Course Curriculum

(Course Structure and Syllabi)

for

Bachelor of Architecture

(Second Year Onwards)

Department of Architecture

National Institute of Technology Hamirpur

Hamirpur – 177 005 (India)

SECOND YEAR													
3rd Semester							4th Semester						
SN	Code	Subject	L	T	P/D	Credits	SN	Code	Subject	L	T	P/D	Credits
1	AR-211	Architectural Design-III	3	0	5	6	1	AR-221	Architectural Design-IV	3	0	5	6
2	AR-212	Building Construction & Materials -III	2	0	4	4	2	AR-222	Building Construction & Materials -IV	2	0	4	4
3	AR-213	History of Architecture -III	3	1	0	4	3	AR-223	Building Services-I	3	1	0	4
4	AR-214	Architectural Drawing & Graphics -III	2	0	4	4	4	AR-224	Computer Applications in Architecture	1	0	3	3
5	AR-215	Climate and Built Environment	3	1	0	4	5	AR-225	Geomatics and Measure Drawing	2	0	4	4
6	CE-218	Analysis of Structures	3	1	0	4	6	CE-228	Design of RCC Structures	3	1	0	4
		Total Hours = 32				**26**			**Total Hours = 32**				**25**

THIRD YEAR													
5th Semester							6th Semester						
SN	Code	Subject	L	T	P/D	Credits	SN	Code	Subject	L	T	P/D	Credits
1	AR-311	Architectural Design-V	3	0	5	6	1	AR-321	Architectural Design-VI	3	0	5	6
2	AR-312	Building Construction & Materials-V	2	0	4	4	2	AR-322	Building Construction & Materials-VI	2	0	4	4
3	AR-313	Building Services-II	3	1	0	4	3	AR-323	Building Services-III	3	1	0	4
4	AR-314	Building Estimation, Costing & Specification	3	1	0	4	4	AR-324	Hill Architecture	3	1	0	4
5	CE-318	Design of Steel Structures	3	1	0	4	5	AR-325	Theory of Design	3	1	0	4
6	OET	Open Elective -I	3	0	0	3	6	OET	Open Elective -II	3	0	0	3
		Total Hours = 29				**25**			**Total Hours = 29**				**25**

FOURTH YEAR													
7th Semester							8th Semester						
SN	Code	Subject	L	T	P/D	Credits	SN	Code	Subject	L	T	P/D	Credits
1	AR- 411	Architectural Design-VII	3	0	5	6	1	AR- 421	Office Training	-	-	-	8
2	AR- 412	Building Construction & Materials -VII	2	0	4	4							
3	AR- 413	Landscape Architecture	3	1	0	4							
4	AR- 414	Low Cost Building	3	1	0	4							
5	AR- 415	Ekistics	3	1	0	4							
6	DET	Professional Elective-I	3	1	0	4							
		Total Hours = 30				**26**			**Total Hours = 00**				**8**

FIFTH YEAR													
9th Semester							10th Semester						
SN	Code	Subject	L	T	P/D	Credits	SN	Code	Subject	L	T	P/D	Credits
1	AR- 511	Architectural Design-VIII	3	0	5	6	1	AR- 521	Architectural Design (Major Project)	0	0	16	8
2	AR- 512	Energy Efficient Architecture	3	1	0	4	2	AR-522	Professional Practice	3	1	0	4
3	AR- 513	Urban Design	3	1	0	4	3	AR-523	Research Methodology	3	1	0	4
4	AR- 514	Earthquake Resistant Building Design	3	1	0	4	4	AR-524	Project Management	3	1	0	4
5	DET	Professional Elective- II	3	1	0	4	5	AR-528	General Proficiency	-	-	-	1
		Total Hours = 24				**22**			**Total Hours = 28**				**21**

Professional Elective Courses

Professional Elective-I

AR-430	Art and Architecture
AR-431	Architectural Photography and Journalism
AR-432	Sustainable Vernacular Practices in Himachal Pradesh
AR-433	Building Maintenance

Professional Elective-II

AR-530	Architectural Conservation
AR-531	Housing
AR-532	Sustainable Settlement Pattern for Climate Resilience
AR-533	Interior Design

Course Name: **Architectural Design-III**
Course Code: **AR-211**
Course Type: **Core**

Contact Hours/Week: **3L + 5D** Course Credits: **06**

Course Objective

To train the students to understand the various issues which arise while designing a double storied RCC building.

