

SAVITRIBAI PHULE PUNE UNIVERSITY

[Formerly the University of Pune]



COURSE STRUCTURE

FIVE YEAR DEGREE COURSE IN ARCHITECTURE

[B.ARCH.]

TO BE IMPLEMENTED FROM 2019-20

BOARD OF STUDIES IN ARCHITECTURE

FACULTY OF SCIENCE AND TECHNOLOGY

BACHELOR OF ARCHITECTURE COURSE STRUCTURE AND RULES

PREAMBLE

The New Syllabus of the B.Arch. course hence forth to be referred as the 2019 Pattern, to be implemented from the year 2019-20, is designed to address the rising expectations of knowledge to be borne by an architect. The interdisciplinary nature of the field of architecture demands integration of knowledge domains from various disciplines such as humanities, art, and technology and so on. However, what distinguishes an architect is the design knowledge and ability to employ the knowledge from the various disciplines for arriving at a solution to a problem.

Hence the syllabus has been designed such that the professional core subjects are supported by building science and technology courses, professional ability enhancement courses and the elective courses. The professional ability enhancement courses and the practical training of one semester focus on connecting the students with the practice. The elective courses enable an exposure to some other domain or nurtures the students' proficiency or skill. The Audit courses are introduced to acknowledge the knowledge that the student seeks in his/her area of interest but not directly contribute to the CGPA.

At the end of the course the graduating student shall be able to methodically approach a problem of creating a built environment be it a small house or a township by employing knowledge from various domains and at the same time making it safe, equitable, feasible and environment friendly. Education needs to equip the student to face the challenges and demands in the field by imbibing first principles.

As per the University guidelines, the course is structured upon the Credit System Based Assessment. The syllabus is structured with the following objectives and expected outcomes

PROGRAM EDUCATIONAL OBJECTIVES[PEO]-

1. **Theoretical Base**—To establish strong theoretical base and understanding of Architecture and work of an architect.
2. **Knowledge and Skills**—To inculcate design sensitivity and ability, as well as knowledge in the domains of humanities, technology & art and impart skills so as to equip the graduate student to undertake work of an architect.
3. **Values** - Sensitize the students to the universal values of equity, environmental care, accessibility, and respect for heritage and equip them to address these through design.
4. **Research** -Train the students to methodically research a issue or a situation to find a creative solution to meet the contextual challenges in the realm of changing technologies, socio economic and cultural changes.
5. **Practice and Ethics**- To enable the students to practice as architects and imbibe them with the knowledge of the professional practice and ethics.
6. **Changes and Diversification**- To expose the students to the changes in architectural practice, diversifications and evolving role of an architect.

PROGRAM OUTCOMES [PO]

1. **Knowledge** -Understanding about role of various knowledge domains such as humanities, technology, and environment in design of built environment.
2. **Principles & Theory**- Knowledge of principles of architecture & theoretical knowledge and its application in design.
3. **Creativity** - Creative and design thinking ability.
4. **Practice** - Ability to understand real life situation of Architectural Practice and to work with ethical and professional responsibilities.
5. **Collaborative Working** -Ability to communicate effectively and work in interdisciplinary groups.
6. **Inclusivity** -Sensitivity in design for inclusivity, equity, environment, diverse cultures, and heritage.
7. **Technological Knowhow**-Ability to review, comprehend and report technological developments in the profession of architecture and construction.
8. **Ability to choose Area of Specialisation or Practise**- Able to judge one's area of interest and accordingly choose the field of practice.

Rule no.1: ELIGIBILITY FOR ADMISSION.

Eligibility Criteria: Students seeking admission to First year of Bachelor's degree course in Architecture must fulfil the eligibility criteria laid down by Savitribai Phule Pune University / Govt. of Maharashtra / Council of Architecture as applicable from time to time.

Rule no.2: SCHEME OF ASSESSMENT.

A candidate to be eligible for the degree of Bachelor of Architecture will be required to appear for and pass examinations as under:

	Semester Numbers	Credits
1	Semester 1	28
2	Semester 2	28
	Total credits for First Year B.Arch.	56
3	Semester 3	28
4	Semester 4	28
	Total credits for Second Year B.Arch.	56
5	Semester 5	28
6	Semester 6	28
	Total credits for Third Year B.Arch.	56
7	Semester 7	28
8	Semester 8	28
	Total credits for Fourth Year B.Arch.	56
9	Semester 9	14
10	Semester 10	24
	Total credits for Fifth Year B.Arch.	38
	Total credits	262

Total Credits of the Course = 262

Colleges may offer the students audit courses one per semester [Sem I to Sem VIII]. The students may choose to opt these courses. The passing in audit courses is by clearance and they are non- credits courses and are not part of the SGPA / CGPA calculation.

Rule no. 3: GRANTING OF TERM.

Academic year shall consist of two semesters of minimum 90 teaching days each. The candidate will be permitted to appear for examination **only if** he/she produces testimonials from the Principal of the College for:

1. 75% attendance in each head of passing of theory and/ or sessional work as prescribed by the University.
2. Satisfactory completion of the sessional work prescribed for each subject and securing minimum required marks in the internal assessment for the same.
3. Good Conduct.

Rule no. 4: RULES OF PASSING

- 4.1 To pass sessional [SS] / sessional viva [SV], the student has to earn minimum 50% marks.
- 4.2 To pass the theory subject head the student has to earn minimum of 45% marks in the End semester exam and minimum 45% average marks (In- Semester Assessment + End semester).
- 4.3 A student shall be promoted to higher class only if she/he scores 50% marks in the aggregate of the total marks of the year.
- 4.4 **For theory subjects** the failing student can repeat the end semester exam to pass the head in any semester and the In-semester assessment exam marks will be retained as it is. Or the failing student can repeat end semester exam as well as In-semester assessment for the head of even semester in the even semester only and for the head of odd semester in the odd semester.
- 4.5 To earn credits of a course (paper/SS/SV) student must pass the course with minimum passing marks / grade.
- 4.6 Student can apply only for the revaluation / photocopying / verification of answer sheets of End semester theory exam only.

Rule no. 5: RULES OF A.T.K.T.

- 5.1 A student can be admitted for the third semester if he/she earns minimum **50%** credits of the total of first and second semester.
- 5.2 A student can be admitted for the fifth semester if he/she earns minimum **50%** credits of the total of third and fourth semester and all the credits (**100%**) of the first and second semester and passing grade of aggregate for first year.
- 5.3 A student can be admitted for the seventh semester if he/she earns minimum **50%** credits of the total of the fifth and sixth semesters and all the credits (**100%**) of the third and fourth semesters and passing grade of aggregate for second year.
- 5.4 A student can be admitted for the ninth semester if he/she earns minimum **50%** credits of the total of the seventh and eighth semesters and all the credits (**100%**) of the fifth and sixth semesters and passing grade of aggregate for third year.

5.5A student would be awarded B.Arch. only if he/she earns **262 (100%) credits** and gets passing grade in all the courses specified in the syllabus and gets passing grade of aggregate within the time permissible by the University.

Rule No. 6: PREREQUISITES FOR ENROLLING FOR THE SUBJECT OF ARCHITECTURAL DESIGN and ARCHITECTURAL DESIGN PROJECT

6.1 A candidate shall not be permitted to enrol for the Architectural Design course in a semester unless he/ she has completed [*attended the course, submitted the work*] of the Architectural Design course of the previous semester and satisfied prerequisites as per 6.2.

6.2 Prerequisites for appearing in Examination

Sr.No.	Appear for examination in	Passing grade to be obtained in
01	Architectural Design III	Architectural Design I[SV]
02	Architectural Design IV	Architectural Design II[SV]
03	Architectural Design V	Architectural Design III[SV]
04	Architectural Design VI	Architectural Design IV[SV]
05	Architectural Design VII	Architectural Design V[SV]

6.3 A candidate shall not be permitted to enrol for the tenth semester Architectural Design project course unless he/ she has successfully completed [*passed*] and received passing grades in Practical Training/ Internship and Architectural Design VI & Architectural Design VII.

The rules of Passing, ATKT and Prerequisites have to be read in conjunction with each other and not in isolation.

Rule no. 7: ASSESMENT AND GRADE POINT AVERAGE

7.1 A grade assigned to each head based upon marks obtained by the student in examination of the course.

**Table 1
GRADING SYSTEM FOR PASSING HEADS (THEORY)**

Grade	Grade Points	% of Marks Obtained	Remarks
O	10	90-100	Outstanding
A	9	80-89	Very good
B	8	70-79	Good
C	7	60-69	Fair
D	6	50-59	Average
E	5	45-49	Below average
F	0	Below 45	Fail

Table 2
GRADING SYSTEM FOR [SESSIONAL/ SESSIONAL VIVA and AGGREGATE]

Grade	Grade Points	% of Marks Obtained	Remarks
O	10	90-100	Outstanding
A	9	80-89	Very good
B	8	70-79	Good
C	7	60-69	Fair
D	6	50-59	Average
F	0	Below 50	Fail

- 7.2 Passing grades for various heads:** The grades O, A, B, C, D & E are passing grades for theory papers. The grades O,A,B,C & D are passing grades for sessional and/or sessional viva voce heads. A candidate acquiring any one of these grades shall be declared as pass only in that particular head.
- 7.3 Passing grades for Aggregate:** The grades O, A, B, C & D are passing grades in the aggregate.
- 7.4 F grade for various heads:** The grade F is a failure grade. The student with F grade will have to pass the concerned course by reappearing for the examination.
- 7.5 F grade for aggregate:** The grade F is a failure grade for aggregate. The student with F grade will have to appear for paper &/ or sessional &/or sessional viva voce for improvement of aggregate.

Rule no. 8: EXAMINATIONS.

The type of examination / assessments are as follows

- I. In Semester Examinations for Theory conducted and assessed at the college
- II. End Semester Theory Paper conducted by the University and assessed at the CAP by the University.
- III. Continuous Assessment for Sessional to be maintained and record to be kept by the subject faculty. The progressive work done by a student through out the semester to be maintained for architectural design course. The weightage of this continuous internal assessment [CIA] shall be 50% of the total marks allocated for the sessional work. The remaining marks to be given by the external examiner referred as External assessment [EA]. CIA and EA will be entered as aggregate at the time of external examination. Break up of marks is mentioned in detailed syllabus at respective subjects.
- IV. Viva voce to be jointly conducted by internal and external examiner at the end of the semester and the weightage for internal and external examiner's assessment will be equal [50:50] and break up of marks is mentioned in detailed syllabus at respective subjects.
- V. For subjects having both sessional assessment and viva voce the marks to be entered as an aggregate of sessional and viva voce.

Structure of Theory Subject Assessment

8.1 The theory subject assessment shall be conducted in two phases for the subjects [Except Architectural Design V paper] as indicated in the structure viz.: In Semester assessment and End Semester examination. This structure of assessment/examinations shall be as below: -

	Time	Mode	Syllabus Coverage	Duration	Max. Marks
In semester Assessment	After the End of 6 th week but before the end of 8 th week	As mentioned in point 8.2 below	Unit I & II	60 minutes	30
End Semester Examination	End of Semester	Written	All Units	150 minutes	70

8.2 The in semester assessment can be in one of the following format- Tutorial / Class test/ Open book test/Time bound assignment/MCQ type Quiz/ and any other innovative time bound assignment to assess the learning of the student. The assessment record to be kept with the college and submitted to the University as and when demanded.

Rule no. 9: CONDUCT AND ASSESSMENT OF EXAMINATIONS.

Theory Assessment

- 9.1 In-Semester Assessment: Shall be carried out at concerned college by the subject faculty as per rule no. 8 above.
- 9.2 End-Semester Examination: Shall be carried out at concerned college as per 8.1 above and schedule of examination program and the question paper for theory exam will be made available by the University.
- 9.3 End-Semester Examination Assessment: Will be done at the CAP centre by the examiners appointed by the University.

Sessional Work Assessment.

- 9.4 The sessional and /or viva examinations is to be conducted and assessed by external and internal examiner approved by the University.
- 9.5 In respect of Sessional work at F. Y. B.Arch., S. Y. B.Arch., T. Y. B.Arch. Fourth Yr. B.Arch. and Fifth Year B.Arch. it shall be continuously assessed by the teacher during semester. The progressive work done by a student in architectural design through out the semester to be maintained.
- 9.6 Performance of Sessional / Viva-voce Examination shall be assessed on the basis of understanding of the concepts and principles of the content and not on the basis of mere completeness of results and ornamental or colourful presentation.
- 9.7 Drawings and reports / notes shall be manually prepared. Students may use computers for sessional work under the guidance of the teachers where nature of work is individual and stress is on content rather than skill. The work done by the students has to be authenticated for its originality by the concerned teachers.

- 9.8 At all the examinations **except** for the SEMESTER X : ARCHITECTURAL DESIGN PROJECT, external assessment shall be carried out by teachers from other college in the University not teaching that subject in the institute where the examination is being conducted.
- 9.9 For tenth semester Architectural Design Project an external examiner means a professional/ academician not teaching in any of the colleges under the University and Internal Examiner is one who is teaching that particular subject in the same/any other college under the University.
- 9.10 Any examiner shall have a minimum of three years teaching/professional experience in a field of study relating to the subject of examination. However an external examiner for 10th Semester Architectural Design Project Shall have minimum of 10 years teaching/professional experience.

Rule no.10: PERFORMANCE INDICES

- 10.1 The semester end grade sheet will contain grades for the course along with titles and SGPA. Final grade sheet and transcript shall contain CGPA.
- 10.2 SGPA: The performance of a student in a semester is indicated by a number called the semester grade point average (SGPA). The SGPA is the weighted average of grade points obtained in all the courses registered by the student during the semester.

Semester Grade Point Average (SGPA) =

$$\text{SGPA} = \frac{\sum_{i=1}^p C_i G_i}{\sum_{i=1}^p C_i}$$

$$= \frac{\sum \text{Grade Points earned} \times \text{Credits for each course}}{\text{Total Credits}}$$

For example : Suppose in a given semester a student has registered for five courses having credits C1, C2, C3, C4, C5 and his / her grade points in those courses are G1, G2, G3, G4, G5 respectively, Then the SGPA would be

$$\text{SGPA} = \frac{C_1 G_1 + C_2 G_2 + C_3 G_3 + C_4 G_4 + C_5 G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

SGPA is calculated up to two decimal places by rounding off.

1. **CGPA** : The CGPA is the weighted average of the grade points obtained in all the courses (theory /sessional / sessional vivavoce) of **all the ten** semesters. It is calculated in the same manner as the SGPA. It is calculated based upon the SGPA of the concerned semesters.

Rule no. 11: RESULT

Based on the performance of the student in the semester examinations, the Savitribai Phule Pune University will declare the results and issue the Semester grade sheets. The class shall be awarded to a student on the CGPA calculated in rule no. 10(3). The award of the class shall be as per the table no. 3 below.

Table 3

Sr.No.	CGPA	Class of the degree awarded
1	7.75 or more than 7.75	First class with distinction
2	6.75 or more but less than 7.75	First class
3	6.25 or more but less than 6.75	Higher second class
4	5.5 or more but less than 6.25	Second class

Rule no. 12: EXEMPTIONS

In case a candidate fails in an examination but desires to appear again,

- Examinations will be held in Oct./Nov.& Apr/May.
- He/She may be exempted from appearing in the head/s of passing in which he/she has passed.
- The students failing to get minimum passing grade for aggregate in a year can also appear for the examinations (paper and/or sessional and/or sessional-viva-voce) to enhance their marks in maximum four heads.
- The above a, b and c are subject to the provisions of passing, ATKT and pre-requisites rules mentioned in these rules and regulations.

Rule no. 13: INTRODUCTION OF THIS CURRICULUM.

The new curriculum for the Degree course in Architecture B.Arch. will be introduced gradually as under:

- First Yr. B. Arch. Course from June 2019
- Second Yr. B. Arch. Course from June 2020
- Third Yr. B. Arch. Course from June 2021
- Fourth Yr. B. Arch. Course from June 2022
- Final Yr. B. Arch. Course from June 2023

Rule no. 14: OTHER RULES.

University may frame additional rules and regulations or modify these regulations if needed and once approved by the University they would be binding on the students.

COURSE STRUCTURE BACHELOR OF ARCHITECTURE [B.Arch.]

The syllabus structure is based upon 28 clock hours per week for 1st to fourth year. Additionally 2 clock hours per week are assigned for utilisation for the lectures / allied activities focussing on the individual philosophy of the institute in form of audit courses / site visits / special lectures / workshops / seminars etc offering choice based activities for the institutes / students. The periods considered for calculating the teaching load are of 60 min duration. The architectural design / architectural design project and building construction studio credits are calculated as 1 hour = 1.5 credits, allied studios/labs/workshops are calculated as 1 hour = 0.5 credits and theory lectures are calculated as 1 hour = 1 credit. The detail structure of the syllabus for the ten semester course is given below.

(Note: SS= Sessional work; In Sem = In Semester exam ; End Sem = End semester exam; SV= Sessional and Viva voce; L= Lecture, S=Studio, T=Total ; Theory Paper -P

FIRST YEAR B.ARCH. SEMESTER I

Course Code	Course Title	L	S	T	Theory		Sessional and / Viva		Total Marks	Credits
					In Sem	End Sem	SS	SV		
1201901	Basic Design	1	6	7			250		250	10
1201902	Building Construction & Materials I[P]	2		2	30	70			100	2
1201903	Building Construction & Materials I[SV]		3	3				100	100	5
1201904	Theory of Structures I	2		2	30	70			100	2
1201905	Architectural Graphics and Drawing I	1	4	5			100		100	3
1201906	History of Arch & Culture I	1	2	3			50		50	2
1201907	Communication Skills	2	1	3			50		50	2
1201908	Workshop I	1	2	3			100		100	2
		10	18	28					850	28
1201917	Audit Course									

FIRST YEAR B.ARCH. SEMESTER II

Course Code	Course Title	L	S	T	Theory		Sessional and / Viva		Total Marks	Credits
					In Sem	End Sem	SS	SV		
1201909	Architectural Design I	1	6	7				250	250	10
1201910	Building Construction & Materials II[P]	2		2	30	70			100	2
1201911	Building Construction & Materials II[SV]		3	3				100	100	5
1201912	Theory of Structures II	2		2	30	70			100	2
1201913	Architectural Graphics and Drawing II	1	4	5			100		100	3
1201914	History of Arch & Culture II	1	2	3			50		50	2
1201915	Fundamentals of Architecture	2	1	3			50		50	2
1201916	Workshop II	1	2	3			100		100	2
		10	18	28					850	28
1201918	Audit Course									

SECOND YEAR B.ARCH. SEMESTER III

Course Code	Course Title	L	S	T	Theory		Sessional and / Viva		Total Marks	Credits
					In Sem	End Sem	SS	SV		
2201917	Architectural Design II	1	6	7				250	250	10
2201918	Building Construction & Materials III[P]	2		2	30	70			100	2
2201919	Building Construction & Materials III[SV]		3	3				100	100	5
2201920	Theory of Structures III	2		2	30	70			100	2
2201921	Computer Aided Drawing and Graphics	1	3	4			50		50	2
2201922	History of Arch & Culture III	1	2	3			50		50	2
2201923	Building Services I[P]	2	0	2	30	70			100	2
2201924	Building Services I[SS]	0	2	2			50		50	1
2201925	Climatology	1	2	3			50		50	2
		10	18	28					850	28
2201935	Audit Course									

SECOND YEAR B.ARCH. SEMESTER IV

Course Code	Course Title	L	S	T	Theory		Sessional and / Viva		Total Marks	Credits
					In Sem	End Sem	SS	SV		
2201926	Architectural Design III	1	6	7				250	250	10
2201927	Building Construction & Materials IV[P]	2		2	30	70			100	2
2201928	Building Construction & Materials IV[SV]		3	3				100	100	5
2201929	Theory of Structures IV	2		2	30	70			100	2
2201930	Environmental Science	1	2	3			50		50	2
2201931	History of Arch & Culture IV	1	2	3			50		50	2
2201932	Building Services II[P]	2	0	2	30	70			100	2
2201933	Building Services II[SS]	0	2	2			50		50	1
2201934	Site Survey and Analysis	1	3	4			50		50	2
		10	18	28					850	28
2201936	Audit Course									

THIRD YEAR B.ARCH. SEMESTER V

Course Code	Course Title	L	S	T	Theory		Sessional and / Viva		Total Marks	Credits
					In Sem	End Sem	SS	SV		
3201935	Architectural Design IV	1	6	7				250	250	10
3201936	Building Construction & Materials V[P]	2		2	30	70			100	2
3201937	Building Construction & Materials V[SV]		3	3				100	100	4
3201938	Theory of Structures V	2		2	30	70			100	2
3201939	Landscape Architecture	1	3	4			100		100	3
3201940	Elective I [Contemporary Architecture]	1	2	3			100		100	2
3201941	Building Services III[P]	2	0	2	30	70			100	2
3201942	Building Services III[SS]	0	1	1			50		50	1
3201943	Working Drawing I	1	3	4			100		100	2
		10	18	28					1000	28
3201953	Audit Course									

THIRD YEAR B.ARCH. SEMESTER VI

Course Code	Course Title	L	S	T	Theory		Sessional and / Viva		Total Marks	Credits
					In Sem	End Sem	SS	SV		
3201944	Architectural Design V[SV]		5	5				250	250	8
3201945	Architectural Design V*[P]	2		2		100			100	2
3201946	Building Construction & Materials VI	2	3	5				150	150	6
3201947	Theory of Structures VI	2		2	30	70			100	2
3201948	Research In Architecture I	1	2	3			50		50	2
3201949	Elective II	1	3	4			100		100	3
3201950	Building Services IV[P]	2		2	30	70			100	2
3201951	Building Services IV[SS]		1	1			50		50	1
3201952	Working Drawing II	1	3	4			100		100	2
		11	17	28					1000	28
3201954	Audit Course									

*The Architectural Design V [Paper] will be of 12 hours duration spread over two days of 6 hours a day. The first day will be 6 hours without break. The second day will be 6 hours with a break after 3 hours.

