowledge Transferred:** The skills required for an architect to grow into a complete professional.

#### Course Contents:

Every student must work in an Architect's Office as a full-time trainee for a period of 20 calendar weeks (excluding Viva-voce) from the date of commencement of training. The Chief Architect in the firm should be registered with the Council of Architecture and have a minimum of five years of practical/professional experience after her/his graduation. The student should involve herself/himself in various aspects of work in an office like working drawings, presentation drawings, quantity and cost estimation, site supervision, municipal drawings, etc.

**Note:** Detailed instructions which may be given by the University regarding the training, the frequency of reporting to the department, etc. are to be followed strictly.

After completion of training, every student will have to submit a detailed report with a set of drawings on at least four projects on which she/he has worked during the practical training period.

#### Evaluation:

- The Internal Assessment shall be evaluated at the end/towards the end of the training period and shall be conducted by the faculty deputed by the department in the institute.
- The Internal Assessment shall be of 100 marks. Each college can decide on the mode of evaluation of the work, either by deputing a faculty member of the College to visit the architect's office or by assessing the work at the Institute, just preceding the External Assessment. The monthly reports, Log book maintained, and reports from the Architect will be considered for Valuation. Each College will follow a uniform policy for all students in the College.
- The detailed report and drawings prepared during practical Training by students will be evaluated at a viva-voce by a jury consisting of one External member, one Internal member (Practical Training Co-ordinator or his nominee and Head of the Department or his nominee).

The Department shall arrange for the conduct of the viva-voce examination after submission of the report the department will arrange.

Students who are interested in training abroad are permitted to do so. The Chief Architect should be licensed/registered with the local appropriate authority and should have been in practice for a minimum of five years. The faculty members may satisfy themselves about the architect's by checking the website but the primary onus of the selection depends on the student. The student and Parent/Guardian must sign an undertaking to be wholly responsible for the expenses, safety and accommodation of the student beforehand.

**Additional Information to Colleges and students for Practical training:**

- A counseling session should be arranged for the students before they start applying to architects offices for internship positions. Apart from faculty members, practicing architects should also be invited to orient the students and guide the students on formats and etiquette of applications, remuneration, work and discipline expectations etc.
- Before giving final permission training abroad the college should conduct a background check of the architect (by seeing the website, listed projects etc.)
- To ensure that students are aware of the options available to them, the College should put up a list of all firms who are willing /interested in taking trainees.
- An Open Day may be organized at The College with a display of students' works and invite architects to view the works and select students for training.
- The College should compulsorily check the portfolios/profiles of the students before submission to the architects' offices.
- The work done at the office may also include a small component of research related to an on-going project. The student may take up a study to give specific inputs, or relate to a new material or product etc. However such work should not engage the student for more than 2 (two) weeks.
- The student should submit a 1000 word report on the projects that they have worked on which should include salient features such as design methodology, special construction features etc.
- The letter from the College to the architect at the time of the student joining should contain the starting and ending dates of training. The HoD/ Practical Training Co-ordinator should inform the architect directly by email or letter the dates when the student is expected to report at the college.
- The students may be permitted to change the office of training after only once, with prior permission from the College and

strictly only where there are compelling reasons. Such cases may be dealt with on a case by case basis based on the merits of the situation.