Unit Number	Course Content	Lectures
UNIT-01	Design of a double storied structure such as Residence/Duplex House, Primary School etc**.**	**18L**
UNIT-02	Design of a Primary Health Center, or Restaurant, etc.	**15L**
UNIT-03	Time Problem of Cyber Café etc.	**3L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Compile and analyze the design of double storey structures.
CO2: Understand the space arrangement in small public buildings.
CO3: Understand the conceptual process of design.

Books and References

1. Building drawing with an integrated approach to Built Environment by M. G. Shah, C. M. Kale, S. Y. Patki, Tata McGraw-Hill Education, 2002.
2. Site Design Graphics by Michael S. Kendall, Van Nostrand Reinhold, 1989.
3. Architectural Graphics, 6th Ed. by Francis D. K. Ching, John Wiley & Sons, 2015.
4. Time-saver Standards for Architectural Design Data: The Reference of Architectural Fundamentals by Donald Watson, McGraw-Hill, 1997.
5. Time Saver Standards for Building Types by John Hancock Calendar, Joseph De Chiara, McGraw-Hill, New York, 1983.
6. Architectural Graphic Standards by Charles George Ramsey, Harold Reeve Sleeper, Bruce Bassler John Wiley & Sons, 2008.

Course Name: **Building Construction & Materials – III**
Course Code: **AR-212**
Course Type: **Core**

Contact Hours/Week: **2L + 4D** Course Credits: **04**

Course Objective

To introduce construction details of various elements of single storied building having load-bearing masonry and foundations.

Unit Number	Course Content	Lectures
UNIT-01	Introduction to binders and plasters such as Cement and Lime, types of pointing. Detailed study of various cement concrete products.	**04L**
UNIT-02	Introduction to Paints and Varnishes. Detailed studies such as manufacturing, types and application of the same. Introduction to popular brand names.	**06L**
UNIT-03	Foundation types: stepped and strip footing. Construction of foundations in brick and stone masonry for load-bearing and toe walls.	**10L**
UNIT-04	Introduction to Lintels, Arches, and Window sills; and their methods of construction. Introduction to various types of staircases with respect to material and shapes.	**04L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand various wall finishes of a load bearing building.
CO2: Learn various foundation types of a load bearing structure and their construction methods.
CO3: Understand various building components such arches, staircases and their construction methods.
CO4: Draw the detailed drawings of load bearing structures.

Books and References

1. The Construction of Buildings, Vol. 1-2-4 by R Barry, Wiley, 2001.
2. Building Construction Metric, Vol. 3 by W.B.Mckay, Orient Longman Private Limited, Mumbai, 2006.
3. Building Construction Illustrated by Francis D.K. Ching, John Wiley& Sons, 2011.
4. Construction Technology, Vol. 1-2-3 by RoyChudley, Roger Greeno, Prentice Hall (UK), 2005.
5. Architectural Graphic Standards by Charles George Ramsey, Harold Reeve Sleeper, Bruce BasslerJohn Wiley & Sons, 2008.
6. Building Construction, 10th Ed. by B.C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, Laxmi Publications PvtLimited, 2008.

Course Name: **History of Architecture– III**
Course Code: **AR-213**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To understand the role of geo-physical, societal, political and technological factors in the evolution of Architecture, and to develop a holistic approach to Architecture as an integral component of the built environment.