FOURTH YEAR B.ARCH. SEMESTER VII

Course Code	Course Title	L	S	T	Theory		Sessional and / Viva		Total Marks	Credits
					In Sem	End Sem	SS	SV		
4201953	Architectural Design VI	1	7	8				300	300	11
4201954	Advanced Building Construction & Services I	1	2	3				150	150	4
4201955	Urban Studies I	2	2	4			100		100	3
4201956	Research In Architecture II	1	2	3			50		50	2
4201957	Elective III	1	2	3			50		50	2
4201958	Quantity Surveying & Specification Writing I	2	2	4	30	70			100	3
4201959	Professional Practice	2	1	3	30	70			100	3
		10	18	28					850	28
4201967	Audit Course									

FOURTH YEAR B.ARCH. SEMESTER VIII

Course Code	Course Title	L	S	T	Theory		Sessional and / Viva		Total Marks	Credits
					In Sem	End Sem	SS	SV		
4201960	Architectural Design VII	1	7	8				300	300	11
4201961	Advanced Building Construction & Services II	1	2	3				150	150	4
4201962	Urban Studies II	2	2	4			100		100	3
4201963	Elective IV	1	2	3			50		50	2
4201964	Elective V	1	2	3			50		50	2
4201965	Quantity Surveying & Specification Writing II	2	2	4	30	70			100	3
4201966	Project Management	2	1	3	30	70			100	3
		10	18	28					850	28
4201968	Audit Course									

FIFTH YEAR B.ARCH. SEMESTER IX

Course Code	Course Title	L	S	T	In Sem	End Sem	Sessional and / Viva		Total Marks	Credits
							ss	sv		
5201967	Practical Training							250	250	14

FIFTH YEAR B.ARCH. SEMESTER X

Course Code	Course Title	L	S	T	In Sem	End Sem	Sessional and / Viva		Total Marks	Credits
							ss	sv		
5201968	Architectural Design Project	3	10	13				550	550	18
5201969	Entrepreneurship Development	2	2	4			100		100	3
5201970	Elective VI*	1	3	4			100		100	3
		6	15	21						24

*Elective VI is preferably offered as an open elective. In case it is not possible to offer open elective colleges should offer any elective from the list of electives which the student has not undertaken earlier.

ANNEXURE A : AUDIT COURSES

The student can opt for one audit course in a semester. A student can opt for a particular course from the list below only once and cannot repeat the same course. The courses may be offered based upon the availability of resources in a college. The method of conduct of course could be based on lectures, site visits, small projects, online sources etc. and can be devised by individual colleges. The course outline given is only suggestive and colleges can expand or modify it for enrichment of the course.

FIRST YEAR B.ARCH. [ANY ONE COURSE TO BE OFFERED PER SEMESTER FROM THE FOLLOWING]			
Sr. No.	Code	Title	Brief Course Outline
1	A	Crafts	Introduction to crafts across the world through history. Types of Indian crafts. Study of any one craft of India.
2	B	Creative Writing	Writing as an art. Fictional and non fictional writing. Poetry, short stories, playwriting. Famous Indian writers, poets and play wrights and their works.
3	C	Performing Arts	Introduction to performing arts across the world through history. Types of Indian performing arts. Introduction to Natya-Shastra. Classical, folk, traditional performing arts. Dance, Music, Drama, Cinema.
SECOND YEAR B.ARCH. [ANY ONE COURSE TO BE OFFERED PER SEMESTER FROM THE FOLLOWING]			
4	D	Foreign Language	Basic introduction to German or Japanese language or a language which a college may choose to offer – syllables, pronunciations, words, simple sentences, grammar.
5	E	Cyber security	Introduction to cyber crime. Types of cyber crimes. Do and don'ts while using computers, smart phones, internet. Security measures to protect from crime. Crime detection mechanism and legislation.
6	F	Yoga	Introduction to Yoga. Benefits of Yoga. Types of yogasanas.
THIRD YEAR B.ARCH. [ANY ONE COURSE TO BE OFFERED PER SEMESTER FROM THE FOLLOWING]			
7	G	Basics of Accounting and Book keeping	Introduction to accounting and various terminologies. Maintaining books of account. Debit and credit.
8	H	Electrical Maintenance	Basic electrical gadgets in home and offices. Introduction to problems related to electricity supply in home environments. Precautions while handling electrical gadgets and wiring. Mechanism of protection from electrical hazards.
9	I	Culinary Art and Practices	Introduction to the basic need of food. Geographical and cultural factors affecting food. Various cuisines and culinary arts across the world. Social, health, dietary, aspects of cuisines. Food cultures in modern times. Places of food.
FOURTH YEAR B.ARCH. [ANY ONE COURSE TO BE OFFERED PER SEMESTER FROM THE FOLLOWING]			
10	J	Civics	Constitution of India. Indian democracy. Citizenship and Rights and responsibilities of citizens. Legislative framework.
11	K	Right to Information	Right to Information Act in India. Its need, scope and significance. Use of right to information. Responsibilities of using RTI. Limitations of using RTI. Case studies and legal precedents of using RTI.
12	L	Sign Language	Introduction to need and significance of inclusive social environment. Communication with the persons who have hearing and speech disabilities. Learning sign language.

ANNEXURE B : LIST OF ELECTIVE COURSES.

Following are the broad streams and electives under them which can be offered in a college. A student can select any one elective from any stream for ***electives II to V each***. A student may adhere to a particular stream of elective of his/her choice and ***nurture his/her area of interest and develop his/her expertise***. However colleges have to ensure that the student does not repeat a particular elective.

Elective VI is preferably offered as an ***open elective***. In case it is not possible to offer open elective colleges should offer any elective from the list of electives which the student has not undertaken earlier.

Codes for stream A	Stream A Art / Design	Codes for Stream B	Stream B Technology / Management	Codes for stream C	Stream C Social/Humanities/History
A1	Product Design	B1	Architecture using Glass	C1	Gender and Architecture
A2	Furniture Design	B2	Architecture using Steel	C2	Architecture of South Asia
A3	Interior Design	B3	Mud Architecture	C3	Architectural Anthropology
A4	Architectural Conservation	B4	Pre fabricated construction	C4	Vernacular Architecture
A5	Universal Design	B5	Pre stressed construction	C5	Culture and Design
A6	Advanced Landscape Design	B6	Disaster Mitigation and Management	C6	Sociology and Architecture
A7	Graphic Design	B7	Green Buildings and Rating Systems	C7	Colonial Architecture
A8	Architectural Photography	B8	Sustainable Cities and Communities	C8	Regional Architecture
A9	Art in Architecture	B9	Building Performance and Compliance	C9	Cultural Landscapes
A10	Theory of Design	B10	Appropriate Building Technologies	C10	Slum Rehabilitation
A11	Urban design	B11	Earthquake Resistant Architecture	C11	Basics of Archaeology
A12	Architectural	B12	Tensile Structures	C12	Introduction to Anthropology

Codes for stream A	Stream A Art / Design	Codes for Stream B	Stream B Technology / Management	Codes for stream C	Stream C Social/Humanities/History
	Journalism				
A13	Music and Space	B13	Facility Management	C13	Environmental Psychology
A14	Healthcare Design	B14	Geographic Information System	C14	Ekistics
A15	Hospitality Design	B15	Parametric modelling	C15	Ecology
A16	Industrial Buildings Design	B16	BIM (Building Information Modelling)	C16	Politics and Architecture
A17	Way finding and Navigation	B17	Introduction to Programming and Embedded Design for Architects	C17	Indology
A18	User experience design	B18	Intelligent Building Systems	C18	Affordable Housing

SAVITRIBAI PHULE PUNE UNIVERSITY

[Formerly the University of Pune]



DETAILED SYLLABUS OF FIRST YEAR B.ARCH

SEMESTER I AND II

FIVE YEAR DEGREE COURSE IN ARCHITECTURE

TO BE IMPLEMENTED FROM 2019-20

BOARD OF STUDIES IN ARCHITECTURE

FACULTY OF SCIENCE AND TECHNOLOGY

SEMESTER I

BASIC DESIGN			
Subject Code 1201901[SS]			
TeachingScheme		ExaminationScheme	
<div style="text-align: center;">TotalContact Hours per week= (lectures=1, Studio=6, Total=7)</div>		Sessional [CIA 125+ EA 125] Viva	250 NIL
		In-semester exam	NIL
		End Semester exam	NIL
		TotalMarks	250
		Total Credits	10

COURSE OBJECTIVES:

- To help students understand the basic elements and principles of design
- To introduce the techniques of creativity, observation skills and to improve sensitivity to surroundings
- To sensitize students to the multi-sensory aspect of space.
- To introduce to various sources of inspiration for creativity

COURSE CONTENT:

The course should cover the following aspects of basic design

1. Study of visual elements of design [such as points, lines, planes, shapes, forms, space, color and texture] and Study of principles of design [such as balance, contrast, scale, proportion, pattern, rhythm and emphasis].
2. Introduction to multi-sensory aspects of space.
3. Techniques to improve creativity [such as brainstorming, matrix of ideas, random combinations, use of manipulative verbs, abstraction, transformation, list of mental associations and use of the ridiculous]
4. Space making through basic elements of design and principles of composition.
5. Role of experience, memory, fantasy, reality, imagination in design.
6. Sources of inspiration such as nature, history, material, climate, geometry, paradox, etc. for creativity.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK:

There should be minimum eight assignments covering all the above course content to include two dimensional as well three dimensional explorations.

OUTCOME:

- Creation using elements and principles of design.
- Synthesis of multi-sensory aspects of space.
- Space making.

RECOMMENDED READINGS:

- Poetics in Architecture : Theory of Design by Anthony Antoniadis
- Operative Design: A Catalog of Spatial Verbs Paperback – 1 Jul 2013 by Anthony di Mari
- Pattern Language – Christopher Alexander
- The Design of Everyday Things by Donald Norman
- Architecture : Form Space and Order – Francis D. K. Ching
- Interior Spaces : Francis D K. Ching
- Universal Principles of Design by William Lidwell, Kristina Holden, Jim Butler
- Graphic Thinking for Architects and Planners by Paul Lassau
- Tim Brown – Change By Design
- Elements of Space Making – Yatin Pandya

BUILDING CONSTRUCTION AND MATERIALS I			
Subject Code 1201902 [THEORY] & 1201903 [SV]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=2, Studio=3, Total=5)		Sessional [CIA 25+EA 25]	50
		Viva [INT 25+ EXT 25]	50
		In-semester exam	30
		End Semester exam	70
		Total Marks	200
		Total Credits	07

COURSE OBJECTIVES:

- To develop a fundamental understanding of basic building elements, their function and behaviour under various conditions with specific reference to load bearing construction.
- To study the principles of designing components of load bearing structures – foundation, plinth, wall, openings etc. with study of materials suitable for load bearing construction.

COURSE CONTENT:

UNIT I Introduction to various building elements from foundation to roof and concept of load transfer.

UNIT II Introduction to building materials with characteristics, common tests, market forms and Applications.

- 1) Suitable for load bearing construction such as stone, bricks, concrete blocks, soil stabilized blocks, rammed earth construction etc.

2) Lime mortar; cement mortar; various pointing and plastering techniques and their processes

UNIT III Strip Foundations suitable for load bearing structures in stone and brick up to plinth level including foundation for steps--Plinth formation, DPC-- Introduction to various tools and equipment commonly used in construction.

UNIT IV Load bearing / non load bearing masonry construction using materials such as Stone, bricks, concrete blocks, soil stabilized blocks, rammed earth construction.

UNIT V Introduction to openings, spanning of openings by types of arches and lintels, principles and terminology of arch construction spanning of openings using materials mentioned in unit III.

UNIT VI Introduction to Bamboo as construction material.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK: Hand drawn drawings/Proportionate sketches on Units 4 and 5; Assignments on units 1, 2, 3 and 6 include sketches, notes, market survey and min one model based on unit 4 or unit 5.

OUTCOME: Students will develop a basic understanding of the relationship of materials to construction systems, techniques and methodology with specific reference to load bearing construction

RECOMMENDED READINGS:

- Dr. B.C Punmia (2012) *Building Construction* (10th edition) Laxmi Publications.
- Harold B.Olin, John L. Schmidt (1994) *Construction principles, Materials and Methods*, John Wiley & Sons, Inc.
- Narayanamurty, D.; Mohan, D (1972) *The use of Bamboo and reeds in building construction* ,UNO Publications
- Roy Chudley, Roger Greeno (2016), *Construction Technology*, 11th Edition Routledge.
- S.C.Rangwala (2013) *Engineering materials* (Fortieth edition),Charotar Publishing pvt.ltd.
- S.K. Duggal(2016) *Building materials* (4th edition) – New age international publishers.
- Willam Morgan (1977) *The elements of structure: An introduction to the principles of building and structural engineering* Distributed by Sportshelf; 2nd edition
- W.B. Mckay (2015) *Building construction Vol. 1* (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition).
- Bureau of Indian standards - Handbook on Masonry Design and Construction (First Revision);National Building Code of India 2016 (Volume 1) and I.S.I. Specifications

THEORY OF STUCTURES I			
Subject Code 1201904 [THEORY]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=2, Total=2)		Sessional Viva	NIL
		In-semester exam	30
		End Semester exam	70
		Total Marks	100
		Total Credits	02

COURSE OBJECTIVES:

- To Introduce Applied Mechanics and Theory of Structures and their significance and application for architects.
- To Understand Different Systems of Forces and their Equilibrium and that a Building is a System of Forces in Equilibrium:

COURSE OUTLINE:

Unit 1: Forces:

1. **Applied Mechanics, Statics and Dynamics**, Importance of Study: Force, Definition, Effects of Forces, Different Systems of Forces , Principle of Transmissibility and Superposition of Forces: Resolution and Composition of Forces:
2. **Equilibrium of Concurrent and Non Concurrent Forces**. Conditions of Equilibrium for a System of Concurrent Forces, Parallelogram, Polygonal & Triangular Law of Forces: Lami's Theorem: Resultant and Equilibrant of a System of Concurrent Forces: Moment as an Effect of a Force. Couple and Properties of Couple, Varignon's Principle, Conditions of Equilibrium for a System of Non-Concurrent Forces
3. **Introducing Dead Loads and Live Loads**: Live Loads as concept only. Calculating Total Dead Loads of Walls Slabs etc. from densities.

Unit 2: Simple Stresses and Strains:

1. Linear Stresses and Strains. Hooke's Law. Stress Strain Diagram for Various Materials. Lateral Strain, Poisson's Ratio: Volumetric Strain, and Bulk Modulus. Shear Stress. Modulus of Rigidity. Relationship between various Moduli. Elastic, Plastic Brittle and Ductile Behaviour. Composite Materials,
Modular Ratio and Equivalent Area e.g. R.C.C Column with Steel Reinforcement:

Unit 3: Transfer of Load:

1. Understanding of Transfer of load in a Load bearing Structure and Framed Structure with essential differences. Basic Principles and care to be taken in Load Bearing Structures: Include principles of Earthquake resistant structures with respect to load bearing structures. Introducing Soil Bearing Capacity

Unit 4: C.G and M.I:

1. Concept of C.G and M.I: Formula only of C.G and M.I for rectangular, Triangular, Circular and Semi Circular Shapes. Parallel Axis Theorem and Radius of Gyration: Formula for Radius of Gyration of a Rectangular Shape

Unit 5: Supports and Loads:

1. Supports, Definition, Reactions offered by Simple, Fixed, Hinged and Roller Support.
2. Statically Indeterminate and Determinate Structures and Degree of Indeterminacy. Beams classified as Simply Supported, Cantilever, Over Hanging, Propped Cantilever, Fixed and Continuous:
3. Loads Classified as U.D.L, Point Load & Varying Load.
4. Loads Classified as Dead, Live, Wind, Snow, Seismic.
5. **Understanding Reactions for 5 Standard Cases:**
 1. Simple Supported Beam with full U.D.L
 2. Simple Supported Beam with Central Point Load
 3. Simple Supported Beam with Eccentric point Load
 4. Cantilevered Beam with Full U.D.L
 5. Cantilevered Beam with End Point Load

Unit 6: S.F.D and B.M.D of Simple Supported Beams Only:

1. Definitions of Shear Force and Bending Moment, Point of Zero Shear, S.F max and B.M max, Relationship Between S.F.D and B.M.D
2. S.F.D and B.M.D of 5 Standard Cases as in Point 6 of Unit 5:

NUMERICAL PROBLEMS TO BE SET AS PER FOLLOWING

1. Calculating Resultant, Equilibrant of a system of Concurrent Forces, and of individual force to get a system of forces into equilibrium. Problems to be limited to 4 forces only, Problems on Parallelogram law of Forces and Lami's Theorem. Problems on Resultant of a system of noncurrent forces as a system of forces in a linear horizontal member/beam only (Points of applications are along or perpendicular to the Beam Axis).
2. Calculating Stress, Strain, Change in Length, Young's Modulus, Stress and change in length for members connected along an axis and in equilibrium due to loads at various points on the axis, Calculating Stress and Load taken by individual materials in a composite Material. Bulk Modulus or Shear Modulus problems kept out of the scope of this syllabus.
3. Calculating width of strip Foundations for given load of super structure.
4. Calculating C.G and M.I to be limited to C, L, T and I Sections only: Also of Symmetrical Rectangular Shapes with Symmetrical Circular cut-outs. M.I of Rectangular Shape about Axis passing through base:
5. Support Reactions for Simply Supported Beams and Cantilevered Beams only (No Overhanging Beams or Inclined Roller Support). Loading to be of U.D.L always with one or two point loads. Problem on calculating dead loads and hence reactions on a beam either simple supported or cantilever beam
6. S.F.D and B.M.D of Simple Supported Beam only with full U.D.L and one or two point loads.

Course Outcome: At the end of semester student develops

- The understanding of building/structure as a system of forces and transfer of forces/load from roof to foundation and soil.
- The understanding of various loads acting on a structure
- The understanding of behaviour of elements like walls, beams and columns subjected to tension, compression, shear and bending.

Reference Books

1. Mechanics of Structures Volume 1 and 2 by Dr. H.J.Shah and S.B.Junnarkar
2. Strength of Materials by A.P.Dongre
3. Basic Structures by Phillip Garrison
4. Architectural Engineering Design by Robert Brown Butler
5. Vector Mechanics by Beer and Johnston
6. Applied Mechanics by R.S.Khurmi and N.Khurmi

ARCHITECTURAL GRAPHICS AND DRAWING I			
Subject Code 1201905 [SS]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=1, Studio=4, Total=5)		Sessional [CIA 50+EA50]	100
		Viva	NIL
		In-semester exam	NIL
		End Semester exam	NIL
		Total Marks	100
		Total Credits	03

COURSE OBJECTIVES:

- To introduce students to Architectural Graphics and drawing techniques and aspects of scale, annotations etc.
- To enable students to express simple three dimensional objects and building components Through Technical Drawings, using various graphic projection systems such as orthography, Isometric, Axonometric projections and cut sections.
- To introduce various techniques of sketching for recording, studying and communicating objects, buildings and spaces.

COURSE CONTENT :

Unit 1

- Introduction to Graphics elements (point , line, plane) and concept of scale.
- Introduction to various drawing instruments and methods of employing them for technical drawing and sketching.

