

<b>Architectural Design IV</b>		
Course Code	3201935 [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 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

<b>Building Construction and Materials V</b>		
Course Code	3201936[P]&3201937 [SV]	
TeachingScheme	ExaminationScheme	
TotalContact Hoursperweek (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
	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, proportions and 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.

\*\*\*\*\*

<b>Theory of Structures V</b>		
Course Code	3201938 [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 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 ofDividing 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.Provisionfor 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.*

<b>LANDSCAPE ARCHITECTURE</b>		
Course Code	3201939 [SS]	
TeachingScheme	ExaminationScheme	
TotalContact Hoursperweek (lectures=1 Studio=3, Total =4)	Sessional [CIA 50 + EA 50]	100
	In semester exam	
	End Semester exam	
	TotalMarks	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.

<b>ELECTIVE I [CONTEMPORARY ARCHITECTURE]</b>			
Course Code		3201940 [SS]	
Teaching Scheme		Examination Scheme	
Total Contact Hours per week= (lectures=1, Studio=2, Total=3)		Sessional [CIA 50+EA 50]	100
		In-semester exam	NIL
		End Semester exam	NIL
		Total Marks	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 20<sup>th</sup> 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.

<b>Building Services III</b>	
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

<b>WORKING DRAWING I</b>			
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)

\*\*\*

<b>Architectural DesignV</b>		
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

<b>Building Construction and Materials VI</b>		
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 able 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

\*\*\*\*\*

<b>Theory of Structures VI</b>		
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

<b>RESEARCH IN ARCHITECTURE I</b>		
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.

<b>ELECTIVE II</b>			
Course Code		3201949 [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	NIL
		End Semester exam	NIL
		Total Marks	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:**

<b>Building Services IV</b>	
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.

<b>WORKING DRAWING II</b>			
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.

\*\*\*