Unit Number	Course Content	Lectures
UNIT-01	Study of development of Church plans during the early Christian period with respect to architectural character. Study of Byzantine churches with respect to architectural forms, structural systems, techniques of construction eg -Hagia Sophia. Study of evolution of Romanesque architecture with respect to changes in church plans, elevation features, techniques of construction and structural systems in Italy, France and Germany.	**10L**
UNIT-02	Detailed studies of Gothic Architecture, Cathedrals of Medieval European towns with reference to Architectural characteristics and their comparison to Romanesque period e.g.- Notre Dame. Comparison of Architectural characteristics of Gothic churches in France and England.	**10L**
UNIT-03	Introduction to the basis of Renaissance Movement and its effect on the built environment. Study of the works of Architects of Early Renaissance and High Renaissance.	**08L**
UNIT-04	Introduction to the basis of Baroque and Rococo Movement and its effect on the built environment. Study of works of Architects - Baroque period such as Bernini and Borromini.	**08L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the Early Christian Architecture.
CO2: Understand the origin and evolution of cathedrals and their comparison from different areas.
CO3: Understand the basis of Renaissance Movement and its effect on the built environment.
CO4: Understand the basis of Baroque or Rococo Movement and its effect on the built environment.

Books and References

1. The World of Architecture by Paul Holberton, Chancellor Press, 1997.
2. Baroque India by Jose Pereira, Aryan Books International, New Delhi, 1990.
3. Renaissance Architecture by Jose Pereira,
4. A History of Architecture by Sir Banister Fletcher, CBS Publisher, 1999.
5. A History of Architecture by Spiro Kostof, Oxford University Press, 1995.
6. Encyclopedia of World Architecture by James Ferguson.

Course Name: **Architectural Drawing & Graphics – III**
Course Code: **AR-214**
Course Type: **Core**

Contact Hours/Week: **2L + 4D** Course Credits: **04**

Course Objective

To enable the students to have a better visualization/understanding of a three dimensional entity through Perspective Drawings

Unit Number	Course Content	Lectures
UNIT-01	Introduction to Perspective drawings Introduction, Concept, Terminologies: Cone of Vision; Centre line of Vision;Horizon line; Distortion; Station Point; Visual rays; Picture plane; Ground line; Height line; and Vanishing Points, Types of Perspective projection: One Point Perspective; Two Point Perspective; Three Point Perspective; Box Method; and Centre line Method.	**02L**
UNIT-02	Setting up One Point Perspective Projection Detailed Method: Obtain the required dimensions through orthographic projection, Location of Station Point and Centre line of Vision, Checking Station Point with Cone of Vision, Location of Picture Plane, Location of Vanishing Point, Location of Horizon line, Location of Ground line, Location of True Elevation on the Picture Plane, Location of Perspective lines through points on the True Elevation, Location of Visual rays to locate the various faces of the object in perspective view, and Illustrative practice examples.	**04L**
UNIT-03	Setting up Two Point Perspective Projection Detailed Method: Obtain the required dimensions through orthographic projection, Location of Station Point and Centre line of Vision, Alignment of Centre line of Vision, Checking Station Point with Cone of Vision, Location of Picture Plane, Location of Vanishing Points, Location of Height line, Location of Horizon line and transferring Vanishing points on them, Location of Ground line, Location of height of object on Height line and top and bottom lines of sides in perspective view, Location of Visual rays to locate end points of side of the object in perspective view, Using Visual rays and Perspective lines for plotting the perspective view of the object, and Illustrative practice examples	**06L**
UNIT-04	Setting up Three Point Perspective Projection Detailed Method: Obtain the required dimensions through orthographic projection, Location of Station Point and Centre line of Vision, Preparing elevation at right angles to Centre line of vision (plan position), Location Profile view of the plan position, Modify the plan position w.r.t Profile view, Location of Picture plane in both Plan & Profile view, Location of Vanishing points in both Plan & Profile view, Locating the Horizon line & Ground line, Extending the Ground plane to meet the Ground line, Extending the plan of Centre line of Vision, Locate V.P.1, V.P.2 & V.P.3 in perspective view, Locate line at 450 from intersection of Ground line & Ground plane for transferring points from the profile view to intersect the points from plan projections through Visual rays, Using Visual rays, Vertical & Horizontal projections and Perspective lines complete the perspective view of the object, and Illustrative practice examples.	**06L**
UNIT-05	Shadow projection in Perspective drawing Introduction, Location of Sun w.r.t. the spectator, Terminologies: Vanishing Point Plan; Vanishing Point Actual; Plan of light rays; Method of obtaining true inclination of light ray with ground plane. Detailed method of constructing shadows in Two point Perspective projection: Location of Sight line, Plan location of Vanishing points, Locating Sight lines for obtaining true angle of inclination of the light ray, Locating vanishing point for the actual light rays, Locating shadow of the object through intersection of light rays joining the vanishing point for the plans of light rays to light rays joining the vanishing point for actual light rays, and Illustrative practice examples	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the perspective drawing.
CO2: Prepare One Point perspective drawing.
CO3: Prepare two point perspective drawing.
CO4: Prepare three point perspective drawing.
CO5: Prepare Shadow projection in perspective drawing.