Unit 2 -Introduction to technical architectural drawing and its components:

- Various Line types: meaning and application.
- Architectural Lettering and dimensioning techniques.
- Architectural annotations and conventions including representation of various building materials and building components.
- Various Standard and Graphic scales and their application.

Unit 3 Plane (two dimensional) and Solid (three dimensional) geometry:

- Introduction to graphical construction of various plane geometrical shapes and their relevance in Architectural Drawings.
- Introduction to various simple/ Euclidian Three Dimensional Solids 's and their generations

Unit 4 Projection Systems in Drawings and graphics

- Introduction to various projection systems used in Architectural drawing; such as Orthographic, Isometric and Axonometric projections to draw and represent various three dimensional Geometrical solid and hollow objects.
- Introduction to importance, meaning and drawing Section/s of various solid and hollow objects including building components

Unit 5 Scale Drawing

- Introduction to Architectural drawings such as Plans, Sections and Elevations of Building using techniques and skills learnt so far.

Unit 6 Sketching:

- Introduction to architectural sketching using various grades of graphite pencil.
- Principles of free hand sketching such as proportions, with primary thrust on sketching of building elements and built environment (indoor and outdoor).

SUBMISSION REQUIREMENT FOR SESSIONAL WORK :

Minimum eight of Manually drafted A1 size drawings covering units 2 to 5. For unit 6 a sketch book has to be maintained with atleast 15 sketches of various types mentioned in unit 6.

COURSE OUTCOME:

- Students at the end of the Semester should be able to comprehend and express nuances of graphic language through various methods learnt.
- Students should be able to communicate various ideas through Architectural Graphic representations including building plans and sections (drafting and sketching).

RECOMMENDED READINGS :

1. Ching Francis D.K.: Architectural Graphics
2. Kelsey W. E.: Geometrical & Building Drawing
3. Leslie Martin: Architectural graphics:
4. B. James: Essential of Drafting
5. H. Joseph and Morris: Practical plane and solid geometry
6. Gill Robert: Rendering with pen and ink
7. Burden Ernest: Architectural Delineation

HISTORY OF ARCHITECTURE AND CULTURE I			
Subject Code 1201906 V[SS]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=1, Studio=2, Total=3)		Sessional [CIA 25+EA 25]	50
		Viva	NIL
		In-semester exam	NIL
		End Semester exam	NIL
		Total Marks	50
		Total Credits	02

Course Objectives:

1. To introduce students to the developments in architecture through history as a result of the social, political, and geographical contexts.
2. To introduce students to the developments in architecture and its meaning, in the Indian sub-continent until 12th century AD with reference to development of typologies, forms, building techniques and features.
3. To gain an integrated understanding of settlements, landscape, and architecture as a manifestation of culture and geography.

Course Outline:

Unit 1: Architecture of the ancient River Valley Civilizations: Nile, Tigris and Euphrates, Indus.

Unit 2: Introduction to tribal and nomadic architecture of India.

Unit 3: Architecture of the Buddhist faith including development of stupas, chaityas, and viharas including rock cut architecture.

Unit 4: Architecture of the early Hindu temples, rock cut architecture of the Hindus. Architecture during the Maurya, Gupta, and Chalukya period. Architecture including temples, forts, step-wells, palaces, etc. of Northern India including architecture in Gujarat, Orissa, Madhya Pradesh, and Rajasthan.

Unit 5: Architecture of Southern India including development of temples and temple towns. Architecture under the Pallavas, Cholas, Pandyas, Nayaks, Hoysalas, and the Vijaynagar kingdom.

Unit 6: Introduction to the traditional Architecture of India with a focus on Maharashtra.

Sessional Work:

- A3 size sheets with sketches- preferably plans and sections- of various buildings discussed in the above units. A minimum of two sheets per unit are required. Minimum twenty buildings should be represented in the sheets across the semester.
- One tutorial.

Course Specific Outcomes:

1. An understanding of architecture, including settlements, landscapes and buildings as a cultural product shaped by various factors.
2. An understanding of the formal, structural, and stylistic aspects of architectural development.

Recommended Readings:

Brown, P. (n.d.). Indian Architecture: Buddhist and Hindu. Delhi: Kiran Book Agency.

Ching, F. D., Jarzombek, M., & Prakash, V. (2011). A Global History of Architecture. New Jersey: John Wiley and Sons Inc.

Dehejia, V. (1997). Indian Art. London: Phaidon.

Desai, M. (2018). Wooden Architecture of Kerala. Ahmedabad: Mapin.

Dhongde, S. R., & Ranade, J. (2009). Aurangabad: Culture, Art, Architecture. Aurangabad: INTACH Aurangabad Chapter.

Fergusson, J. (1891). History of Indian and eastern Architecture. London: John Murray.

Jain, K., & Jain, M. (2000). Architecture of the Indian Desert. Ahmedabad: AADI Centre.

Jain, S. (2004). Havelis: A Living Tradition of Rajasthan. Delhi: Shubhi Publications.

Joshi, O. P. (2010). Tribal Architecture in India. Ahmedabad: Tribal Research and Training Institute.

Juneja, M. (2008). Architecture in Medieval India. Delhi: Permanent Black.

Kanhere, G. K. (1989). Temples of Maharashtra. Mumbai: Maharashtra Rajya Sahitya va Sanskriti Mandal.

Kanhere, G. K. (2013). Temples, Wadas, and Institutions of Pune: A Legacy and Symbolism in Architecture. Pune: BNCA Publication Cell.

Kolkman, R., & Blackburn S. (2014). Tribal Architecture in Northeast India. Leiden: Brill.

Mate, M. S. (2008). Maratheshahi Vastushilpa. Pune: Continental Prakashan.

Pandya, Y. (2013). Concepts of Space in Traditional Indian Architecture. Ahmedabad: Mapin Publishing.

Pramar, V.S. (2005). A Social History of Indian Architecture. Delhi: Oxford University Press.

Pramar, V.S. (1989). Haveli: Wooden Houses and Mansions of Gujarat. Ahmedabad: Mapin.

Tadgell, C. (1994). The History of Architecture in India. London: Phaidon.

Taschen, A. (Ed.). (2003). Indian Interiors. Berlin: Taschen.

Taschen, A. (Ed.). (2008). Indian Style. Berlin: Taschen.

COMMUNICATION SKILLS			
Subject Code 1201907 [SS]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=2, Studio=1, Total=3)		Sessional [CIA 25+ EA 25]	50
		In-semester exam	NIL
		End Semester exam	NIL
		Total Marks	50
		Total Credits	2

Communication Skills

Objectives: To enhance skills required for effective communication in Architectural education and practice.

Course Content

Unit 1: Introduction to the various modes of communication and their significance.

Unit 2 : **Written communication:** Paraphrasing, Grammar and punctuation. Developing vocabulary pertaining to architecture and design through reading. Introduction to technical writing and forms of writing in architecture discipline such as site visit report, letters, tour reports, appraisals, email etc.. Expressing ideas and concepts through words.

Unit 2: **Verbal communication:** Presenting an idea/ thought, debate, group discussion. And **Nonverbal aspects of communication** such as body language, posture, stance etc.

Unit 3: **Graphical communication:** Analytical diagrams, info graphics, flow charts, mind maps, posters, logo design.

Unit 4: Use of **Digital tools for communication:** Basics of Word based, numerical based software, and visual presentation techniques such as photography, videography etc.

Sessional work: Minimum 6 assignments to cover the aspects mentioned above. Assignments may be tied up with other subjects in the syllabus, wherever relevant. Assignments to be framed focusing on the profession of architecture.

OUTCOME : At the end of the course the student should be able to communicate fluently in English language and also use tools of communication such as written and graphical for effective communication.

WORKSHOP I			
Subject Code 1201908 [SS]			
Teaching Scheme		Examination Scheme	
TotalContact Hours per week= (lectures=1, Studio=2, Total=3)		Sessional [CIA 50+EA50]	100
		Viva	NIL
		In-semester exam	NIL
		End Semester exam	NIL
		TotalMarks	100
		Total Credits	02

COURSE OBJECTIVES:

- To Introduce students to the Significance of Model making in Architecture in exploring and representing Massing, form of buildings and spaces
- Introduce to various basic model making techniques and materials their relationship.

COURSE CONTENT :

- Introduction to Importance of Model making in process and communication of Architectural design.
- Introduction to various materials (such as various paper, boards, foam board, wood, etc.) tools and techniques of architectural model making through construction of simple three dimensional objects and simple building models.

It is expected that the limitations and advantage of all the materials is explained by demonstration/presentation.

Models should preferably be co-ordinated with other subjects in the curriculum.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK :

Minimum six assignments, with thrust on exploring at least three materials and techniques, understanding their appropriateness for the purpose.

OUTCOME:

Students at the end of Semester should be able to understand relevance of model making both in the process of design and as a Product

RECOMMENDED READINGS :

- John Taylor, Model Building for Architects and Engineers
- Rolf Janke, Architectural Models

SEMESTER II

ARCHITECTURAL DESIGN I			
Subject Code 1201909 [SV]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=1, Studio=6, Total=7)		Sessional [CIA100+EA100] Viva [INT 25+ EXT 25]	200 50
		In-semester exam	NIL
		End Semester exam	NIL
		Total Marks	250
		Total Credits	10

COURSE OBJECTIVES:

- To introduce design as a process of decision making.
- To introduce to the aspects of decision making such as anthropometry, climate, form, function, structure and material.
- To understand experiential quality of space.
- To comprehensively understand the role of socio cultural and geographical factors in shaping of rural settlements and architecture.

COURSE CONTENT:

Unit 1 : Study and analysis of small scale built spaces with respect to its context, comfort, function, anthropometrical data and layout

Unit 2 : Designing of single activity space like a seating area in public space, kiosks, play area, entrance gate etc. demonstrating the application of the design principles and communicated effectively through two and three-dimensional hand drawings, sketches and models.

Unit 3 : Study and analysis of a rural settlement and architecture with respect to lifestyle, climate & social structure etc.

Unit 4 : Designing in the context of the studied settlement.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK:

- Assignments focusing on each of the four units above and to be presented in various mediums like doodles, sketches, diagrams etc in addition to the architectural drawings and models.

OUTCOME :

The student would be able to analyze simple spaces, identify factors affecting their design and be able to design a simple space for human use.

RECOMMENDED READINGS :

- A Pattern language by Alexander Christopher
- Structure in Nature -Strategy for Design- Peter Pearce
- Patterns in Nature - Peter Streens
- Visual thinking- Arnheim Rudolf
- Architecture: Form Space and order _ Francis D.K. Ching
- Rybczynski, Witold. *How the other half builds*
- Jan A. Silva and Leslie Fairweather. *A.J. Metric Handbook*
- Michael Pause & Roger H. Clark. *Precedents in Architecture*
- Gail Greet Hannah (2002). *Elements of Design*
- Bernard Rudofsky (1964). *Architecture without Architects: A Short Introduction to non-pedigreed Architecture*
- Ching Francis D.K.(1979). *Form, Space and Order*
- Ching Francis D.K.(.). *A Visual Dictionary of Architecture*
- Christopher Alexander (.). *A Pattern Language*
- Christopher Alexander(.). *The Timeless Way of Building*
- Robert Summer(.). *Design Awareness*
- YatinPandya (.). *Elements of Space Making*
- Paul Lassau (.). *Graphic Thinking for Architects & Planners*
- Rybczynski, Witold. *How the other half builds*
- Jan A. Silva and Leslie Fairweather. *A.J. Metric Handbook*
- Michael Pause & Roger H. Clark. *Precedents in Architecture*
- *Elements of Design*

BUILDING CONSTRUCTION AND MATERIALS II			
Subject Code 1201910 [THEORY] & 1201911 [SV]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=2, Studio=3, Total=5)		Sessional [CIA25+EA25]	50
		Viva [INT25+EXT 25]	50
		In-semester exam	30
		End Semester exam	70
		Total Marks	200
		Total Credits	2+5

COURSE OBJECTIVES:

- To develop a fundamental understanding of basic building elements, their function and behaviour under various conditions with specific reference to Timber construction.
- To study the principles of designing components of Timber Structure – Floor, Roofs ,Door, Windows

COURSE CONTENT:

UNIT I Introduction to earthquake, its magnitude and its effects earthquake resistant measures for load bearing construction. Construction of reinforced masonry walls, pillars and lintels; Masonry vaults and domes.

UNIT II Introduction to materials with characteristics, common tests, market forms and Applications.

1) Timber, timber derivatives and Introduction to various tools and equipment commonly used in carpentry work.

2) Roofing materials for small span sloping roofs including Mangalore tiles, sheet roof covering.

UNIT III Study of Single and double floor construction for G+1 building; Staircases – terminology and construction in timber.

UNIT IV Introduction to timber panelled and flush doors; various types of timber casement windows along with necessary joinery details, finishes required.

UNIT V Introduction to timber roof truss, forces in truss members; Construction of various types of roofs for spans up to 6m also king post and queen post truss.

UNIT VI Introduction to wooden partition and wall paneling used for interior application along with necessary joinery details, finishes required.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK: Hand drawn drawings on Units 4,5 and 6; Assignments on units 1, 2 and 3 include sketches, notes, market survey and min one model based on unit 1,5 or unit 6.

OUTCOME: Students will expand a basic knowledge about earth quake, understanding of properties, construction techniques of timber with specific reference to use of timber in superstructure (spanning, framing techniques).

RECOMMENDED READINGS:

- Dr. B.C Punmia (2012) *Building construction* (10th edition) Laxmi Publications.
- Harold B.Olin, John L. Schmidt (1994) *Construction principles, Materials and Methods*, John Wiley & Sons, Inc.
- Roy Chudley, Roger Greeno (2016), *Construction Technology*, 11th Edition Routledge.
- S.C.Rangwala (2013) *Engineering materials* (Fortieth edition),Charotar Publishing pvt.ltd.
- S.K. Duggal(2016) *Building materials* (4th edition) – New age international publishers.
- Willam Morgan (1977) *The elements of structure: An introduction to the principles of building and structural engineering* Distributed by Sportshelf; 2nd edition.
- W.B. Mckay (2015) *Building construction Vol. 1* (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition).

- Bureau of Indian standards - Handbook on Masonry Design and Construction (First Revision); National Building Code of India 2016 (Volume 1) and I.S.I. Specifications.

THEORY OF STUCTURES II			
Subject Code 1201912 [THEORY]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=2, Total=2)		Sessional Viva	NIL
		In-semester exam	30
		End Semester exam	70
		Total Marks	100
		Total Credits	02

COURSE OBJECTIVES:

- To Study S.F.D and B.M.D of Overhanging Beams
- To Introduce Lattice Constructions
- To Study the Effect of Forces on a Spanning Members
- To Understand Compression Members

Unit 1: S.F.D and B.M.D Continued:

1. Overhanging Beams on Both Side, Point of Contra flexure, Negative B.M, Representative S.F.D and B.M.D for Beam with Full U.D.L

Unit 2: Frames and Trusses:

1. Introduction to Plane Lattice Construction. Applications of Frames and Trusses with B.T Terminology of Rafters, Purlins etc.: Different Geometry of Trusses e.g. Howe Truss, Fink Truss, N Girder: Perfect Frames, Imperfect Frames, Redundant and Deficient Frames: Assumptions in the Solution of Frames: Effect of Horizontal and Vertical Forces on Frames.

Unit 3: Effect of Force on Spanning Members:

A. Bending Stresses:

1. Assumptions in the Theory of Simple Bending: The Theory of Simple Bending to create Moment of Resistance: Flexural Formula: Stress Distribution across a Section and across the span of the Beam: Moment of Resistance: Section Modulus and how M.R is proportional to square of depth. Why Beams should be deeper than Wider

B. Shear Stresses:

1. Shear Stress Formula: Stress Distribution across a Rectangular, Circular T, L, I, C Section: Differences between Bending Stress Distribution and Shear Stress Distribution across the Section and across the span: Simplified Formula for Rectangular and Circular Section (Hollow and Solid)

C. Deflection:

1. Definition of Deflection and Slope: Maximum and Minimum Slope and Deflection for Cases 1,2,4,5 as defined in semester 1. Double Integration Method of Calculating Deflection and Slope: Derive Formula for Deflection max and Slope max for a Simple Supported Beam with full U.d.l. Formula only for the remaining 3 cases(Omit case of Simple Supported Beam with eccentric point load)

Unit 4: Understanding the Failure of Compression Members:

a. Eccentric Loaded Columns:

1. Compression Members Subjected to eccentricity of loading about one and both axis. Derivation of Middle third Rule for eccentricity about one axis. Concept of Core or Kernel of a column for eccentricity about both axes. Applying the Middle Third Rule to Brick Pier Foundation.

b. Long Columns: and Short Columns:

1. Euler's Theory, Assumptions, Euler's Formula and its Limitations leading to Rankine's Theory. Long and Short Columns for different Materials: Various End Conditions and their Effective Lengths.

NUMERICAL PROBLEMS TO BE SET AS PER FOLLOWING

1. S.F.D and B.M.D of Over Hanging Beams with over-hang only on one side *with one udl per span and one or two point loads only*
2. Solution of Frames for Simple Supported Frames(with Symmetrical Loading) and Cantilever Frames using Method of Joints and Method of Sections only.
3. Problems based on Flexural Formula and Calculating Stresses at Distances away from the Neutral Axis, Given a section Calculating load or Span or load so that Stresses are not Exceeded.
4. Problems of Shear Stress Calculation for a Rectangular or Circular Section Only
5. Calculating Deflection max and slope max for symmetrically loaded simple supported or cantilever beams by substituting values in the formula and not by double integration
6. Calculating stresses and drawing stress diagrams for Eccentric loading on Compression Members about one axis only:
7. Analytical problems for Euler's Theory and Rankine's Theory. Problems on Rankine's Theory to be based on basic formula and not Rankine's constant.
8. *Note for all Problems: All Problems should be based on realistic material properties and section sizes*

Course Outcome: At the end of semester student develops

- The understanding of effect of various forces in terms of various stresses and deflection for various structural members like beams and columns.
- The understanding of truss as lattice construction and structural actions in it's members.

Reference Books

1. Mechanics of Structures Volume 1 and 2 by Dr. H.J.Shah and S.B.Junnarkar
2. Strength of Materials by A.P.Dongre
3. Basic Structures by Phillip Garrison
4. Architectural Engineering Design by Robert Brown Butler
5. Vector Mechanics by Beer and Johnston
6. Applied Mechanics by R.S.Khurmi and N.Khurmi

ARCHITECTURAL GRAPHICS AND DRAWING II			
Subject Code 1201913 [SS]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=1, Studio=4, Total=5)		Sessional [CIA50+EA50]	100
		Viva	NIL
		In-semester exam	NIL
		End Semester exam	NIL
		Total Marks	100
		Total Credits	03

COURSE OBJECTIVES:

- To enable the students to understand and express Composite three-Dimensional objects and buildings formed by additive and interpenetrated solids using various graphical projection systems including sections.
- To enable the students to communicate an architectural idea / proposal in a legible and effective manner through perspective projections, use of shades and shadows, and various architectural presentation and rendering techniques.

COURSE CONTENT :

Unit 1 Solid Geometry:

- Understanding and drawing of composite and complex three dimensional objects including building components formed by addition and/or interpenetration of various objects. .
- Surface Development of various three dimensional objects.
- Orthographic projections of true shapes of sectional planes.

Unit 2 Perspective Drawing:

- Drawing one-point and two-point perspective of objects and buildings/ building components using various methods including grid method.
- Introduction to concept of bird's eye view, worm's eye view etc

Unit 3 Sciography: Principles of Sciography (shades and shadows) for 3-Dimensional objects and buildings on plans, elevation, isometric and perspective.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK :

- Sessional work should be planned to cover all the units mentioned in course outline with thrust on skill development, accuracy and understanding of the topic.

Unit -1	4 assignments
Unit 2	3 assignments
Unit 3	3 assignments

OUTCOME :

- Students at the end of the Semester should be able to comprehend and express composite solid geometry through sketches and drawings leading to comprehension of building components.

- Students should be able to communicate various ideas through Architectural Graphic representations including building plans and sections (drafting and sketching).

RECOMMENDED READINGS :

1. Ching Francis D.K.: Architectural Graphics
2. Kelsey W. E.: Geometrical & Building Drawing
3. Leslie Martin: Architectural graphics:
4. B. James: Essential of Drafting
5. H. Joseph and Morris: Practical plane and solid geometry
6. Gill Robert: Rendering with pen and ink
7. Burden Ernest: Architectural Delineation

HISTORY OF ARCHITECTURE AND CULTURE II			
Subject Code 1201914 [SS]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=1, Studio=2, Total=3)		Sessional [CIA25+EA25]	50
		Viva	NIL
		In-semester exam	NIL
		End Semester exam	NIL
		Total Marks	50
		Total Credits	02

Course Objectives:

1. To introduce students to the developments in architecture of the Indian sub-continent after 12th century AD as a result of the social, political, and geographical contexts.
2. To study the development of architecture with specific reference to form, technology, and ornament.
3. To gain an integrated understanding of settlements, landscape, and architecture as a manifestation of culture.