Books and References

1. Rendering with Pen and Ink by Robert W. Gill, Thames & Hudson Ltd., 1984.
2. Creative Perspective by Robert W. Gill, Thames & Hudson Ltd., 1975.

Course Name: **Climate and Built Environment**

Course Code: **AR- 215**

Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

To acquaint students with the concept of climate as a significant determinant of built form.
Familiarization with climate controlling devices.

Unit Number	Course Content	Lectures
UNIT-01	Climatology: role of climate with respect to shelter and importance of building climatology, tropics, climatic zones, macro and micro-climate, elements of climate and climatology data needed for planning of buildings, change of seasons, distribution of global pressure belts & wind movements. Human Comfort: human heat balance and thermal comfort, thermal stress index, effective temperature and bio climatic analysis, interrelationship of climatic elements and psychometric chart	**06L**
UNIT-02	Air Temperature: factors that influence air-temperature - latitude, altitude, seasons, water, trees, areas etc.; thermal conductivity and heat exchange between building and environment, thermal properties of material. Solar Radiation: calculation of solar radiation on building surfaces, solar charts; design and application of shading devices, sun machines and their uses; opaque building elements and heat transfer through this elements, solar gain factor and sol-air temperature. Wind: study of diurnal and seasonal variations, heating and cooling, effect of topography: effect of wind on location of industrial areas, airports and other land-uses and road patterns, air movement in and around buildings, wind eddies, size and position, effect of wind on design and siting of buildings. Precipitation: Water-vapor. Relative-humidity, condensation, rain, fog, snow and architectural responses.	**12L**
UNIT-03	Day-light: glare, amount of light, sky as a source of light and day-light factor, effect of size and shape of openings in different planes with and without obstructions. Orientation and application of climatic principles: siting of buildings with respect of sun, wind and view; climatic design of indigenous shelters in response to different climatic zones in India; Use of landscape elements, evaporative cooling, ground cooling, cavity walls, topography; Ventilation of roof spaces and controlled ventilation.	**09L**
UNIT-04	Example of climate responsive building projects from India and abroad. Introduction to climatic design analysis and building simulation software.	**09L**

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: Understand Climatology & Human comfort and its role in architecture.

CO2: Understand the role of air temperature, solar radiation, wind & precipitation on building design.

CO3: Apply the Climatic principles in their designs.

Books and References

1. Manual of Tropical Housing and Building: Climate Design by O.H. Koenigsberger et.al, Madras: Orient Longman, 1984.
2. Environmental Design by Randall Thomas, Taylor & Francis; 3rd edition, 2006.
3. Microclimatic Landscape Design by Robert D. Brown and Terry J. Gillespie, John Wiley & Sons, 1995.
4. Energy-efficient Buildings in India by Mili Majumdar, TERI Press,
5. Sustainable Building-Design Manual- Volume I & II by TERI Press,
6. Thermal control in passive solar buildings by S.C. Kaushik, G.N. Tiwari and J.K. Nayak, IBT Publishers & Distributors, 1988.

Course Name: **Analysis of Structures**
Course Code: **CE-218**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To understand the principles of Structural Analysis, so that it forms the basis for Structural design.

Unit Number	Course Content	Lectures
UNIT-01	Bending Moment in Beams, theory of simple bending, section modulus, design criterion, bending Moment in symmetrical and unsymmetrical sections, strength of sections. Shear stress In Beams and torsion, shear stress in beams and torsion in symmetrical and unsymmetrical sections,	**10L**
UNIT-02	Fixed and Continuous Beams, review of shear force and Bending Moment diagram for simply supported beam, Effect of continuity, its advantages and disadvantages. Analysis of Continuous Beams for two to four spans, conceptual idea about full and partial loading and fixed end moment using moment distribution method and Theorem of three moments.	**10L**
UNIT-03	Trusses, definition of Truss, Perfect Truss, Imperfect truss, types of Trusses and suitability, analysis of simple trusses by analytical method. Arches, types and behavior of arches with history. Introduction to three hinged arches. Frames, indeterminacy of frames with different end conditions, analysis of frame by portal & cantilever method.	**10L**
UNIT-04	Introduction of basic structural systems in architecture, Tensile structures, Compressive structures, Trusses, Shear structures, Bending structures	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the concept of Bending Moment and Shear stress in Beams.

CO2: Understand the various forces on Fixed and continuous beams and calculate the loading by applying different methods.

CO3: Understand the concept of Trusses.

CO4: Understand the basic structural systems in architecture.

Books and References

1. Strength of Materials by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 2011.
2. Theory of Structures SMTS - II: SI Units by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 2011.
3. Elements of Strength of Materials by Stephen P. Timoshenko and Donovan H. Young, East West, 2003.
4. Strength of Materials by Ramamrutham S., DhanpatRai Publications, 2011.
5. Relevant Design Codes and Design Aids

Course Name: **Architectural Design – IV**

Course Code: **AR-221**

Course Type: **Core**

Contact Hours/Week: **3L + 5D** Course Credits: **06**

Course Objective

To learn various aspects of design on hill terrains.

Unit Number	Course Content	Lectures
UNIT-01	Design of a frame structure: Guest house, Hostel/ Old age home etc. with due emphasis to contextual issues such as topography, local architectural character etc.	**12L**
UNIT-02	Design of Tourist resort, Small Hotel/ Motel etc. Emphasis should be given on climatically and environmentally responsive architecture. Site may be chosen in different climatic conditions of India.	**18L**
UNIT-03	Introduction to Measure Drawings is to be completed in this semester. Measure Drawing exercise to be conducted during next semester.	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the topography and local architectural character of hilly terrain.

CO2: Designing a climate responsive building.

CO3: Understand the Measure drawing techniques.

Books and References

1. Building drawing with an integrated approach to Built Environment by M. G. Shah, C. M. Kale, S. Y. Patki, Tata McGraw-Hill Education, 2002.
2. Planning and Design of Library buildings by Godfrey Thompson, Butterworth Architecture, 1995.
3. Shopping centers by Nadine Beddington, Butterworth Architecture, 1991
4. School Buildings: Planning-Design-Management by A.K.Jain, Management Publishing Company, 1998.
5. Buildings for the Performing Arts: Design and Development guide by Ian Appleton, Routledge, 2012.
6. Time-saver Standards for Architectural Design Data: The Reference of Architectural Fundamentals by Donald Watson, McGraw-Hill, 1997.
7. Time Saver Standards for Building Types by John Hancock Calendar, Joseph De Chiara, McGraw-Hill, New York, 1983.

Course Name:	**Building Construction & Materials – IV**
Course Code:	**AR-222**
Course Type:	**Core**
Contact Hours/Week: **2L + 4D**	Course Credits: **04**

Course Objective

To familiarize the students with methods of detailing different parts of building in RCC.

Unit Number	Course Content	Lectures
UNIT-01	Concrete composition, properties and uses; water cement ratio; grade of concrete; PCC, RCC, light weight concrete and autoclaved aerated concrete etc.	**04L**
UNIT-02	Type of RCC foundations in framed structure – stepped, isolated, combined and cantilevered footing, raft and pile foundation; selection of foundation type as per soil bearing capacity and its improvements; depth and width of foundations; causes and failure and remedies of foundation. Different type of RCC roofs such as flat (one way, two way & continuous), conical & circular slabs. Introduction to various types of RCC staircases. Detailed drawings and construction details to be made for any RCC Stairs. Typical cross-section of a RCC Structure. Introduction to formwork. Excavation and timbering of trenches with special references to loose soil and sub- soil water. Detailed studies of various types of formwork for concrete, Scaffolding and temporary supports and Shoring & Underpinning.	**14L**
UNIT-03	Introduction to cladding materials of interior and exterior walls in various materials such as brick tiles, stones, vitreous tiles, paneling etc. Detailed drawings of their fixing details. Introduction to various materials like P.V.C.,fiber based product, etc. Detailed studies such as properties and application of the same in building industry.	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand RCC as a building material.