Course Outline:

Unit 1: Islamic principles of architectural form, ornament, and meaning. Early Islamic architecture and its evolution and development. Architecture under the Delhi Sultanate-Slave, Khalji, Tughlaq, Sayyid, and Lodhi dynasties.

Unit 2: Islamic architecture in Gujarat, Bengal, Malwa.

Unit 3: Mughal architecture and urbanism.

Unit 4: Post- Mughal architecture of India till 19th Cent. AD.

Unit 5: Development of architecture in the Deccan since the 12th AD.

Unit 6: Architecture of the Peshwa region and Western Maharashtra.

Sessional Work:

A3 size sheets with sketches- preferably plans and sections- of various buildings discussed in the above units. A minimum of two sheets per unit are required. Minimum twenty buildings should be represented in the sheets across the semester.

One measured drawing of a vernacular / traditional building from the region of the college. This can be undertaken as group work with identifiable individual contribution not less than 1 A2 sized sheet.

Course Specific Outcomes:

1. An understanding of architecture as a cultural product shaped by various factors.
2. An understanding of the formal, structural, and stylistic aspects of architectural development.
3. An understanding of Indian architecture of the twentieth century in the context of its historical precedents.

Recommended Readings:

Asher, C. B. (1992). *Architecture of Mughal India*. Cambridge: Cambridge University Press.

Brown, P. (n.d.). *Indian Architecture: Islamic*. Delhi: Kiran Book Agency.

Dehejia, V. (1997). *Indian Art*. London: Phaidon.

Dhongde, S. R., & Ranade, J. (2009). *Aurangabad: Culture, Art, Architecture*. Aurangabad: INTACH Aurangabad Chapter.

Fergusson, J. (1891). *History of Indian and eastern Architecture*. London: John Murray.

Juneja, M. (2008). *Architecture in Medieval India*. Delhi: Permanent Black.

Koch, E. (2014). *Mughal Architecture*. New York: Midpoint Trade Books.

Mate, M. S. (1961). *Islamic Architecture of the Deccan*. Pune: Deccan College Research Institute.

Michell, G., & Pasricha, A. (2011). *Mughal Architecture and Gardens*. Suffolk: Antique Collectors Club.

Michell, G., & Zebrowski, M. (1999). *Architecture and Art of the Deccan Sultanates*. Cambridge: Cambridge University Press.

Sohoni, P. (2018). *The Architecture of a Deccan Sultanate*. London: I.B.Tauris.

Tadgell, C. (1994). *The History of Architecture in India*. London: Phaidon.

Taschen, A. (Ed.). (2003). *Indian Interiors*. Berlin: Taschen.

Taschen, A. (Ed.). (2008). *Indian Style*. Berlin: Taschen.

Tillotson, G. (1999). *The Rajput Palaces*. Delhi: Oxford University Press.

FUNDAMENTALS OF ARCHITECTURE			
Subject Code 1201915 [SS]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=2, Studio=1, Total=3)		Sessional [CIA25+EA25]	50
		In-semester exam	NIL
		End Semester exam	NIL
		Total Marks	50
		Total Credits	2

COURSE OBJECTIVES

To introduce the students to the field of architecture ,its scope and fundamentals

COURSE OUTLINE :

Unit 1 : Introduction to the profession of Architecture and its distinguishing characteristics with respect to other professions.

Unit 2 : Scope of architecture as a discipline

Unit 3 : Fundamentals of architecture -function , structure ,culture and environment and their integration into the architectural form

Unit 4 : Factors affecting architectural design- site, context , function, circulation, structural system, materials ,sustainability and aesthetics.

Unit 5 : Concept of Shelter and introduction to various building typologies and their design concerns

Unit 6: Scope and significance of subjects in architectural curriculum.

SESSIONAL WORK :

A Study journal and tutorial covering all the above mentioned units.
Appraisal report of any one building typology.

RECOMMENDED READINGS :

1. Structure in Architecture – Heller Robert and Salvadori Mario
2. Design Fundamentals in Architecture –Pramar
3. Architecture : Form, Space and order – Francis D. K.Ching

WORKSHOP II			
Subject Code 1201916 [SS]			
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=1, Studio=2, Total=3)		Sessional [CIA 50+ EA 50] VIVA	100 NIL
		In-semester exam	NIL
		End Semester exam	NIL
		TotalMarks	100
		Total Credits	02

COURSE OBJECTIVES:

- To enable students to make Architectural models with various materials during process of Design and Construction studios and as final presentation to express ideas
- Introduction to Digital modeling with basic softwares

COURSE CONTENT :

- Introduction to advanced materials such as balsa wood, polymers/ plastics, cork and the techniques to make Architectural Models
- Introducing computer aided/ Digital 3D Modeling of simple and composite objects as an exploratory tool.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK :

Minimum six number of assignments with thrust on exploring materials & tools (physical as well as digital), understanding their appropriateness for the purpose. At least one of the assignment should be based on the design project and building technology concepts each.

OUTCOME :

Students at the end of Semester should be able demonstrate sufficient skills in making architectural models.

RECOMMENDED READINGS :

- John Taylor, Model Building for Architects and Engineers
- Rolf Janke, Architectural Models
- Aidan Chopra, Sketchup-2014 for Dummies

Architectural Design II		
Course Code	2201917[SV]	
TeachingScheme	ExaminationScheme	
TotalContact Hoursperweek (lectures=1 Studio=6, Total = 7)	Sessional [CIA 100 + EA 100] Viva [Int 25 + Ext 25]	200 50
	In semester exam	NIL
	End Semester exam	NIL
	TotalMarks	250
	Total Credits	10

COURSE OBJECTIVE:

To understand Architectural Design as a process generating design brief and taking design decisions based on the following aspects:

- **Socio-Cultural Aspects:** To introduce students to socio-cultural aspects like lifestyle, culture, traditions, and their effect on architectural design etc.
- **Aesthetics:** To understand the Aesthetic aspects of Design (visual and experiential) along with spatial attributes (scale and proportions, volume, texture, light and shadows, etc.) and formal characteristics. (profile, base, corner, termination).
- **Anthropometry & Function:** To address functional aspects of design (activity, use of space, adequacy and efficiency of space for a particular activity, essential adjacencies of spaces, ease and efficiency of circulation, light, ventilation, user-space relationship, vertical connections)
- **Climate:** To understand the Climatic aspects those have a bearing on architectural design and address climatic concerns like adequate light, ventilation, protection from rain, insulation, shading, heat gain, through passive strategies.
- **Building Material and Construction Technology:** To study relevance of various building materials to a project, to get introduced to various expressions of a building material, to introduce a student to the construction technologies relevant to the building materials chosen, to understand the scope and limitations of a building technique to achieve the desired form and space.
- **Building Services:** To understand the spatial and structural implications of basic services involved in building design.
- **Site :** To understand the site and its context, both immediate and wider, in order to enable students to take decisions of zoning, circulation within site, distribution of built and open spaces, activity relationships and adjacencies, and views.
- **Universal Design:** To understand the concept and principles of universal design.
- **Precedent Studies:** To introduce the students to learn from case, referral, live studies - process of observation, analysis, documentation and deriving inferences.

COURSE OUTLINE:

- Project 1 (Major Project) : A dwelling for a single family or clusters of dwellings for multiple families with area 300 sq.m. to 500 sq.m. The project should explicitly address at least 4-5 aspects of the design decision process from those listed above. The project should be designed without the aid of mechanical means for vertical transportation.
- Project 2 (Minor Project): A time bound assignment Short term project focusing specifically on any one of the aspects mentioned in course objectives/ Hands-on Workshop / Exercise based on detailing any one of the components of Project 1 but with separate deliverables in addition to the deliverable of Project 1.

SESSIONAL WORK:

- Project 1 (Major Project): The student must represent the identification of core design aspect, formulation of design approach and development, and the final design outcome through architectural drawings along with representative details of construction. Along with the drawings, the student must develop the design through a series of models/ 3D visualizations made at various stages.
Design deliverable for Project 1:
 - i. Portfolio A - Architectural drawings and model at an appropriate scale
 - ii. Portfolio B - Process drawings / tracings (Recommended)
 - iii. Study models of various stage (Recommended)
- For Project 2 (Minor Project): The deliverable in case of a time bound assignment or a design exercise should be a portfolio of drawings and / or model. In case of Workshops the deliverable should be a report to be presented on the day of viva.

COURSE OUTCOME:

- At the end of the course the student is equipped to take design decisions by considering various aspects and methodically evolve a design and communicate it in form of 2D and 3D representations.

REFERENCE BOOKS :

1. Antoniadou, A. (1992). The Epic of Gilgamesh: Utility to Metaphor Through the Dawn of Architecture. *IN Epic Space: Towards the Roots of Western Architecture*, 3-18.
2. Sommer, R. (1972). Design awareness.
3. Deasy, C. M. (1974). *Design for human affairs*. Halsted Press.
4. Alexander, C. (1977). *A pattern language: towns, buildings, construction*. Oxford university press.
5. Sealey, A. (1979). *Introduction to building climatology*. Commonwealth Association of Architects.
6. Franck, K. A., Lepori, R. B., & Franck, K. A. (2007). *Architecture from the inside out: from the body, the senses, the site, and the community* (p. 56). London: Wiley-Academy.
7. Salvadori, M. G., & Heller, R. (1963). *Structure in architecture* (No. 624). Prentice-Hall.
8. Pandya, Y. (2005). *Concepts of space in traditional Indian architecture*. Mapin Publishing Pvt.
9. Koenigsberger, O. H. (1975). *Manual of tropical housing & building*. Orient Blackswan.
10. Neufert, E., & Neufert, P. (2012). *Architects' data*. John Wiley & Sons.

11. Chiara, J. D., Panero, J., & Zelnik, M. (1991). *Time-saver standards for interior design and space planning*. McGraw-Hill.
12. Ching, F. D. (2014). *Architecture: Form, space, and order*. John Wiley & Sons.
13. Ching, F. D. (2011). *A visual dictionary of architecture*. John Wiley & Sons.
14. Nithya Srinivasan and Kiran Venkatesh., *91 Houses*. InCite
15. Publications by Costford
16. 15a. Laurie Baker. *Brickwork*. Costford
17. 15b. Laurie Baker. *A Manual Of Cost Cuts For Strong Acceptable Housing*. Costford
18. 15c. Laurie Baker. *Houses : How to reduce building costs*. Costford
19. 15d. Laurie Baker. *Mud*. Costford
20. 15e. Laurie Baker. *Rubbish by Baker*. Costford
21. 15f. Laurie Baker. *Earthquake*. Costford
22. 15g. Laurie Baker. *Rural Community buildings*. Costford
23. 15h. Laurie Baker. *Chamoli Earthquake Hand Book*. Costford
24. 15h. Laurie Baker. *Rural House plans*. Costford
25. 15h. Laurie Baker. *Are Slums In-evitable*. Costford
26. 15h. Laurie Baker. *Alleppey : Venice of the East*. Costford
27. 15h. Laurie Baker. *Rainwater Harvesting*. Costford
28. Arvind Krishnan, (2001) *Climate Responsive architecture*. Tata McGraw Hill
29. It is strongly recommended that students are exposed on the books on works of Master architects

Building Construction and Materials III		
Course Code	2201918 [P] & 2201919 [SV]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=2 Studio=3, Total = 5)	Sessional [CIA 25 + EA 25]	50
	Viva [Int 25 + Ext 25]	50
	In semester exam	30
	End Semester exam	70
	Total Marks	200
	Total Credits	07

COURSE OBJECTIVES:

- To introduce students to soil study, its relevance to foundation.
- To introduce students to different building materials related to RCC construction.
- To understand basic principles of RCC construction w.r.t. smaller spans.

COURSE CONTENT:

UNIT I

- Introduction to Soil study & Foundation - Study of different types of soils and their bearing capacities; Concept of bulb of pressure and its significance for site investigation, Introduction to methods of site and strata investigation

- Introduction to different types of shallow foundations and footings and their application in construction

UNIT II: Reinforced Cement Concrete

- Cement: Composition of cement, properties, grades of cement & various types of cement and their uses
- Introduction to concrete as a material--Study of its ingredients viz. binding material, fine aggregate, coarse aggregate and water cement ratio, storage of materials on site, understanding good quality material; field & lab tests involved
- Various concrete mixes and their application in construction, and workability of concrete, Various types of cement concrete, the properties and application, additives and admixtures used in concrete
- Concreting: form work for concreting, mixing, transporting and placing, consolidating and curing of concrete.
- Reinforcement ---steel, grades of steel and steel-mesh reinforcement; along with role of reinforcement in RCC.
- Introduction to the concept of Precast Concrete.

UNIT III Reinforced Cement Concrete Construction upto plinth

- RCC frame structure for smaller spans generally applicable to residential structures, along with earthquake resistant features, reference of a RCC drawing
- R.C.C structural details up to plinth viz. footings, external and internal plinth beams, with plinth formation, with details for toilet block at plinth level.

UNIT IV Reinforced Cement Concrete Construction in superstructure

- Construction of columns, beams for various types of end conditions
- R.C.C floor slab details, viz. one-way, two-way slabs with different end conditions, column-beam-slab junction with details for toilet block, also lintel & weather-shed

UNIT V Windows in non- timber materials

- Study of non-timber windows with materials like Steel-framed, aluminum, UPVC and their construction details.

UNIT VI Flooring & paving materials

- Different flooring & paving types that are cast-in-situ viz. Mud flooring, Brick flooring, Indian Patent Stone finish, Terrazzo flooring etc. and readymade tiles available in market viz. natural stone tiles / slabs, mosaic cement tiles / blocks, ceramic tiles, vitrified tiles and other modern materials, including the process of providing or laying the flooring and pavement
- Floor finishes of various materials viz. carpet, linoleum, rubber, PVC etc.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK:

Hand drafted drawings on Units 3 and 4 to cover all the aspects of course outline in sufficient detail; Assignments on units 1, 2, 5 and 6 to include sketches, notes, market survey. Site visits for unit 3 and 4 should be conducted and presented in report form.

OUTCOME: Students will develop a basic understanding of the relationship of materials to construction systems, techniques and methodology with specific reference to reinforce cement concrete construction; an understanding of the concepts of concrete as a building construction material.

RECOMMENDED READINGS:

- Dr. B.C Punmia (2012) Building Construction (10th edition) Laxmi Publications.
- Harold B.Olin, John L. Schmidt (1994) Construction principles, Materials and Methods, John Wiley & Sons, Inc.
- Roy Chudley, Roger Greeno (2016), Construction Technology, 11th Edition Routledge.
- S.C.Rangwala (2013) Engineering materials (Fortieth edition), Charotar Publishing pvt.ltd.
- S.K. Duggal (2016) Building materials (4th edition) – New age international publishers.
- Willam Morgan (1977) The elements of structure: An introduction to the principles of building and structural engineering distributed by Sportshelf; 2nd edition.
- W.B. McKay (2015) Building construction Vol. 1 (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition).
- National Building Code of India 2016 (Volume 1) and relevant I.S.I. Specifications.

Theory of Structures IV		
Course Code	2201920[P]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=2 Studio=0, Total = 2)		
	In semester exam	30
	End Semester exam	70
	Total Marks	100
	Total Credits	02

COURSE OBJECTIVES:

1. To Understand Fixity and Continuity. To understand the action of Torsion
2. To Understand Loading on Buildings and Different Design Methodologies
3. To Understand Wood as a Material, as a Structural Material and to Design Wooden Beams
4. To Understand Concrete as a Material and To Design small spanned R.C.C Super Structures

COURSE OUTLINE:

Unit 1: Fixed and Continuous Beams:

1. Fixed Beam as a statically in-determinate structure. Concept of Negative Bending Moment at supports. Advantages and Disadvantages over Simple Supported Beams. Fixed End Reactions for u.d.l, central and eccentric point load (No derivations). Simple Numerical with full u.d.l and one central point load or one eccentric point Load
2. Theory only of Continuous Beams. Concept of continuity over supports and Typical B.M.D to explain the negative B.M.D over supports using I.S.456 coefficients for 3 or more, more or less equal spans. Enlist methods for computing B.M.D. Advantages and Disadvantages over Simple Supported Beams.
3. Theory only to Introduce Torsion and its applications.

Unit 2a: Loading on Buildings and Design Methodologies:

1. Theory only of Listing of all Loads acting on a Structure in single line Definitions. Study of Live Load (as per I.S.875 Part 2), Dead Load, Wind Load and Seismic Load and Snow Load in Detail
2. Theory only of Various Design Methodologies in Brief. Study of **Working Stress Method** in Detail. Understanding the application of Factors of Safety. Advantages and Dis-advantages of W.S.M compared to other methods.

Unit 2b: Wooden Structures:

1. Study of Wood as a Material and as a Structural Material, Its Advantages and Dis-advantages. Theory only of Form Factors
2. Numerical on Design of a Primary Wooden Flexural Member (Without Secondary Beams) either as a Simple Supported Beam or a Cantilever, with Simple Loading and depths limited to 300mm. Theory only Framing of Floors using Secondary and Primary Beams

Unit 3: Concrete Material and L.S.M:

1. Theory only of use of I.S.456. To Understand Concrete as a material, it's Grades, all the individual constituents, their sizing, proportioning, Production of Concrete. Testing of Concrete w.r.t. listing various tests and studying Slump and Compressive Strength Test in Detail. Form work and Stripping as per I.S.456
2. Theory only of Steel Used in R.C.C, Why steel only, its properties, forms and suitability in various R.C.C elements.
3. Theory only of Limit State Method – Philosophy, Various Limit States and their care in R.C.C. Span to Depth Ratios for Various R.C.C Elements. L.S.M Flexural Diagram for M25 grade and Fe500 steel. Derivations of Flexural Formula for Balanced Section. Annotations in a Standard R.C.C Flexural Section like Depth Overall, Depth Effective, Cover and its importance and values as per I.S.456

Unit 4: Design of R.C.C Slabs for Small Spans (L.S.M for Flexure only):

1. Concept of One Way – Two-Way Slab, Importance of Distribution Steel and I.S.Provisions.
2. Numerical on Design of One Way Slab and Design of Two Way Slab

3. Numerical on Design of Cantilever Slab resting on a Beam (Beam Torsion in theory only)
4. Numerical on Design of Small Slabs like Toilet Sunken Slabs with Inverted Beams, Passage Slabs, Chajjas with Minimum Depth, Minimum Area of Steel with minimum/ maximum standards of Spacing.

Unit 5: Design of Beams (L.S.M for Flexure and Shear):

1. Numerical on Design of Simple Supported R.C.C Beams including Transfer of Load from Slab to Beam for one way slab only,
2. Theory only for Detailing in for a Beam supporting a Cantilever Porch

Unit 6: Design of Short R.C.C. Columns (L.S.M for Compression):

1. Definition of Short R.C.C. Columns. Various I.S.Provisions for Compression Members.Numerical on Design of Short R.C.C. Columns including Transfer of Load from Beam to Column

Course Outcome:*At the end of semester student develops*

1. *The understanding of the concepts of Fixity, Continuity and Torque*
2. *The Skills to Design small spanned Wooden Beams*
3. *The Skills to Design Small Spanned R.C.C Structure w.r.t Slabs, Beams and Columns and use it for his B.C.M and W.D. subjects*

Reference Books

1. Design of R.C.C. Structures by H.J.Shah
2. Design of R.C.C. Structures by Punmia and A.K.Jain
3. Design of Reinforced Concrete Structures by N.Krishnaraju
4. R.C.C Theory and Design by Dr. V.L.Shah and Dr.S.R.Karve
5. Strength of Materials by A.P.Dongre
6. Design and Analysis of Steel Structures by V.N.Vazirani. M.M.Ratwani and Vineet Kumar (For Wooden Structures Unit 2b)

Computer Aided Drawing and Graphics			
Subject Code		2201921[SS]	
Teaching Scheme		Examination Scheme	
Total Contact Periods per week (lectures=1, Studio=3)	04	Sessional [CIA 25 + EA 25]	50
		In semester exam	
		End Semester exam	
		TotalMarks	50
		Total Credits	02

COURSE OBJECTIVES:

- To enable the students to communicate an architectural idea / proposal in a legible and effective manner through various architectural presentations and rendering techniques.
- To enable the students to generate simple architectural drawings using **Computer Aided Drawing**
- To enable the students to express their design ideas through various sketching techniques

COURSE OUTLINE:

Unit 1 Graphics:

- Introduction to various mediums for architectural presentations in various drawing formats (minimum two mediums)
- It is recommended to work on presentation drawings for any Architectural design project. A set of drawing shall include rendering of Plans, Elevations, Sections with internal and external perspective views.