CO2: Understand the different components of a RCC framed structure.

CO3: Prepare drawings of a RCC structure.

CO4: Understand the Cladding materials of Interior and Exterior walls in detail.

Books and References

1. Construction Technology, Vol. 1 by Roy Chudley, Roger Greeno, Prentice Hall (UK), 2005.
2. The Construction of Buildings, Vol. 2 by R Barry, Wiley, 2001.
3. Handbook of Architectural details for Commercial buildings by Joseph De Chiara, McGraw-Hill, 1979.
4. Time Saver Standards for Building Materials and systems by Donald Watson, McGraw-Hill, 2000.
5. Time Saver Standards for Interior Design and Space Planning by Joseph DeChiara, Julius Panero, Martin Zelnik, McGraw Hill Professional, 2001.
6. Building Design and Construction Handbook by Merrit, Ricketts, McGraw-Hill Prof Med/Tech,2000.

Course Name: **Building Services – I**
Course Code: **AR- 223**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To familiarize the students with fundamentals of water supply and drainage in building services & their integration with architectural design.

Unit Number	Course Content	Lectures
UNIT-01	Water Supply :- Detailed studies such as sources and treatment of water Water demand & calculations, storage & conveyance of water at municipal level Water supply systems and various fittings Hot and cold water supply layouts Water supply design of a residence: connection with water mains, design of underground &overhead water tanks, pump capacity, calculations for diameter of pipe Introduction to water supply in a multistoried building.	**12L**
UNIT-02	Wastewater :- Definition of sub soil water, storm water, night soil, sewage sanitary, domestic & industrial, sewer, sewerage & waste water. Various drainage & sanitary fixtures & fittings, traps, role of water seal, sizes, materials and their space requirements, water efficient and waterless fixtures Types of pipes and drains in different materials and their usage, diameter of pipes, slope standards inspection and intercepting chambers, manholes etc. Sewage and effluent treatment, innovative and cost effective sanitation concepts e.g. EcoSAN Sewage systems for a small project, wastewater recycling methods e.g. DEWATS etc. Introduction to STP's & ETP's, design calculations of septic tank & soak pit Storm water design calculations for roof top & for surface drains, Rainwater Harvesting & Groundwater Recharge Exercise: Design a layout for a residence for water supply, drainage, sewage and storm water Zero discharge concepts	**15L**
UNIT-03	Solid Waste management- Definition of refuse, garbage, rubbish, sullage. Waste production in India and at Global scale, Waste management techniques	**09L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the fundamentals of water supply to a building.
CO2: Understand the collection & treatment of waste water.
CO3: Understand solid waste management and learn its management techniques.

Books and References

1. Water Supply Engineering by Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 2003.
2. Design & Practical Handbook on Plumbing by Cr Mohan and Vivekanand, Standard Publishers Distributors, 2014.
3. Wastewater Engineering by Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 1998.
4. Environmental Education and Solid Waste Management by A. Nag and K. Vizayakumar, New Age International, 2005.
5. Water and Wastewater Calculations Manual by Shun Dar Lin and C. C. Lee, McGraw-Hill Professional; 2ndedition, 2007.
6. Advances in Water Supply Management: Proceedings of the CCWI '03 Conference, London, 15-17 September 2003, by CedoMaksimovic, David Butler and Fayaz Ali Memon, 2003.

Course Name: **Computer Applications in Architecture**
Course Code: **AR- 224**
Course Type: **Core**

Contact Hours/Week: **1L + 3D** Course Credits: **03**

Course Objectives

At the end of this course the students should be able to create three dimensional objects in space, which can also be used for the purpose of presentation as well as visualization using different rendering techniques.

Unit Number	Course Content	Lectures
UNIT-01	Creating a document file, viewing editing and formatting a document, using graphics in a text document, etc., Report writing, Computation of data & Presentations through relevant Software.	**03L**
UNIT-02	Introduction to 2D tools of CAD Creating Drawings & Using text. Use of Drawing and modify toolbar. Grouping of Objects.	**03L**
UNIT-03	Introduction to Building Information Modeling (BIM). Introduction to other Modeling Software. Introduction to Image Processing Software.	**03L**
UNIT-04	3D Rendering:-Introduction to 3D Rendering, Simulating the Sunlight angle, Adding shadows, Adding Materials and adjusting its appearance, Adding a background scene, Effects with light, Adding Reflections and details with Ray Tracing, Creating and adjusting Texture maps, Adding Landscape and people and Improving your images and editing.	**03L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Improve their report writing & presentation skills.
CO2: Design and compose architectural drawings in CAD.
CO3: Create 3D objects in space.
CO4: Visualize the color, texture and material of different objects.

Books and References

1. Mastering Microsoft Office-2007, CADD Centre, India.
2. Mastering AutoCAD 2010 and AutoCAD LT 2010 by George Omura, Wiley, 2009.
3. Mastering Adobe Photoshop.

Course Name: **Geomatics and Measure Drawing**

Course Code: **AR- 225**

Course Type: **Core**

Contact Hours/Week: **2L + 4P** Course Credits: **04**

Course Objectives

To bring about awareness about the role of Geomatics in architectural and planning projects.

Unit Number	Course Content	Lectures
UNIT-01	Importance of Geomatics, data collection techniques- field surveying. Definition of surveying, basic principles, types of maps, their scales, and uses, surveying equipment namely Levels, Compass, Theodolite, Total Station and Laser based equipments.	**04L**
UNIT-02	Measurements of distance, angles, directions and heights: principles and components of Theodolite, Magnetic Compass, IOP Levels, Auto Levels, Total Station. Contouring: technical terms used in contouring, characteristics of contours, methods of contouring, tracing the contour, gradient for alignment of a roads and paths, uses of contours.	**08L**
UNIT-03	Plane table surveying: Plane table and its accessories, setting and orienting the plane table, methods of plane tabling, advantages and disadvantages of Plane table survey.	**04L**
UNIT-04	Survey drawing of any settlement.	**08L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the Surveying techniques.

CO2: Understand the various equipments and methods for surveying.

CO3: Understand the method of plane table survey.

CO4: Learn practical application of geomatics.

Books and References

1. Surveying- Vol.1 by Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi; Sixteenth edition, 2005.
2. Textbook of Surveying by C. Venkatramaiah, Orient Blackswan; Second edition, 2011.
3. A Textbook of Advanced Surveying by R. Agor, Khanna Publishsers, 2002.
4. Surveying and Levelling by S. C. Rangwala and P. S. Rangwala, Charotar Book Stall, 6th edition, 2011.
5. Advanced Surveying by P. B. Shahani, 2nd edition; Oxford & IBH Publishers Co., 1992.

Course Name: **Design of RCC Structures**
Course Code: **CE- 228**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

To understand the basic properties of RCC as a building material and principles of design of RCC structures.

Unit Number	Course Content	Lectures
UNIT-01	Introduction:- materials, basic properties of concrete and steel, reinforcement, standard loading, characteristics strength, permissible stresses in concrete and steel as per Indian Standard, design philosophies- working method, Ultimate Load Method and Limit state Method.	**06L**
UNIT-02	Limit State Design Method: safety and serviceability requirements, limit states, characteristics material strength and loads and Partial safety factors. Design of Beams: design of singly and doubly reinforced beams including L & T beams for flexure shear, bond and torsion. Design of Compression members: design of short and slender columns. Design of RCC one way & two way slab.	**12L**
UNIT-03	Proportioning of footings: - Square, Rectangular, Circular, Trapezoidal and combined.	**12L**
UNIT-04	Introduction to pre-stressed concrete.	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the basic properties of concrete & steel as per Indian Standards.
CO2: Learn the design of beams, columns and slabs.
CO3: Understand the proportioning of footings.
CO4: Understand the concepts of pre-stressed concrete.