Unit 2 Computer Aided Drawing:

- Introduction to basics of Computer Aided Drawing with basic commands for Drawing, sufficient to construct simple geometrical shapes and 3D objects.
- Advance commands in CAD such as Setting Drawing parameters, Layer controls, Hatching, Model and paper space settings etc.
- Drafting single building from Semester II Design on CAD.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK:

Sessional work should be planned to cover all the units mentioned in course outline with thrust on skill development, accuracy and understanding of the topics.

Unit 1	Demonstration of presentation techniques in various drawing formats (minimum two mediums) to include external perspective and internal perspective of students' own architectural design.	2 assignments [hand drawn]
Unit 2	CAD drawings (Plan, Section/s Elevation/s) with layers, hatch and dimensions from Semester II Design project	2 assignments
	CAD Drawings of orthographic solid objects studied in Semester II	2 assignments

OUTCOME :

- Students should be able to comprehend and express nuances of graphic language through various presentation techniques and methods learnt.
- Students should be able to communicate various ideas through architectural graphic representations (drafting and sketching).

RECOMMENDED READING:

Burden, E. E. (1971). *Architectural delineation: a photographic approach to presentation*. McGraw-Hill Companies.

Holmes, J. M. (1954). *Applied perspective;: The theory and application of perspective for architects, painters, and draughtsmen*. s.l.:s.n

Capelle, F. W. (1969). *Professional perspective drawing for architects and engineers*. s.l.:s.n

Schaarwachter, G. (1967). *Perspective for the Architect*. Thames and Hudson.

Sha Publishing Co. Ltd.; Interior perspective in Architectural Design- Japan Graphics

Japan Publishing Co: Modern Architectural Rendering best 180

Japan Publishing Co: Perspective Drawings of Modern Architecture

Japan Publishing Co: Air brushing in rendering

Shankar Mulik: Perspective and Sciography

Course Code		2201922[SS]	
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=1, Studio=2, Total=3)		Sessional [CIA 25+EA 25] Viva	50 NIL
		In-semester exam	NIL
		End Semester exam	NIL
		Total Marks	50
		Total Credits	02

Course Objectives:

1. To understand the development of European architecture through the historical period till 17th century AD.
2. To understand the relationship of religion and society with architecture
3. To understand the drivers of change, revival, and evolution of architecture

Course Outline:

Unit 1: Greek architecture including Greek temples, domestic architecture, public architecture, city planning, and the Acropolis.

Unit 2: Roman architecture including domestic architecture, public architecture, architecture of the forums, urban planning, structural innovations, forms, materials and techniques of construction.

Unit 3: Early Christian architecture including adaptation of Roman models, early church prototypes, Byzantine architecture

Unit 4: Early medieval manors, monasteries, Romanesque churches

Unit 5: Gothic architecture and developments therein with reference to church plans, structural techniques, and ornamentation, Gothic churches and cathedrals

Unit 6: Renaissance and resultant architecture including works of Andrea Palladio, Michelangelo, Brunelleschi. Works of Sir Christopher Wren and Inigo Jones. Post-Renaissance and Baroque architecture

Sessional Work:

- Minimum 25 representative buildings of the periods under study should be represented in Plans, sections and views- of various buildings discussed in the above units.
- One measured drawing and digital documentation of any site/ building / or part/features of the building related to the course content studied.. This can be undertaken as group work with identifiable individual contribution.
- One tutorial.

Course Specific Outcomes:

1. An understanding of architecture as a product shaped by various factors like religion and society.
2. An understanding of the formal, structural, and stylistic aspects of architectural development.
3. An understanding of the factors that bring about the processes of change in architectural manifestations and its meanings.

Recommended Readings:

Anderson, Christy. Renaissance Architecture. Oxford University Press, 2013.

Ching, Francis D K, Mark Jarzombek, Vikramaditya Prakash. A Global History of Architecture. John Wiley and Sons, 2011.

Fletcher, Sir Banister and Dan Cruickshank. Sir Banister Fletcher's A History of Architecture On The Comparative Method. Architectural Press, 1996.

Frankl, Paul. Gothic Architecture. Yale University Press, 2001.

Lawrence, A W. Greek Architecture. Yale University Press, 1957.

Summerson, John. The Classical Language of Architecture. Thames and Hudson, 1980.

Ward-Perkins, J B. Roman Imperial Architecture. Yale University Press, 1992.

Building Services I		
Course Code	2201923 [P] & 2201924 [SS]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=2 Studio=2, Total =4)	Sessional [CIA 25 + EA 25]	50
	In semester exam	30
	End Semester exam	70
	Total Marks	150
	Total Credits	03

COURSE OBJECTIVES:

To make students understand the Plumbing scope in the MEP services integration. To introduce students to following Plumbing Services in low, medium and high rise buildings and inculcate them the integration of services required in architectural design.

This term aims at following services:

- Systems for hot and cold water supply in a building premises
- Systems for Sewage, Sullage, Storm water & and its disposal within or from building premises.

COURSE OUTLINE:

Introduction to sourcing, storage, and distribution of hot and cold water in building premises including the study of all necessary components involved and their installation.

To introduce students to drainage systems viz. collection, conveyance & disposal of sewage, sullage and

Effluents from building premises, including methods, components and apparatus involved.

UNIT I Water supply - I

1.1 Principles and techniques of supplying water

- Treatment of water
- Concept of Pressure head
- Flow through pipes

1.2 Tapping of water mains on street by means of Ferrule

1.3 Requirement, Storage and distribution of water in building premises

- Sizing of Water tanks
- Static water storage requirements (Fire Tank)
- Collection and Storage systems
- Types of Pumps and applications
- Storage and Distribution in High rise buildings

1.4 Pipes and piping network

- Materials of Pipes
- Joinery
- Installation techniques

1.5 Various control valves and their applications

UNIT II Water supply - II

2.1 Types of Taps, Faucets, Fittings and advanced proprietary systems used in baths, kitchen and WC units.

2.2 Provisions, Installations and applications of above.

UNIT III Hot Water Supply.

3.1 Systems of hot water supply using conventional and non-conventional energy sources.

- Instantaneous and Centralized
- Direct system and In-Direct system
- Components and Equipment used for the same.

3.2 Piping Insulation, safety and special considerations in piping network.

3.3 Failures, precautions, and safety measures

3.4 Information on other Circulation systems i.e. ring system, up-feed/ down-feed systems, etc. and its application.

UNIT IV Drainage-I (Vertical Drainage systems)

4.1 Introduction to various sanitary fittings with necessary knowledge of provisions to be made and their Installations.

- Sanitary fittings like Wash basins, Sinks, Bathing units, Water Closets (Indian and European), Urinals
- Selection criteria and variations in Installing and provisions to be made for same
- Assembling, combining and coordinating them in washing, bathing and WC units

4.2 Study of various Traps, with their working and applications.

- All types of traps and their installation.

4.3 Pipes and piping network. Techniques of Vertical drainage system in shafts, ducts and external face of **low, medium and high rise buildings**.

- Study of service Shafts, Ducts, Floors
- Single and double stack systems with part and full ventilation.
- Pipe materials, their classification and methods of Installation
- Special fittings used for - Jointing and installations.
- Special fittings for High rise buildings (vent system, Expansion chambers, Pressure relief lines, Bypass Socket etc)
- Anti-Syphonic system of ventilation in drainage system

UNIT V Drainage-II (Horizontal Drainage system)

5.1 Techniques of underground drainage systems for waste water, effluents and sewage. Principle and concept of self-cleansing velocity in flow through pipes. Techniques in laying, leveling, planning, aligning, testing, inspection and maintenance

- Invert levels, Gradients, Access point planning
- Types of Chambers, Sumps, Channels, Shafts, service corridors, catch basins
- Ventilation of drainage system.
- Connection to Main Sewer Drain on Road side

5.2 Rainwater drainage system and surface runoff methods

- Storm water drainage systems.
- Invert levels, Gradients
- Sedimentation tanks and catch basins
- Rainwater harvesting methods

UNIT VI Sewage Treatment and Disposal

6.1 Disposal within the Premises.

- Septic tanks, its function, types and design (Sizing).
- Maintenance of Septic tank.

6.2 Waste Water and Sewage treatment plant (Large and Compact)

- Introduction to Waste water treatment plant
- Introduction to sewage treatment plant
- Decentralized waste water treatment

6.3 Bio-Gas plant and its functioning

SESSIONAL WORK

1. Illustrative Sketches of Installations of Bathroom accessories and Sanitary ware showing water inlet connection and Drain provisions
2. Preparing internal Water supply and Drainage layouts for Residential toilets, Kitchen and Public Toilets
3. Preparing external water supply and drainage layouts for individual Bungalow with septic tank
4. Preparing external water supply and drainage of a building site having more than one building on the site and connectivity to City Municipal Supply and Drain
 - The drawing assignments to be based upon the theory learnt and supported with necessary drawings and calculations (70% weightage).
 - Visits to construction sites and preparing site visit reports, market survey and finding out latest trends and new materials (30% weightage).

RECOMMENDED READING

- NBC 2016 Vol 2, Part 9, Sections (1, 2, 3)
- Handbook on Water supply and Drainage - BIS SP 35 1987
- Building Services Handbook - Fred Hall & Roger Greeno
- Sanitation, Drainage and Water Supply - Mitchell.
- IPC 2018 (International Plumbing Code)
- Plumbing – Design & Practise – S G Deolalikar
- Environment and Services - Peter Burberry.

Climatology		
Course Code	2201925 [SS]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=1 Studio=2, Total = 3)	Sessional [CIA 25 + EA 25]	50
	In semester exam	
	End Semester exam	
	Total Marks	50
	Total Credits	02

COURSE OBJECTIVES:

To understand climate as a determinant of architectural design and to enable the students to evolve climate responsive design.

COURSE OUTLINE

Unit I:

1. Understanding the Earth-Sun relation and context of what shapes climate.
2. Elements of climate and understanding climate at different scales ie, global, regional, macro and micro.

Unit II:

1. Global Climate classification
2. Climatic zones of India and its classifications

Unit III:

1. Introduction to passive design strategies at various scales ie urban, building and building component scale.

Unit IV:

1. Introduction to concept of Thermal Comfort in buildings.

Unit V:

1. Introduction to various tools like sun path, bioclimatic chart, site analysis matrix etc that are used to study sun movement, wind and comfort in buildings.

SESSIONAL WORK

- Individual Assignment to apply the various tools like sun path and bioclimatic chart in building element design etc.
 - Group work to study contemporary and vernacular architectural case studies in India with climate responsive architecture and passive design strategies.
 - Minimum two tutorials on all the units.
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Architectural Design III		
Course Code	2201926 [SV]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=1 Studio=6, Total = 7)	Sessional [CIA 100 + EA 100] Viva [Int 25 + Ext 25]	200 50
	In semester exam	NIL
	End Semester exam	NIL
	Total Marks	250
	Total Credits	10

COURSE OBJECTIVE:

To understand Architectural Design as a process of generating design brief and taking design decisions based on the following aspects:

- **Socio-Cultural Aspects:** To introduce students to socio-cultural aspects like lifestyle, culture, traditions, and their effect on architectural design etc.
- **Aesthetics:** To understand the Aesthetic aspects of Design (visual and experiential) along with spatial attributes (scale and proportions, volume, texture, light and shadows, etc.) and formal characteristics. (profile, base, corner, termination).
- **Anthropometry & Function:** To address functional aspects of design (activity, use of space, adequacy and efficiency of space for a particular activity, essential adjacencies of spaces, ease and efficiency of circulation, light, ventilation, user-space relationship, vertical connections)
- **Climate:** To understand the Climatic aspects those have a bearing on architectural design and address climatic concerns like adequate light, ventilation, protection from rain, insulation, shading, heat gain, through passive strategies.
- **Building Material and Construction Technology:** To study relevance of various building materials to a project, to get introduced to various expressions of a building material, to introduce a student to the construction technologies relevant to the building materials chosen, to understand the scope and limitations of a building technique to achieve the desired form and space.
- **Building Services:** To understand the spatial and structural implications of basic services involved in building design.
- **Site :** To understand the site and its context, both immediate and wider, in order to enable students to take decisions of zoning, circulation within site, distribution of built and open spaces, activity relationships and adjacencies, and views.
- **Universal Design:** To understand the concept and principles of universal design.
- **Precedent Studies:** To introduce the students to learn from case, referral, live studies - process of observation, analysis, documentation and deriving inferences.

COURSE OUTLINE:

- **Project 1 (Major Project):** A design project that introduces the concept of site planning with multiple built spaces with an area 1000 sq.m. to 1500 sq.m.. This project should house a variety of core and allied activities requiring built, open, and transition spaces. The project should explicitly address at least four aspects of the design decision variables from those listed in course objectives.
- **Project 2 (Minor Project):** The students must undergo a Settlement study / study tour in a region with which is different in terms of socio geographic characteristics than the place where the institute is located. A short term project or eskee based in the settlement the students have studied.

SESSIONAL WORK:

- **Project 1 (Major Project):** The student must represent the identification of core design aspect, formulation of design approach and development, and the final design outcome through architectural drawings along with a narrative and representative details of construction. Along with the drawings, the student must develop the design through a series of models/ 3D visualizations made at various stages.
Design deliverables -
 - i. Portfolio A - Architectural drawings and model at an appropriate scale
 - ii. Portfolio B - Process drawings / tracings (Recommended)
 - iii. Study models of various stage (Recommended)
- **Project 2 (Minor Project):** The Study Tour documentation covering details from whole to part and must include narratives, sketches, scale drawings, photographs. It may additionally have information presented in any other formats in addition to the ones mentioned above. The short term project or eskeeto be presented in form of drawings to explain the scheme.

COURSE OUTCOME :

- At the end of the course the student is equipped to take design decisions by considering various aspects and methodically evolve a design where two or more buildings are to be planned on a site and communicate it in form of 2D and 3D representations.

REFERENCE BOOKS

2. Lynch, K., Lynch, K. R., & Hack, G. (1984). *Site planning*. MIT press.
3. Rybczynski W. (1984). *How the Other half builds, Volume 1 : Space*. Centre for Minimum Cost Housing. McGill University. Montreal Canada
4. Carlos Barquin (1986). *How the Other half builds, Volume 2 : Plots*. Centre for Minimum Cost Housing. McGill University. Montreal Canada
5. Vikram Bhatt. (1990). *How the Other half build, Volume 3 : Self selection Process*. Centre for Minimum Cost Housing. McGill University. Montreal Canada
6. Rapoport, A. (1969). *House form and Cultua*. Prentice-Hall of India Private Ltd.: New Delhi, India.
7. Correa, C. (2010). *A place in the shade: the new landscape & other essays*. Penguin Books India.

8. Dave, B., Thakkar, J., Shah, M., & Hāṇḍā, O. (2013). *Prathaa: Kath-khuni Architecture of Himachal Pradesh*. SID Research Cell, School of Interior Design, CEPT University.
9. Kanvinde, A., & Miller, H. J. (1969). *Campus design in India: experience of a developing nation*. Jostens/American Yearbook Company.
10. Adler, D. (2007). *Metric handbook*. Routledge
11. Neufert, E., & Neufert, P. (2012). *Architects' data*. John Wiley & Sons.
12. Gropius, W. (1956). *Scope of total architecture*. London: G. Allen & Unwin.
13. Giedion, S. (1967). *Space, time and architecture: the growth of a new tradition*. Harvard University Press.
14. Gibbered, Fredrick: Town Design.
15. David Gosling, Gordon Cullen – Visions of Urban Design.
16. Bawa, G., & Robson, D. (2002). *Geoffrey Bawa: the complete works*. Thames & Hudson..
17. Scheer, B. C. (2017). *The evolution of urban form: Typology for planners and architects*. Routledge.
18. It is strongly recommended that students are exposed on the books on works of Master architects

Building Construction and Materials IV		
Course Code	2201927 [P]& 2201928 [SV]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=2 Studio=3, Total = 5)	Sessional [CIA 25 + EA 25]	50
	Viva [Int 25 + Ext 25]	50
	In semester exam	30
	End Semester exam	70
	Total Marks	200
	Total Credits	07

COURSE OBJECTIVES:

- To understand basic principles of RCC construction w.r.t. Cantilever slabs, Staircase.
- To introduce students to vertical transportation systems.

COURSE CONTENT:

UNIT I Cement Concrete types

- Types of special concretes, to include lightweight concrete, ready-mixed concrete, ferro-cement etc; study of its ingredients viz. along with storage of materials on site, understanding good quality material and field & lab tests involved.

UNIT II Damp- & Water-Proofing

- Causes of dampness and reasons for damp- & water-proofing, Different methods or treatments of damp- & water-proofing brick on edge, rough Shahabad stone, bitumen sheets,

plastic sheets, epoxy resins and metallic water proofing materials and other proprietary materials application of the above in construction for terraces, chhajja, toilet slabs etc.

UNIT III Reinforced Cement Concrete Construction

- R.C.C structural details for balcony slabs, canopies and Construction of various types of pre-cast and in-situ RCC stairs, along with earthquake resistant features, reference of a RCC drawing

UNIT IV Vertical Transportation: Lifts, Escalators & Conveyors

- Study of elevators, escalators, conveyors – types, size, capacity, speed and Mechanical safety methods, provisions in civil work for installation of elevators and escalators

UNIT V Sliding & Sliding folding doors, Bay window

- Study of Various types of sliding and folding doors and
- Construction of Bay Window

UNIT VI Glass, Plastics

- Glass as a building material, brief history of its use through examples. Manufacture, properties and uses of glass. Various types of glass and its application in building construction
- Plastic as a building material; its properties, types, uses and application of plastics in building industry.
- Different types of adhesives and sealants used in building construction

SUBMISSION REQUIREMENT FOR SESSIONAL WORK:

- Hand drafted drawings on Units 3 and 5 to cover all the aspects of course outline in sufficient detail;; Assignments on units 1, 2, 4 and 6 include sketches, notes, market survey and site visits.

OUTCOME:

- Students will develop an understanding about concrete and its variants and artificial materials such as glass and plastic and their application in construction. Students will be developing knowledge about the vertical transportation systems and their design and construction requirement.

RECOMMENDED READINGS:

- Dr. B.C Punmia (2012) Building construction (10th edition) Laxmi Publications.
- Harold B.Olin, John L. Schmidt (1994) Construction principles, Materials and Methods, John Wiley & Sons, Inc.
- Roy Chudley, Roger Greeno (2016), Construction Technology, 11th Edition Routledge.
- S.C.Rangwala (2013) Engineering materials (Fortieth edition),Charotar Publishing pvt.ltd.
- S.K. Duggal (2016) Building materials (4th edition) – New age international publishers.

- Willam Morgan (1977) The elements of structure: An introduction to the principles of building and structural engineering Distributed by Sportshelf; 2nd edition.
- W.B. McKay (2015) Building construction Vol. 1 (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition).
- Central Public works Department CPWD), IBC, CEAI & CCPS. Guidelines on use of Glass in Buildings - Human Safety.
- National Building Code of India 2016 (Volume 1) and relevant I.S.I. Specifications.

Theory of Structures IV		
Course Code	2201929 [P]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=2 Studio=0, Total = 2)		
	In semester exam	30
	End Semester exam	70
	Total Marks	100
	Total Credits	02

COURSE OBJECTIVES:

1. To continue the study of Design of Various Elements of a R.C.C Super Structure.
2. To Study Steel as a Material and get Introduced to various Steel Sections and their appropriate Use
3. To Design Girders and Stanchions in L.S.M as per I.S.800-2007

Unit 1: Design of R.C.C Slabs Continued:

1. Theory only of Different ways of supporting a Balcony
2. Numerical of Design of a Cantilever Slab as an Overhanging Slab

Unit 2: R.C.C Beams Continued:

1. Numerical of Design of Cantilever Beams to support Balcony Slabs
2. Concept of Under Reinforced, Balanced and Over Reinforced Sections. Numerical on Analysis of a Given Beam with Strain Diagrams
3. Audit of a Load Bearing Structure for various Structural and Non-Structural Elements

Unit 3: Design of R.C.C Slabs Continued:

1. Numerical of Design of Dog Legged Staircase with Beams at Various Positions:
2. Theory only on Support Systems and Reinforcement Detailing in the following Cases
 - Stringer Beams - End Stringer Beams with S.S Slabs Treads.
 - Stringer Beams - Central Stringer Beams with cantilever Slab Treads.
 - Folded Plate Staircases.

- Open Well Staircases.
- Dog-legged Staircase with Various Beam Positions.
- Numerical of Design of One Way Continuous Slabs - 3 equal spans using I.S.456 Coefficients.

Unit 4: Introduction to Steel Structures:

1. Theory only of Elements of Steel Structures - Steel Framed Multiple Floors and Buildings with Trusses.
2. Standard Lay Out of Factory or Trussed Buildings in Plan and Section. Plan to include Store Areas, Loading Platforms. Section to Include Cladding.
3. Study of Steel as a Material and Use E250 Steel as Structural Steel. Reading of Steel Tables. Different Structural Steel Sections. Identifying the Sections to be used for Girders, Stanchions, Compound Stanchions, and Struts etc.

Unit 5: Design of Steel Structures:

1. Theory only L.S.M or Plastic Design in steel - Various Limit States, Prevention of Dis-Proportionate Collapse, Development of Plastic Hinges, Plastic Moment, Section Modulus Plastic, Plastic Neutral Axis and Shape Factor, Various Partial Factors of Safety, All as per I.S.800 2007
2. Numerical of Design of Small Span Girders for Lofts and Balconies and Large Spans for creating Floors in Industrial Buildings, including Classification of Sections into Plastic, Compact and Semi Compact.
3. Numerical of Design of Stanchions. Theory only of connections to Girders to Stanchions and Stanchions to Base Pads.

Course Outcome:*At the end of course student develops*

1. *The understanding of supporting Balconies and Staircases*
2. *The Understanding of Dividing Larger Rooms in Smaller One Way or Two Way Slab Units*
3. *The Understanding of Steel as a Material and Various Steel Sections and their use.*
4. *The understanding of using Steel Girders and Stanchions*

Reference Books

1. Design of R.C.C. Structures by H.J.Shah
2. Design of R.C.C. Structures by Punmia and A.K.Jain
3. Design of Reinforced Concrete Structures by N.Krishnaraju
4. R.C.C Theory and Design by Dr. V.L.Shah and Dr.S.R.Karve
5. L.S.Design of Steel Structures by S.K.Duggal
6. Design of Steel Structures By Limit State Method as per I.S.800- 2007 By S.S.Bhavikatti

Environmental Science		
Course Code	2201930 [SS]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=1 Studio=2, Total = 3)	Sessional [CIA 25 + EA 25]	50
	In semester exam	-
	End Semester exam	-
	Total Marks	50
	Total Credits	02

COURSE OBJECTIVES:

Basic introduction to Multidisciplinary nature of environmental studies with focus on

- Natural Resources
- Eco Systems
- Biodiversity and its conservation
- Environmental Pollution
- Environment Legislation and Social aspects of environment
- Environment friendly buildings

COURSE CONTENT:

Unit I –Natural Resources-Land, water, forest, energy and food

Unit II -Concept of Eco Systems with structure and functions

- Biochemical cycles
- Different ecosystems such as forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystems (ponds, lakes, streams, rivers, estuaries, oceans)

Unit III -Biodiversity

- Value of biodiversity: consumptive, productive use, social, ethical and aesthetic
- Treats to biodiversity and conservation of biodiversity(in-situ and ex-situ)

Unit IV - Environmental Pollution

- Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution noise pollution, thermal pollution and nuclear hazards

Unit IV –Environment Legislation and Social aspects of environment

- Basic Introduction to Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act and Forest Conservation Act
- Environment and human health, human rights and value education for environmental awareness
- Basic introduction to Environment clearance for construction projects
- Brief introduction to the concept of “green buildings” and green building rating systems.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK:

- Journal on each unit with basic concept, definitions and case studies
- Seminar/essay on any one current environmental issue and its interconnectedness with architecture/development

OUTCOME:

Students should be able to grasp the interdisciplinary nature of environment science and its interdependence on development and society. They should be able to think holistically about environment when taking architectural design decisions

RECOMMENDED READINGS:

1. Textbook for Environmental Studies for undergraduate courses of all branches of higher education, ErachBharucha for University Grants Commission
2. Objective Environmental Science, B.B.Singh
3. Fundamentals of Environmental Studies ,MahuaBasu and S.Xavier
4. Environment and Development,1st Edition, Basic Principles, Human Activities, and Environmental Implications, Editors: Stavros PouloupoulosVassilisInglezakis

HISTORY OF ARCHITECTURE AND CULTURE IV			
Course Code		2201931 [SS]	
TeachingScheme		ExaminationScheme	
TotalContact Hours per week= (lectures=1, Studio=2, Total=3)		Sessional [CIA 25+EA 25] Viva	50NIL
		In-semester exam	NIL
		End Semester exam	NIL
		TotalMarks	50
		Total Credits	02

Course Objectives:

1. To introduce students to the developments in architecture of the post-medieval Western World as a result of the cultural, political, and economic contexts.

2. To study the development of architecture with specific reference to form, technology, and ornament.
3. To understand contemporary architecture of the world with respect to historical precedents.

Course Outline:

- Unit 1: Industrial revolution and the resulting architecture of eighteenth, and nineteenth century in Europe.
- Unit 2: Revival architecture in Europe and America
- Unit 3: Colonial Architecture in India
- Unit 4: Early Modern movements
- Unit 5: Modernism, International style, and influence of Bauhaus
- Unit 6: Post-independence Architecture in India till 1990.
- Unit 7: Post liberalization Architecture in India.

Sessional Work:

- .Minimum 25 representative buildings of the periods under study should be represented in Plans, sections and views- of various buildings discussed in the above units.
- One measured drawing and digital documentation of any site/ building/ part or features of a building related to the course content studied.. This can be undertaken as group work with identifiable individual contribution.
- One tutorial.

Course Specific Outcomes:

1. An understanding of architecture as a product shaped by various factors like technological developments, colonization, globalization, economy, and urbanization.
2. An understanding of the formal, structural, and stylistic aspects of architectural development.
3. An understanding of contemporary architecture of the world with reference to historical precedents and responses to the same.
4. An understanding of the architecture of colonial and post-independence India.

Recommended Readings:

- Bhatt, Vikram and Peter Scriver. Contemporary Indian Architecture After the Masters. Mapin Publishing Pvt Ltd, 1990.
- Correa, Charles and Kenneth Frampton. The Work of Charles Correa. Thames and Hudson, 1996.
- Curtis, William J R. Balkrishna Doshi- An Architecture for India. Rizzoli, 1988.
- Curtis, William J R. Modern Architecture Since 1900. Phaidon, 2007.
- Dingle, Narendra. Dialogues with Indian Master Architects. Marg Foundation, 2015.
- Dhongde, Sharvey and Chetan Sahasrabudhe (eds). Achyut Kanvinde. BNCA Publication Cell, 2009.
- Droste, M and Bauhaus Archiv. Bauhaus 1919-1933. Taschen, 1993.
- Eastlake, Charles Locke. A History of the Gothic Revival. Cambridge University Press, 2012.
- Fletcher, Sir Banister and Dan Cruickshank. Sir Banister Fletcher's A History of Architecture On The Comparative Method. Architectural Press, 1996.

- Hitchcock, Henry Russell and Philip Johnson. The International Style. W W Norton, 1997.
- Kagal, Carmen (ed). Vistara- The Architecture of India. The Festival of India, 1986.
- Lang, Jon. A Consise History of Modern Architecture in India. Permanent Black, 2002.
- The Masters of World Architecture (Series).
- Twombly, Robert (ed). Louis Kahn- Essential Texts. W W Norton, 2003.
- Various monographs on the works of twentieth century Architects.

Building Services II		
Course Code	2201932 [P] & 2201933 [SS]	
TeachingScheme	ExaminationScheme	
TotalContact Hoursperweek (lectures=2 Studio=2, Total =4)	Sessional [CIA 25 + EA 25]	50
	In semester exam	30
	End Semester exam	70
	TotalMarks	150
	Total Credits	03

COURSE OBJECTIVES:

To introduce students to Building Services in low, medium and high rise buildings and inculcate in them the understanding of integration of services in architectural design. The Building Services will include

- Solid Waste Management
- Lighting –Natural and Artificial
- Electrification

COURSE CONTENT:

Unit I –Solid Waste Management- This unit covers the collection, treatmentand disposal of organic and in-organic waste

- Collection- Garbage chutes and space requirement for manual mechanism
- Treatment and Disposal -Introduction to vermicomposting, organic waste composters, incinerators etc. and space requirements on site and in building

Unit II -Lighting-Natural- Introduction to integrated design approach for daylighting to cover

- Passive design strategies of siting, form, fenestration design,
- Choice of glazing material
- Methods for predicting daylight i.e. daylight factor.
- New technologies to access (light pipes) and control daylight (Lighting Controls)

Unit III -Lighting-Artificial

- Introduction to different sources of light, their characteristics (CRI, Color temperature and lamp life, energy consumption) lighting systems (Direct & Indirect) and their applications in building projects
- Lumen Method for designing appropriate lighting as per NBC 2016

Unit IV - Electrification

- Electrical installations in a building from the supply company mains to individual outlet points including meter board, distribution board, layout of points with load calculations.
- Electrical wiring systems for small and large installations including different materials involved
- Electrical control and safety devices – switches, fuse, circuit breakers, earthing, lightning conductors etc.
- Introduction to alternative sources of energy such as Solar PV, Wind turbines etc. and integration in building design

Unit V-Low Voltage network systems-Introduction to Low Voltage electrical systems and its integration in BMS –

- Wi-Fi and LAN network EPABX & Telecommunication system
- CCTV (Closed circuit TV and camera system)
- FA PA (Fire Alarm and Public address system)
- Access systems (Access control, Tracking, planning and provisions made)

SUBMISSION REQUIREMENT FOR SESSIONAL WORK:

- Preparing electrical layout and lighting plan of a building interior supported with necessary calculations (70% weightage).
- Visits to construction sites and preparing site visit reports, market survey and finding out latest trends and new materials for all the units.(30% weightage).

OUTCOME:

Students should be able to understand basic principles of daylight and artificial lighting and should be able to design a lighting plan for a space. They should be able to calculate the energy requirement of building electrical systems. Students should be able to identify space requirements and integration of these systems in architectural design.

RECOMMENDED READINGS:

- National Building Code of India 2016-Volume 2 , Bureau of Indian Standards
- Building Services and Equipments by Ashok L. Chhatre
- Building Services, By Mrs. Shubhangi Bhide
- Building Construction Illustrated by Frances D K Ching

- Basics Lighting Design Ed. by Bielefeld, Bert
- Daylight in Architecture-Benjamin Evans
- Lighting in Buildings-HapkinsenH.D.Kajr
- Lighting in Architectural Design -Derek Philip

SITE SURVEY AND ANALYSIS			
Course Code		2201934 [SS]	
TeachingScheme		ExaminationScheme	
TotalContact Periodsperweek (lectures=1, Studio=3, total=4)		Sessional [CIA 25 + EA 25]	50
			nil
		In-semester exam	nil
		End Semester exam	nil
		TotalMarks	50
		Total Credits	2

COURSE OBJECTIVES:

- To introduce students to the various factors related to Site Survey and Analysis relevant to Architectural Site Planning
- To enable the students to get conversant with locating the object positions in horizontal and vertical plane
- To prepare and interpret survey drawings.
- To develop understanding of contours and grading for Site development
- To analyze physical, socio-cultural and contextual parameters of the site enabling Site planning

COURSE OUTLINE:

- **Unit 1. Linear Measurements** Measurements in horizontal plane, survey stations, survey lines open and closed traverse, locating objects by chaining and offsetting, direct and indirect ranging, locating field boundaries and working out area of field, measuring distances with chain, tapes, ODM's ,EDM's, introduction to Total Station, survey accessories, measurements along sloping ground. Chain Surveying: Base line, tie lines, check lines, Understanding of land demarcation drawings.
- **Unit 2. Directional and Angular Measurements** Magnetic and true meridian, Magnetic and true bearings, use of bearings, use of prismatic compass, calculation of included angles, Fore and back Bearings, declination plotting and adjustment of closed traverse, Uses of Transit Theodolite. Measuring horizontal and vertical angles, calculation height of buildings, use of Theodolite as tacheometer, tacheometric tables

- **Unit 3. Levelling** Dumpy level, auto and tilting level, principle lines of levelling instrument, axis of telescope, axis of bubble tube, line of collimation, vertical axis recording by collimation plane, method and rise-fall method, B.S./I.S./F.S, change point, level surface, horizontal surface, datum, Reduced Level/ elevation of a point, Bench Marks, GTS, PBM/ABM/TBM. Temporary Adjustments.
- **Unit 4. Plane Table Surveys** Accessories used in plane tabling, methods of locating objects, methods of table orientation, Advantages and disadvantages. Use of Planimeter: Area of zero circle, calculating area of irregular shape figures.
- **Unit 5. Contours** Plotting the contours and profiles, interpolation of contours, contour interval, Characteristics of contours, Profile levelling: Understanding gradient, cut and fill for desired ground level, direct and indirect methods of contouring, block contour surveys
- **Unit 6. Site Analysis and Synthesis** Understanding of Natural and Manmade aspects (such as microclimate, topography, hydrology and vegetation), physical and socio-cultural context of the site. Site Analysis of the above parameters, Site Synthesis and Site Suitability

SESSIONAL WORK:

- 1) Calculation of area of field (Chain and cross staff survey)
- 2) Compass Survey.
- 3) Plane Table Survey.
- 4) Block Contour Survey.
- 6) Slope Analysis and Profile Levelling.
- 7) Site Analysis and Synthesis (Associated with Design Project)

COURSE OUTCOME

- At the end of the course students would be able to comprehend the site characteristics, reading and interpreting survey drawings, understanding equipment and methods of surveying leveling.

REFERENCE BOOKS:

- 1) Basak, N.N, *Surveying and Levelling*, McGraw Hill Education (India) New Delhi, 1994
- 2) Kanetkar, T.P, Kulkarni, S.V, *Surveying and Levelling*, Pune Vidyarthi Griha Prakashan, 2014
- 3) Lynch, K, *Site Planning*, Cambridge: The MIT Press, 1962

Architectural Design IV		
Course Code	3201935 [SV]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=1 Studio=6, Total = 7)	Sessional [CIA 100 + EA 100] Viva [Int 25 + Ext 25]	200 50
	In semester exam	NIL
	End Semester exam	NIL
	Total Marks	250
	Total Credits	10

COURSE OBJECTIVE:

To understand Architectural Design as a process of generating design brief and taking design decisions based on the following aspects:

- **Socio-Cultural Aspects:** To introduce students to socio-cultural aspects like lifestyle, culture, traditions, and their effect on architectural design etc.
- **Aesthetics:** To understand the Aesthetic aspects of Design (visual and experiential) along with spatial attributes (scale and proportions, volume, texture, light and shadows, etc.) and formal characteristics. (profile, base, corner, termination).
- **Anthropometry & Function:** To address functional aspects of design (activity, use of space, adequacy and efficiency of space for a particular activity, essential adjacencies of spaces, ease and efficiency of circulation, light, ventilation, user-space relationship, vertical connections)
- **Climate:** To understand the Climatic aspects those have a bearing on architectural design and address climatic concerns like adequate light, ventilation, protection from rain, insulation, shading, heat gain, through passive strategies.
- **Building Material and Construction Technology:** To study relevance of various building materials to a project, to get introduced to various expressions of a building material, to introduce a student to the construction technologies relevant to the building materials chosen, to understand the scope and limitations of a building technique to achieve the desired form and space.
- **Building Services:** To understand the spatial and structural implications of basic services involved in building design.
- **Site :** To understand the site and its context, both immediate and wider, in order to enable students to take decisions of zoning, circulation within site, distribution of built and open spaces, activity relationships and adjacencies, and views.
- **Universal Design:** To understand the concept and principles of universal design.
- **Precedent Studies:** To introduce the students to learn from case, referral, live studies - process of observation, analysis, documentation and deriving inferences.

COURSE OUTLINE:

1. Designing of progressively complex spaces and buildings in terms of area, a specific community, typology, function etc, with emphasis on either scale or complexity of the project, or both.
2. Project could be evolved based on the current needs of the city and / or context responding to aspects like heritage and conservation, landscape and ecology, image and identity, etc.
3. Development of building design program from not only client or user's requirements but also in response to context specific factors like socio-economic, socio-cultural, environmental etc.
4. Introduction to develop a design philosophy/narrative as a thought process in design.
5. Analysing activities around the buildings within a campus and understand the same in context to relation of built form and open spaces, elements of landscape, pedestrian and vehicular movement, their segregation, managing sloping sites, contours, etc.
6. Introduction to Campus design with reference to design of campuses developed in the past.
7. In case of multiple buildings (existing and/or proposed) to be accommodated within a campus, analyse and understand their relationship with each other in context to establish continuity of form, construction, materials, design theme, climate, etc. and the same should reflect in the drawings and models.
8. Integrating functions, structure and services in a building with relevant structural system and its resultant effect on visual form / character of building
9. To understand various issues and aspects of sustainability, earthquake resistance, construction, universal accessibility, etc. and study how these could be integrated in the architectural design process.
To study a location in urban context preferably in a different socio-geographic setting other than the Institute (not mandatory), and document the study done in the tour in the form of a report with emphasis on relevant aspects like climate, social structure, culture, architectural typology, construction technology, urban fabric, economy, etc or any other issues which need to be considered for envisaging a design project in totality.

SESSIONAL WORK

Assessment Criteria: Major project should have 80% weightage and 20% weightage should be given to the minor project.

A] Major project:

Project based on Campus Design with emphasis on site planning & relationship of built and open spaces, circulation and movement pattern, activity pattern, architectural character, image, identity, philosophy etc.

Deliverables:

- i. Portfolio A - Architectural drawings at an appropriate scale preferably 1:200/1:100. And model to appropriate scale.
- ii. Portfolio B - Process drawings / tracings (Recommended)
- iii. Study models of various stage (Recommended)

B] Minor project:-

A Time Bound Project of 12 hours as a means to gauge students' ability to apply the learning of the design studio and in the process acclimatizing them to work under time constraint and meet deadlines. This project of 12 hrs may be based on the parameters of the Design VI paper such as :

1. The suggested nature of project can be in the form of a social amenity in an urban context. However individual colleges do have freedom to choose a topic.
2. Size of the site given for the design should be such that it fits imperial size sheet.
3. Preferred scale of the drawing would be 1:200.

Deliverables: Architectural drawings in appropriate scale preferably 1:200/1:100. (Model optional).

COURSE OUTCOME:

1] Build competency and ability to make communicative architectural drawings that are of readable scales, preferably in:

1:200 (Site level drawings & Model)

1:100 (Cluster level drawings)

Appropriate details to be explored at 1:50/20/10 etc.

2] Be able to negotiate various scales in drawings and models.

3] Be equipped to resolve structural systems of various construction techniques and services.

4]

REFERENCE BOOKS

1. Lynch, K., Lynch, K. R., & Hack, G. (1984). *Site planning*. MIT press.
2. Rybczynski W. (1984). *How the Other half builds, Volume 1 : Space*. Centre for Minimum Cost Housing. McGill University. Montreal Canada
3. Carlos Barquin (1986). *How the Other half builds, Volume 2 : Plots*. Centre for Minimum Cost Housing. McGill University. Montreal Canada
4. Vikram Bhatt. (1990). *How the Other half build, Volume 3 : Self selection Process*. Centre for Minimum Cost Housing. McGill University. Montreal Canada
5. Rapoport, A. (1969). *House form and Cultua*. Prentice-Hall of India Private Ltd.: New Delhi, India.
6. Correa, C. (2010). *A place in the shade: the new landscape & other essays*. Penguin Books India.
7. Dave, B., Thakkar, J., Shah, M., & Hāṇḍā, O. (2013). *Prathaa: Kath-khuni Architecture of Himachal Pradesh*. SID Research Cell, School of Interior Design, CEPT University.
8. Kanvinde, A., & Miller, H. J. (1969). *Campus design in India: experience of a developing nation*. Jostens/American Yearbook Company.
9. Adler, D. (2007). *Metric handbook*. Routledge
10. Neufert, E., & Neufert, P. (2012). *Architects' data*. John Wiley & Sons.
11. Gropius, W. (1956). *Scope of total architecture*. London: G. Allen & Unwin.
12. Giedion, S. (1967). *Space, time and architecture: the growth of a new tradition*. Harvard University Press.
13. Gibbered, Fredrick: *Town Design*.
14. David Gosling, Gordon Cullen – *Visions of Urban Design*.
15. Bawa, G., & Robson, D. (2002). *Geoffrey Bawa: the complete works*. Thames & Hudson..
16. Scheer, B. C. (2017). *The evolution of urban form: Typology for planners and architects*. Routledge.
17. It is strongly recommended that students are exposed on the books on works of Master architects

Building Construction and Materials V		
Course Code	3201936[P]&3201937 [SV]	
TeachingScheme	ExaminationScheme	
TotalContact Hoursperweek (lectures=2 Studio=3, Total = 5)	Sessional [CIA 25 + EA 25] Viva [Int 25 + Ext 25]	50 50
	In semester exam	30
	End Semester exam	70
	TotalMarks	200
	Total Credits	06

COURSE OBJECTIVES:

- To understand the variations in frame structure with options of different types of slab like flat slab, ribbed and waffle slabs etc. along with pre-stressed RCC technology.
- To understand the construction of single basement along with its waterproofing, provision for access and ventilation details. To understand the construction of different types of retaining walls and the detailing of the same
- To introduce materials and technology of assembling interior elements like partitions, suspended ceiling, furniture units etc.

COURSE CONTENT:

UNIT I Materials for Interior Essentials

Characteristics, Properties and types of following materials and their application for interior essentials.

- Wood, wood derivatives and other panel materials used for interior application.
- Finishing materials like laminates, veneers, plastics and metal sheets.
- Paints and varnishes
- Hardware required for application to interior and furniture elements

UNIT II Foundations, Retaining Wall& single basement construction

- Concept of shallow and deep foundations with respect to basement construction, high rise buildings and different soil conditions
- Study of Single basement construction along with waterproofing details, also study of cast-in-situ and precast Retaining wall and its terminology, proportionsand construction details.

UNIT III Reinforced Cement Concrete construction

- Reinforced cement concrete floor construction systems like flat plate, flat slab, ribbed slab, waffle slab, band beam and slab, pre-stressed slabs along with earthquake resistant features, reference of a RCC drawing

UNIT IV Partitions and Paneling

- Study of demountable partition construction using proprietary and non-proprietary systems using non-timber materials
- Proprietary and non-proprietary systems of paneling in various materials

UNIT V Suspended Ceiling

- Study of Suspended ceiling construction using proprietary and non-proprietary systems using various materials

UNIT VI Furniture Design and assembly

- Study of furniture for residential, commercial, office buildings and assembly details using timber and other material along with finishing and upholstery.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK: Hand drafted drawings on Units 4, 5 and 6 to cover all the aspects of course outline in sufficient detail;; Assignments on units 1, 2, and 3 including sketches, notes, market survey.

OUTCOME: Students will understand of the principle, methods, advantages and disadvantages of concrete floor construction systems and single basement construction. Students will get to know the proprietary construction techniques for partition ceilings with latest available materials.

RECOMMENDED READINGS:

- Dr. B.C Punmia (2012) *Building Construction* (10th edition) Laxmi Publications.
- Harold B.Olin, John L. Schmidt (1994) *Construction principles, Materials and Methods*, John Wiley & Sons, Inc.
- Narayanamurty, D.; Mohan, D (1972) *The use of Bamboo and reeds in building construction*, UNO Publications
- Roy Chudley, Roger Greeno (2016), *Construction Technology*, 11th Edition Routledge.
- S.C.Rangwala (2013) *Engineering materials* (Fortieth edition), Charotar Publishing pvt.ltd.
- S.K. Duggal (2016) *Building materials* (4th edition) – New age international publishers.
- Willam Morgan (1977) *The elements of structure: An introduction to the principles of building and structural engineering* Distributed by Sportshelf; 2nd edition
- W.B. McKay (2015) *Building construction Vol. 1* (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition).
- National Building Code of India 2016 (Volume 1) and relevant I.S.I. Specifications.

Theory of Structures V		
Course Code	3201938 [P]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=2 Studio=0, Total = 2)		
	In semester exam	30
	End Semester exam	70
	Total Marks	100
	Total Credits	02

COURSE OBJECTIVES:

- *To Understand Doubly Reinforced Beams, T and L Beams and to adopt span to depth ratios for them*
- *To Understand Design of columns across multiple floors changing grade and percentage of steel and grade of concrete*
- *To understand how to increase M.R of girders and Load carrying capacity of Stanchions. To study alternative methods of spanning vis-à-vis Portal Frames*
- *To introduce lateral pressure and understand the proportioning and stability of a gravity retaining wall*

COURSE OUTLINE:

Unit 1: Design of Beams Continued:

- **Doubly Reinforced Beams:** Concept, Need, Applications. **Numerical** on Design of Doubly Reinforced Beams including calculation of Load and Shear Design
- **T Beams and L Beams:** Theory of Dividing a Large Hall Slab into Smaller one way or Two Way Slab units by using T Beams and L Beams. Concept, Applications and Advantages and Disadvantages. **Numerical** on Design of T Beams and L Beams including calculation of Load and Shear Design.
- Theory only on Design of **Coffered Slab** and **Flat Slab Construction**. Concept of Large Beam less Spaces, Column Capitals, Header Beams. I.S.456 Provisions for Various R.C.C Elements

Unit 2: Design of Columns Continued: Reasons for eccentricity of Load on a Column and I.S. Provision for eccentricity. **Numerical** on Calculation of load from floor to floor (From Slab to Beam to Column, Also load calculations from a given floor plate to be divided equally over columns). **Numerical** on Design of columns changing concrete grade and / or steel percentage and / or size of column.

Unit 3: Foundations: Theory of Shallow and Deep Foundations. Theory of foundations in Soil of Low S.B.C. Study of Isolated Footing, Combined Footing, Strip Foundations, Raft Foundations, Piles and Pile Caps. **Numerical** on Design of Isolated Footing including Single Shear and Double Shear, **Numerical** on design of combined footing in Plan Only.

Unit 4: Design of Girders and Stanchions Continued:

- Theory of Girders with flange plates to increase M.R of Section. **Numerical** on Design and Analysis of Steel Girders with flange plates.
- Extending the above Theory to Study Castellated Beams and Plate Girders. Theory only of Gantry Girders, Functions and Loads acting on each element of a Gantry Girder
- Theory of Stanchions with Flange Plates to increase Load Carrying Capacity. **Numerical** on Design and Analysis of Stanchions with Flange Plates, Finding thickness and size of Connecting Plate to Pad Foundation and Design of Pad.
- Theory only of Portal Frames, Basic Concept - Rigid, Two Hinged and Three Hinged Portal Frames with B.M.D. Advantages and Disadvantages of R.C.C Portal Frame - Detailing of Hinged and Pinned Column to Footing Junction. Advantages and Disadvantages of Steel Portal Frame - Detailing of Hinged and Pinned Column to Footing Junction, Rigidity at Beam to Column Junctions.

Unit 5: Retaining Walls:Retaining Walls - Need, Angle of Repose, Rankine's Theory, Different types of Retaining walls and their Applications, Study of Proportioning and Stability of Gravity Retaining Walls, Weep Holes and Effect of Surcharge. **Numerical** on Stability of Gravity Retaining Walls.

Unit 6: Advanced Structures: Pre-stressed Constructions: Concept and Process of Pre-tensioning and Post-Tensioning. Advantages and Disadvantages over Conventional R.C.C Construction. Use of High Strength Concrete and Steel in Pre-Stressed Elements. Methods of Pre-stressing - Freyssinet System. Numerical on Extreme Fibre Stresses at Mid Span and End Span.

Reference Books

1. Design of R.C.C. Structures by H.J.Shah
2. Design of R.C.C. Structures by Punmia and A.K.Jain
3. Design of Reinforced Concrete Structures by N.Krishnaraju
4. R.C.C Theory and Design by Dr. V.L.Shah and Dr.S.R.Karve

Course Outcome:*At the end of semester student develops*

- *The understanding of larger space spanning both in R.C.C and Steel*
- *The understanding of carrying of vertical loads by R.C.C. Columns and Stanchions*
- *The understanding Lateral pressure and structural principles for overcoming it.*

LANDSCAPE ARCHITECTURE		
Course Code	3201939 [SS]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=1 Studio=3, Total =4)	Sessional [CIA 50 + EA 50]	100
	In semester exam	
	End Semester exam	
	Total Marks	100
	Total Credits	03

COURSE OBJECTIVES:

- To introduce the students to Landscape Architecture and its scope.
- To understand the elements and principles of landscape design and role of landscape elements in design of outdoor environments on the site.
- To understand the Intent and content of designed landscapes.
- To develop understanding of site analysis and site planning and integrated design of open and built spaces.
- Creating awareness about using Landscape design as a tool to address environmental concerns in Architecture.

COURSE OUTLINE:

- **Unit 1.** Introduction to Landscape Architecture and its scope ,elements(natural and manmade) and their application in achieving functional, aesthetic, environmental and cultural goals.
- **Unit 2.** Principles and approaches in Landscape Design. Illustrations can be from contemporary as well as historic landscapes for understanding various approaches of design.
- **Unit 3.** Study of Hard landscape (civil work) details with respect to materials and construction techniques..
- **Unit 4.** Study of Softscape (plant material), their characteristics and contribution in terms of creating and imparting character to outdoor spaces.
- **Unit 5** Introduction to basics of Site planning and process of site planning.

SESSIONAL WORK:

- Minimum two assignments to expose the students to landscape elements, their application, principles of design and approaches of design.
- Short duration projects such as eskees to allow students to explore the palette of landscape elements in open space creation and design. – Minimum 2.

- One long duration site planning and landscape design project preferably the third year architectural design project. The outcome shall be landscape design drawings, concept generation, site studies, analysis along with constructional details and planting concepts.

REFERENCE BOOKS

Mcharg, I, *Design with Nature*. John Wiley and co. 1978.

Jellicoe, G and Jellicoe, S, *The Landscape of Man*, London: Thames and Hudson, 1991.

Simonds, J. O, *Landscape Architecture: The Shaping of Man's Natural Environment*, N Y: McGraw Hill Book Co. Inc. 1961.

Lynch, K, *Site Planning*, Cambridge: The MIT Press, 1962.

Shaheer, M, Wahi Dua, G and Pal A (editors), *Landscape Architecture In India, A Reader: LA, Journal of Landscape Architecture*, 2013.

Lyall, S, *Designing The New Landscape*: UK: Thames and Hudson, 1998.

Dee, C, *Form And Fabric In Landscape Architecture: A Visual Introduction*, UK: Spon Press, 2001.

Eckbo, G, *Urban Landscape Design*, N Y: McGraw hill co. 1961.

Laurie, M, *An Introduction to Landscape Architecture*, N Y: American Elsevier Pub. Co. Inc. 1975

Rutledge, A J, *A Visual Approach to Park Design*. New York: John Wiley and Sons, 1985.

Randhawa, M S, *Flowering Trees*, New Delhi: National Book Trust, 1998.

Bose, T K and Choudhary, K, *Tropical Garden Plants in Colour*, Horticulture and Allied Publishers, 1991.

Krishen, P, *Trees of Delhi: A Field Guide*, Penguin India, 2006.

Mukherjee, P, *Trees of India (WWF Natures Guide)*, Oxford, 2008.

Sahni, K C, *The Book of Indian Trees (Bombay Natural History Society)*, Oxford, 1998.

Krishna, N and Amrithalingam, M, *Sacred Plants of India*, Penguin Books Limited, 2014.

Motloch, J. L, *Introduction to Landscape Design*, US: John Wiley and Sons, 2001.

Dines, N and Harris, C, *Timesavers Standards for Landscape Architecture*, McGraw Hill Education, 1998.

Reid, G, L, *Landscape Graphics*, Watson-Guptill, 2002.

Botkin, D. B and Keller, E. A, *Environmental Science: Earth As a Living Planet*, N Y: John Wiley And Co. 1995.

Grosholz, E, *The Poetics of Landscape Architecture*, University of Pennsylvania Press, 2010.

ELECTIVE I [CONTEMPORARY ARCHITECTURE]			
Course Code		3201940 [SS]	
Teaching Scheme		ExaminationScheme	
TotalContact Hours per week= (lectures=1, Studio=2, Total=3)		Sessional [CIA 50+EA 50]	100
		In-semester exam	NIL
		End Semester exam	NIL
		TotalMarks	50
		Total Credits	02

Course Objectives:

- To analyze the contemporary trends/approaches in architectural production in terms of design, practices, its perception, appreciation and critical discourses.
- To critically reflect and comment on contemporary architecture across the world.

Course Outline:

- Unit 1 - Post-Modernism and other movements in Architecture since the second half of 20th century.
- Unit 2 - Post 2000 CE trends in architecture, various critical discourses and current architectural issues
- Unit 3 - Analysis and critical appraisal of Architecture across the world

Sessional Work:

- Book review / article / chapter of a book in 1000 words.
- Unit 3 should be a research essay of about 1500-2000 words on a topic selected by the student and accompanied by an oral presentation of 15 minutes duration and discussion.

Students should be encouraged to follow the formalities of writing a research essay. The submission has to be in hand written format.

Students should be assessed primarily for the identification of issues, ability to take position and development of an argument.

Course Specific Outcomes:

1. Application of the knowledge gained through the study of history of architecture to analyse contemporary architecture.
2. Development of individual view point and construction of an argument to put it across.
3. Skill of orally presenting a topic of choice, and generating a discussion.

REFERENCE BOOKS

- Buchanan, Peter. "The Big Rethink". The Architectural Review (AR), (Articles – December 2011, January to May 2012, July – September 2012, November 2012)
- Correa, Charles. A Place in the Shade: The New Landscape and Other Essays. Penguin Books India, 2010.
- Curtis, William J R. Modern Architecture since 1900. Phaidon, 2007.
- Frampton, Kenneth. Modern Architecture. Thames and Hudson, 1992.
- Hays, K. Michael. Architecture Theory since 1968 (2000). MIT Press., Oct 1997, Feb. 2000.
- Hertzberger, Herman. Lessons for Students in Architecture. 010 Publishers, 1973.
- Jencks, Charles. The New Paradigm in Architecture- The Language of Post-Modern Architecture. Yale University Press, 2002.
- Leach, Neil. Anaesthetics of Architecture, MIT Press, 1999
- Mehrotra, Rahul. Architecture in India: Since 1990. Pictor Publishing, 2007.
- Pallasma, Juhani. The Eyes of the Skin: Architecture and the Senses. Academy Press, 2 edition, 2005
- Smith, Koryden H. Introducing Architectural Theory. Routledge, 2012
- Unwin, Simon. Analysing Architecture. Routledge, 2002.
- Venturi, Robert. Complexity and Contradiction in Architecture. MOMA, 1966.
- Wigley, Mark. The Architecture of Deconstruction- Derrida's Haunt. MIT Press, 1993.

Building Services III	
Course Code	3201941 [P] & 3201942 [SS]

TeachingScheme	ExaminationScheme	
TotalContact Hoursperweek (lectures=2 Studio=1, Total =3)	Sessional [CIA 25 + EA 25]	50
	In semester exam	30
	End Semester exam	70
	TotalMarks	150
	Total Credits	03

COURSE OBJECTIVES

- To comprehend building services as an integral part of architectural design process
- To obtain knowledge of technical and design aspects of natural ventilation, heating, cooling and HVAC

COURSE OUTLINE

- Principles of working of natural ventilation, heating, cooling and HVAC systems, components, materials and provisions in architectural design
- Functional and aesthetical aspects of building services coordination in architectural design

TEACHING PLAN

Unit I: Natural ventilation

- 1.1 Conditions of human thermal comfort
- 1.2 Factors affecting natural ventilation
- 1.3 Strategies to effect natural ventilation

Unit II: Mechanical ventilation

- 2.1 Systems of mechanical ventilation
- 2.2 Components of mechanical ventilation systems
- 2.3 Mechanical ventilation - Schematic design
- 2.4 Introduction to Psychometric charts

Unit III: Heating and cooling

- 3.1 Passive heating and cooling techniques
- 3.2 Low energy mechanical cooling techniques

Unit IV: Air-conditioning - 1

- 4.1 Principles of air-conditioning systems
- 4.2 Components of air-conditioning systems

Unit V: Air-conditioning – 2

- 5.1 Types of air-conditioning systems

Unit VI: Air-conditioning – 3

- 6.1 Onsite case study of air-conditioning system
- 6.2 Air-conditioning and ducting layout – Schematic calculations and design for a space / part of a building.

SESSIONAL WORK

Tutorials for Units I, II, III, IV and V (50% marks)

Onsite case study report for 6.1 (25% marks)

Schematic air-conditioning calculations and ducting layout for 6.2 (25% marks)

RECOMMENDED READING

- National Building Code of India 2016
- Air Conditioning Principles and Systems – Edward G Pita
- Environmental Science - B J Smith, G M Phillips, M Sweeney
- Building Service Handbook – Fred Hall and Roger Greeno
- Refrigeration and Air Conditioning – Arora Ramesh Chandra
- Fundamentals of Air Conditioning Systems – Billy C Langley
- Basic Refrigeration and Air Conditioning – P N Ananthanarayanan

WORKING DRAWING I			
Course Code		3201943 [SS]	
Teaching Scheme		Examination Scheme	
Total Contact Periods per week (lectures=1, Studio=3, total=4)		Sessional [CIA 50 + EA 50]	100
		In-semester exam	nil
		End Semester exam	nil
		Total Marks	100
		Total Credits	2

COURSE OBJECTIVES

- To enable the students to prepare working drawings of an architectural project and imbibe the significance of working drawings from the point of view of execution of the work on site and as important component of tender documents.

COURSE CONTENT

- Introduction to the concept of working drawings and their importance.
- Graphical presentation of all the components of a building along with dimensioning and annotations.
- Understand and apply IS Codes and internationally accepted norms / conventions / methods of preparing a working drawing along with tabulation of schedules of materials, finishes and hardware.

SESSIONAL WORK

- One working drawing of an architectural design project having load bearing structure with minimum 100 sq. m. carpet area. Manually drafted drawings [minimum 6] sufficiently explaining the building from the execution point of view.
- At least two details related to the design such as doors / windows / railings / kitchen etc. to suitable scale. (1 drawing)

Architectural DesignV		
Course Code	3201944[SV]+3201945[P]	
TeachingScheme	ExaminationScheme	
TotalContact Hoursperweek (lectures=2 Studio=5, Total = 7)	Sessional [CIA 100 + EA 100] Viva [Int 25 + Ext 25]	200 50
	In semester exam	NIL
	End Semester exam	100
	TotalMarks	350
	Total Credits	10

COURSE OBJECTIVE:

To understand Architectural Design as a process of generating design brief and taking design decisions based on the following aspects:

- **Socio-Cultural Aspects:** To introduce students to socio-cultural aspects like lifestyle, culture, traditions, and their effect on architectural design etc.
- **Aesthetics:** To understand the Aesthetic aspects of Design (visual and experiential) along with spatial attributes (scale and proportions, volume, texture, light and shadows, etc.) and formal characteristics. (profile, base, corner, termination).
- **Anthropometry & Function:** To address functional aspects of design (activity, use of space, adequacy and efficiency of space for a particular activity, essential adjacencies of spaces, ease and efficiency of circulation, light, ventilation, user-space relationship, vertical connections)
- **Climate:** To understand the Climatic aspects those have a bearing on architectural design and address climatic concerns like adequate light, ventilation, protection from rain, insulation, shading, heat gain, through passive strategies.
- **Building Material and Construction Technology:** To study relevance of various building materials to a project, to get introduced to various expressions of a building material, to introduce a student to the construction technologies relevant to the building materials chosen, to understand the scope and limitations of a building technique to achieve the desired form and space.
- **Building Services:** To understand the spatial and structural implications of basic services involved in building design.
- **Site :** To understand the site and its context, both immediate and wider, in order to enable students to take decisions of zoning, circulation within site, distribution of built and open spaces, activity relationships and adjacencies, and views.
- **Universal Design:** To understand the concept and principles of universal design.
- **Precedent Studies:** To introduce the students to learn from case, referral, live studies - process of observation, analysis, documentation and deriving inferences.

COURSE OUTLINE:

10. Designing of progressively complex spaces and buildings in terms of area, a specific community, typology, function etc, with emphasis on either scale or complexity of the project, or both.
11. Project could be evolved based on the current needs of the city and / or context responding to aspects like heritage and conservation, landscape and ecology, image and identity, etc.
12. Development of building design program from not only client or user's requirements but also in response to context specific factors like socio-economic, socio-cultural, environmental etc.
13. Introduction to develop a design philosophy/narrative as a thought process in design.
14. Analysing activities around the buildings within a campus and understand the same in context to relation of built form and open spaces, elements of landscape, pedestrian and vehicular movement, their segregation, managing sloping sites, contours, etc.
15. In case of multiple buildings (existing and/or proposed) to be accommodated within a site, analyse and understand their relationship with each other in context to establish continuity of form, construction, materials, design theme, climate, etc. and the same should reflect in the drawings and models.
16. Integrating functions, structure and services in a building with relevant structural system and its resultant effect on visual form / character of building
17. To understand various issues and aspects of sustainability, earthquake resistance, construction, universal accessibility, etc. and study how these could be integrated in the architectural design process.
18. To study a location in urban context preferably in a different socio-geographic setting other than the Institute (not mandatory), and document the study done in the tour in the form of a report with emphasis on relevant aspects like climate, social structure, culture, architectural typology, construction technology, urban fabric, economy, etc or any other issues which need to be considered for envisaging a design project in totality.

SESSIONAL WORK

Assessment Criteria: Major project should have 80% weightage and 20% weightage should be given to the minor project.

A] Major project:

System oriented project with emphasis on structural system, vertical and horizontal circulation, services like HVAC, electrical, fire-fighting systems, parking, rules & regulations etc. The project could also be evolved based on the need of the city with socio-economic context, historical context, ecological concerns, etc.

Deliverables:

- i. Portfolio A - Architectural drawings at an appropriate scale preferably 1:200/1:100. And model to suitable scale.
- ii. Portfolio B - Process drawings / tracings (Recommended)
- iii. Study models of various stage (Recommended)

B] Minor project:

Option 1: A Time Bound Project of 12 hours as a means to gauge students' ability to apply the learnings of the design studio and in the process acclimatizing them to work under time constraint and meet deadlines. This project of 12 hrs may be based on the parameters of the Design VI paper such as :

1. The suggested nature of project can be in the form of a social amenity in an urban context.
2. Size of the site given for the design should be such that it fits imperial size sheet.
3. Preferred scale of the drawing would be 1:200.

Deliverables: Architectural drawings in appropriate scale preferably 1:200/1:100. (Model optional).

Or

Option 2: Study Tour linked short term project

Deliverables: Study tour documentation must include architectural study supported by drawings, narratives, sketches, photographs and information presented in any other formats deemed suitable by the college and linked short term project.

COURSE OUTCOME:

1] Build competency and ability to make communicative architectural drawings that are of readable scales, preferably in:

1:200 (Site level drawings & Model)

1:100 (Cluster level drawings)

Appropriate details to be explored at 1:50/20/10 etc.

2] Be able to negotiate various scales in drawings and models.

3] Be equipped to resolve structural systems of various construction techniques and services.

REFERENCE BOOKS

18. Lynch, K., Lynch, K. R., & Hack, G. (1984). *Site planning*. MIT press.
19. Rybczynski W. (1984). *How the Other half builds, Volume 1 : Space*. Centre for Minimum Cost Housing. McGill University. Montreal Canada
20. Carlos Barquin (1986). *How the Other half builds, Volume 2 : Plots*. Centre for Minimum Cost Housing. McGill University. Montreal Canada
21. Vikram Bhatt. (1990). *How the Other half build, Volume 3 : Self selection Process*. Centre for Minimum Cost Housing. McGill University. Montreal Canada
22. Rapoport, A. (1969). *House form and Cultua*. Prentice-Hall of India Private Ltd.: New Delhi, India.
23. Correa, C. (2010). *A place in the shade: the new landscape & other essays*. Penguin Books India.
24. Dave, B., Thakkar, J., Shah, M., & Hāṇḍā, O. (2013). *Prathaa: Kath-khuni Architecture of Himachal Pradesh*. SID Research Cell, School of Interior Design, CEPT University.
25. Kanvinde, A., & Miller, H. J. (1969). *Campus design in India: experience of a developing nation*. Jostens/American Yearbook Company.
26. Adler, D. (2007). *Metric handbook*. Routledge
27. Neufert, E., & Neufert, P. (2012). *Architects' data*. John Wiley & Sons.
28. Gropius, W. (1956). *Scope of total architecture*. London: G. Allen & Unwin.
29. Giedion, S. (1967). *Space, time and architecture: the growth of a new tradition*. Harvard University Press.
30. Gibbered, Fredrick: Town Design.

31. David Gosling, Gordon Cullen – Visions of Urban Design.
32. Bawa, G., & Robson, D. (2002). *Geoffrey Bawa: the complete works*. Thames & Hudson..
33. Scheer, B. C. (2017). *The evolution of urban form: Typology for planners and architects*. Routledge.
34. It is strongly recommended that students are exposed on the books on works of Master architects

Building Construction and Materials VI		
Course Code	3201946 [SV]	
TeachingScheme	ExaminationScheme	
TotalContact Hoursperweek (lectures=2 Studio=3, Total = 5)	Sessional [CIA 50 + EA 50] Viva [Int 25 + Ext 25]	100 50
	In semester exam	NIL
	End Semester exam	NIL
	TotalMarks	150
	Total Credits	06

COURSE OBJECTIVES:

- To introduce the design potential of steel as a material in building construction and it's inherent structural benefits.
- To create awareness with the best practices of steel as a construction material.
- To understand the concept of modular co-ordination and industrialized building construction along with precast technology.
- To understand issues and construction of earthquake resistant frame structures.

COURSE CONTENT:

UNIT I Metal and Metal alloys, Sheet roof covering

- Types of steel used in building construction- Use of Structural and non-structural steel for low and medium span building , their properties and advantages of steel in construction.
- Market forms of structural and non-structural steel.
- Use of lightweight steel for building construction.
- Built-up sections for structural purpose.
- Sheet roof coverings --Characteristics, Properties, market forms of sheet roof covering for medium and long spans and their application.

UNIT II Fencing and Gates

- Fencing using different materials like steel, barbed wire, chain-link, weld-mesh and other available materials in market.
- Construction details of fencing and suitable gate with due consideration to design parameters.

UNIT III Steel Trusses

- Understanding concepts of trusses, basic connections for trusses along with earthquake resistant features.
- Construction of trusses for low rise medium span buildings.

UNIT IV Steel structure construction

- Understanding methods of construction of various components of steel structures; steel frame construction for multi-storey steel building.
- Construction details of assembly with stanchion, beams and metal deck flooring along with earthquake resistant features.
- Moisture and fire protections in steel framed buildings

UNIT V Modular co-ordination

- Concept of modular coordination for Industrialized building construction, planning and construction details
- Precast floor and roof construction along with the following systems developed by CBRI:
 - Floor and roof construction using partially precast planks and joist.
 - Floor and roof construction using precast Waffle unit.
 - Introduction to locally available proprietary precast systems

UNIT VI Earthquake resistant frame structures.

- Overview of earthquake resisting structural systems.
- Application of Moment resisting frames, crossed braced frames and shear wall for Earthquake resistance structures.

SUBMISSION REQUIREMENT FOR SESSIONAL WORK: Hand drawn drawings on Units 3,4 and 5 to cover all the aspects of course outline in sufficient detail;; Assignments on units 1, 2,6 include sketches, notes, market survey and case-studies.

OUTCOME: Students will develop an understanding of possibilities of steel as an important building construction material. Understanding of properties of ferrous and non ferrous metals as materials for buildings will enable students to use Steel innovatively in building projects.

RECOMMENDED READINGS:

- Central Public Work Department, Indian Building Congress. Handbook on Seismic Retrofit of Buildings. Narosa Publishing House. 2008
- Andrew Charleson. Seismic Design for Architects: Outwitting the Quake. Elsevier Ltd 2008
- Terri Meyer Boake. Understanding Steel Design: An Architectural Design Manual. Birkhauser Basel 2012.
- Stephen Emmitt. Barry's Advanced construction of buildings. Wiley, 2006

- Mackay J.K. Building Construction vol.-1-4. Longman Scientific & Technical, 1988.
- IS 7921 : Recommendations for modular coordination in building industry Horizontalcoordination
- IS 7922 : Recommendations for modular coordination in building industry Verticalcoordination
- M. M. Mistry. Modular coordination & prefabrication, Principles of Modular Coordination in building.
- BMTPC. Standards & Specifications for Cost-Effective Innovative Building Materials and Techniques. BMTPC 1996

Theory of Structures VI		
Course Code	3201947 [P]	
TeachingScheme	ExaminationScheme	
TotalContact Hoursperweek (lectures=2 Studio=0, Total = 2)		
	In semester exam	30
	End Semester exam	70
	TotalMarks	100
	Total Credits	02

COURSE OBJECTIVES:

- *To the study of effect of Lateral Pressure of Soil and Water for increasing heights.*
- *To Develop in Students the Feel for Structural Principles and their Relates to Building Design*
- *To Develop in Students the Concept that “Every Structure is a System that Forms the Space” and the fact that Architecture and Structure cannot be conceived independently.*
- *To Develop in Students the fact that Structural Engineering is a Specialist Discipline and that the Architect has to appreciate the consultant’s concern and make an informed choice about the most appropriate Structural System for his Building with Reasonable Understanding of its Economic and Operational Implications.*
- *To Develop in Students the Mathematical logic that would enable him to Design the Structural System for Ground +2 Storey R.C.C Structure and a medium span Factory Building in steel.*
- *To in-still in the Students a Confidence that they could develop and explore a Structural System of their own design and execute the same.*

Unit 1: Lateral Pressure and Retaining Walls Continued:

- Theory of **Cantilever Retaining walls**, their Proportioning, Stability, Reinforcement Detailing of Stem and Base, Shear Key. **Numerical** on Stability of Cantilever Retaining Wall, Design of Stem Reinforcement.
- Theory of **Counter Fort Retaining Wall**, Its Parts, Structural Action on Each Part and Reinforcement Detailing
- **Water Tanks in R.C.C:** Joints in Water Tanks, Limit State of Cracking, Minimum Percentage of Steel and Other Standards.
 - R. C.C. Circular Water Tank with Flexible and Rigid Joint between Wall and Base -Concept of Hoop Tension – Reinforcement Detailing.
 - R. C.C. Square and Rectangular Water Tanks -Reinforcement Detailing.
 - R.C.C. Under-Ground Water Tanks - Pressure Conditions -Reinforcement Detailing.
 - Over Head Water Tank - An Intze Tank - Parts and General Detailing

Unit 2: Design of R.C.C Framed Structure:

- **Total review** of design of ground + two storied RCC building. Defining Structural system, different loads, Design sequence, transfer of load, Actual design procedure. Framing of a Given Plan as per constraints on Beam and Slab Depths
- **Understanding Structural Schedules and drawings**, Sketching Based on Given Schedule.

Unit 3: Design of Steel Structures Continued:

- **Compound Stanchions:** Theory of Compound Stanchions. **Numerical** on Design and Analysis of Compound Stanchion. Lateral System Design of Lacing and Battening and other Lateral Systems in Theory Only
- **Trusses:** Truss types, **Numerical** on Design of Purlins and Transfer of Load to Trusses. **Numerical** on Design of Compression and Tension Members with Design of Bolted and Welded Joints. Connections in Structural Steel.

Unit 4: Design of Steel Framed Factory Buildings:

- Total review of design of medium span factory building in steel. Structural systems, different loads, Design sequence, transfer of load, actual design, procedure, Understanding structural drawings.

Unit 5: Understanding Wind Load:

- Factors Affecting Wind Load. Analysis of Win Load for Ground + 9 Storeyed Building.
- Resulting Stresses in Foundations due to Effect of Wind load on Tall Structures
- Effect of Wind Load on Roof.

Unit 6: Advanced Structures:

- **Long span structural systems** in Steel and R.C.C like Domes. Vaults, Folded Plates, and Tensile Structures using Fabric. Advantages and disadvantages of different systems.

- **High Rise Buildings Structural System** like Rigid frame, Moment Resisting Frames, Braced Frames, Shear Walls, Out Rigger Systems, Tube Systems, Tube in Tube, Dia-Grid, Exo- Skeleton. Space Trusses etc. Appropriate System as per height.

Course Outcome: *At the end of semester student develops*

1. *The understanding Effects of Lateral Pressure of Soil and Water*
2. *The sense to frame R.C.C and Steel Buildings*
3. *The Understanding of different Structural Systems for Larger Spans and Tall Buildings with an understanding of Wind Load*

Reference Books

1. Design of R.C.C. Structures by H.J.Shah
2. Design of R.C.C. Structures by Punmia and A.K.Jain
3. Design of Reinforced Concrete Structures by N.Krishnaraju
4. R.C.C Theory and Design by Dr. V.L.Shah and Dr.S.R.Karve
5. L.S.Design of Steel Structures by S.K.Duggal
6. Design of Steel Structures By Limit State Method as per I.S.800- 2007 By S.S.Bhavikatti

RESEARCH IN ARCHITECTURE I		
Course Code	3201948 [SS]	
Teaching Scheme	Examination Scheme	
Total Contact Hours per week (lectures=1 Studio=2, Total =3)	Sessional [CIA 25 + EA 25]	50
	In semester exam	NIL
	End Semester exam	NIL
	Total Marks	50
	Total Credits	02

COURSE OBJECTIVES:

- To introduce students to Research in Architecture and its value in design
- To enable the students to prepare a research proposal.

COURSE OUTLINE:

- Unit I -- Introduction to the meaning and need of research in architecture. Introduction to various concepts such as types of variables, measurement of variables, sample selection, ethics in research.
- Unit II – Process of research – Methodology

- Unit III – Literature study
- Unit IV – Methods of research in architecture. Use of surveys, observations, experiments, secondary sources.

SESSIONAL WORK:

- Tutorial based on all of the above units
- Literature Review of at least 5 papers related to the topic of their choice.
- Research proposal giving details of aims, objectives, scope, limitations, methods, samples selected on the topic approved by the head of the institution.

NOTE:

- The guide must have minimum 5 years of teaching experience. Preferably a guide should not guide more than 8 students.
- It is desirable that the research proposal is presented in front of experts.
- It is beneficial to the students if the topic is related to the architectural design project of semester X.

REFERENCE BOOKS

Babbie, E. *The Practice of Social Research*. third edition. Belmont: Wadsworth Publishing Co., 1983. Book.

Cresswell, J.W. *Research Design: Qualitative and Quantitative Approaches*. Thousand Oaks: Sage, 1994. Book.

De Vaus, D.A. *Surveys in Social Research*. Jaipur: Rawat Publications, 2003. Book.

Dey, I. *Qualitative Data Analysis: A User Friendly Guide for Social Scientists*. London: Routledge, 1993. Book.

Groat, L. & Wang, D. *Architectural Research Methods*. New York: John Wiley and Sons Inc., 2002. Book.

Kothari, C.R. *Research Methodology: Methods and Techniques*. New Delhi: WishwaPrakashan, 2005. Book.

Michelson, William. *Behavioural Methods in Environmental Design*. Stroudsburg, Pennsylvania: Dowden, Hutchinson and Ross, Inc., 1982.

Nachmias, C.F. & Nachmias, D. *Research Methods in Social Sciences*. Great Britain: St. Martin's Press Inc., 1996. Book.

Patton, M.Q. *Qualitative Evaluation Methods*. Newbury Park: Sage Publications, 1980. Book.

Sanoff, H. *Methods of Architectural Programming*. Vol. 29. Dowden Hutchinson and Ross, Inc., 1977. document.

—. *Visual Research Methods in Design*. USA: Van Nostrand Reinhold, 1991.

ELECTIVE II			
Course Code		3201949 [SS]	
Teaching Scheme		ExaminationScheme	
TotalContact Hours per week= (lectures=1, Studio=3, Total=4)		Sessional [CIA 50+EA 50]	100
		In-semester exam	NIL
		End Semester exam	NIL
		TotalMarks	100
		Total Credits	03

Course Objectives:

To allow the students to study a subject of their interest and develop theoretical as well as practical understanding of the same. As mentioned in the course structure of 2019 pattern syllabus [Appendix B] a student may adhere to a particular stream of elective of his/her choice and *nurture his/her area of interest and develop his/her expertise*. However colleges have to ensure that the student does not repeat a particular elective.

Course Outline:

Colleges have to develop course outline for the elective they wish to offer such that theoretical as well practical aspects are covered linking them to the field of architecture. Apart from lectures delivered by the subject resource persons, self study in form of hands on workshop / field work/ review of literature / seminar or any suitable format of learning may be adopted.

Sessional Work:

The submission to be devised by the colleges in form suitable to the elective offered. The format could be [but not limited to] as following.

- Field study reports
- Mapping / documentation / photographic / videographic documentation
- Measured drawings
- Computer based assignments
- Tutorials

Course Specific Outcomes:

Building Services IV	
Course Code	3201950[P] & 3201951 [SS]
Teaching Scheme	Examination Scheme

TotalContact Hoursperweek (lectures=2 Studio=1, Total =3)	Sessional [CIA 25 + EA 25]	50
	In semester exam	30
	End Semester exam	70
	TotalMarks	150
	Total Credits	03

COURSE OBJECTIVES

- To comprehend building services as an integral part of architectural design process
- To obtain knowledge of fire safety provisions and aspects of good acoustics in architectural design

COURSE OUTLINE

- Properties of sound, strategies for reducing noise, aspects of treatments for good acoustical conditions
- Provisions for fire prevention, life safety and fire protection as per NBC 2016-Part 4

TEACHING PLAN

Unit I: Acoustics- 1

- 1.4 Generation and propagation of sound, properties of sound, human hearing ranges
- 1.5 Planning and design to control outdoor noise and indoor noise
- 1.6 Materials and construction for acoustical treatment, NRC and STC ratings

Unit II: Acoustics -2

- 2.1 Parameters for good acoustical conditions
- 2.2 Air and structure borne noise control

Unit III: Acoustics- 3

- 2.5 Reverberation time calculation and recommendation for acoustical treatment
- 2.6 Sound amplification systems

Unit IV: Fire prevention

- 4.1 The fire triangle, causes, impacts, basic terminology
- 4.2 Occupancy based classification of buildings, fire zones, construction types, fire rating requirements
- 4.3 Provisions for emergency power, escape lighting and exit signage, fire/smoke dampers
- 4.4 Provisions related to air conditioning, glazing, interior finishes, fire command centre

Unit V: Life safety

- 5.1 Exit requirements, egress components
- 5.2 Compartmentalisation, provision for basements, gas supply, fire detection and alarm

Unit VI: Fire protection

- 6.1 Fire extinguishers/fixed firefighting installations, static water storage tanks, pump house, automatic sprinkler installations, automatic high velocity and medium velocity water spray systems, fixed foam installation, gas-based suppression system, automatic water mist systems

SESSIONAL WORK

- Tutorials for Units I to VI (50% marks)
- Reverberation time calculations and recommendations for acoustical treatment(25% marks)
- Design for provisions for fire prevention, life safety and fire protection (25% marks)

RECOMMENDED READING

- National Building Code of India 2016
- Architectural Acoustics - M. David Egan
- Architectural Acoustics: Principles and Design - Madan Mehta, James Allison Johnson, Jorge Rocafort
- Auditorium Acoustics and Architectural Design - Michael Barron
- Building Services Handbook- Fred Hall, Roger Greeno.

WORKING DRAWING II			
Course Code		3201952 [SS]	
Teaching Scheme		Examination Scheme	
Total Contact Periods per week (lectures=1, Studio=3, total=4)		Sessional [CIA 50 + EA 50]	100
		In-semester exam	nil
		End Semester exam	nil
		Total Marks	100
		Total Credits	2

COURSE OBJECTIVES:

- To Introduce idea of Design Development and detailing and its relevance in converting 'concept design' to working drawing and hence the realization of design on site.
- To imbibe further the importance of working drawings as an essential tool for effective site execution and execution of a building contract.
- To expose to the standard methods, conventions, drawing annotations including International standards, IS codes, its application in working drawing set with material and component and schedules.

COURSE OUTLINE:

- Lecture demonstration/s to elaborate on standard practices, conventions, graphic annotations, sequencing and cross reference systems of a good working drawing set.

- Design development and detailing of own **design** to resolve the design idea to one which can be executed/ constructed, exposing students to construction parameters, limitation and sequencing.
- Generating a working drawing set for the **chosen design/ building** with framed/composite construction including schedules of material, finishes, components and accessories
- Developing and drafting details of Civil work and furniture/ interior design including schedule of finishes

SESSIONAL WORK:

- Preparing a manually drafted/ CAD generated working drawing set of 'own design project' with carpet area not less than 250 Sq. M. and at least Ground plus one storied building having framed/composite construction. The set to also include at least two civil details out of following.
 - I. Façade / skin of the building with fenestration and weather protection.
 - II. Stairway/ staircase
 - III. Public Washroom
- Interior layout of any one space of about 25sq.m. Area showing furniture layout, fittings, lighting, partitions, reflected ceiling plan to a suitably large scale. And any one construction detail related interior finishes/ custom made furniture of following.
 - I. Suspended ceiling
 - II. Paneling or partitions
- A rough folio comprising of design development drawings, sketches supporting the final working drawing set shall be retained by the candidate.