Books and References

1. R.C.C. Designs (Reinforced Concrete Structures) by Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi; Tenth edition, 2006.
2. Reinforced Concrete, 6th Edition by S.K.Mallick and A.P.Gupta, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, 1996.
3. Limit State Design of Concrete Structures by Dr.Ramchandra and VirendraGehlot, Scientific Publishers, 2007.
4. Comprehensive RCC Design by Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi; Tenth edition, 2006.

Course Name: **Architectural Design-V**
Course Code: **AR-311**
Course Type: **Core**

Contact Hours/Week: **3L + 5D** Course Credits: **06**

Course Objective

To understand the traditional construction techniques and to study the design considerations under the broad heading of Barrier Free Environment.

Unit Number	Course Content	Lectures
UNIT-01	Completion of the measured drawing of the building studied in the summer vacations.	**15L**
UNIT-02	Design of a small campus such as Residential school, Museum etc. with emphasis on design with Barrier Free Environment.	**18L**
UNIT-03	Time Problem of District Library, etc.	**3L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Learning of various traditional construction techniques.

CO2: Learning various barrier free design methodologies.

CO3: Learning design methodologies of medium scale public buildings.

Books and References

1. Building drawing with an integrated approach to Built Environment by M. G. Shah, C. M. Kale, S. Y. Patki, Tata McGraw-Hill Education, 2002.
2. Manual of Tropical Housing &Building by O. H Koenigsberger, T. G Ingersoll, Alan Mayhew, S V Szolay, Universities press, 2000.
3. Campus Architecture: Building in the Groves of Academe by Richard P. Dober, 1996.
4. Campus & Community, Moore RubleYudell Architecture and Planning by Rockport Publishers, Inc., 1997.
5. Environmental Design An introduction for architects and engineers by Randall Thomas, Taylor and Francis, 2005.

Course Name: **Building Construction and Materials-V**

Course Code: **AR-312**

Course Type: **Core**

Contact Hours/Week: **2L + 4D** Course Credits: **04**

Course Objective

To understand the constructional aspects of structural steel and its application as various building components.

Unit Number	Course Content	Lectures
UNIT-01	Introduction to structural steel sections, grillage foundation and framed construction. Detail studies such as characteristics of structural steel sections, methods of jointing and its applications of structural members in different parts of building. Introduction to the concept of Mezzanine floor.	**04L**
UNIT-02	Types of industrialized doors and windows: casement window, sliding, revolving, collapsible, rolling shutters, etc. Detailed drawings and construction details of Steel stairs such as Straight flight and Spiral.	**08L**
UNIT-03	Introduction to Structural steel trusses. Detailed drawings and construction details of North light truss, tubular truss, lattice girder along with roof coverings, valleys, gutters etc.	**06L**
UNIT-04	Introduction to various materials, products and hardware for false ceiling, paneling and partitions. Detailed drawings and construction details of false ceilings.	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Identify the various steel sections associated with different structural components.

CO2: Understand the details of industrialized doors and windows in steel.

CO3: Draft the various construction details of steel trusses.

CO4: Understand the details of false ceiling.

Books and References

1. The Construction of Buildings, Vol. 3 4/e PB by R Barry, Wiley, 2001.
2. Building Construction Metric, Vol. 4 by W.B.Mckay, Orient Longman Private Limited, Mumbai, 2006.
3. Building Construction Illustrated by Francis D.K. Ching, John Wiley & Sons, 2011.
4. Construction Technology, Vol. 2-3-4 by Roy Chudley, Roger Greeno, Prentice Hall (UK), 2005.
5. Architectural Graphic Standards by Charles George Ramsey, Harold Reeve Sleeper, Bruce BasslerJohn Wiley & Sons, 2008.
6. Interior Design by Ahmed A Kasu, Om Books, 2005.
7. Time Saver Standards for Interior Design and Space Planning by Joseph De Chiara, Julius Panero& Martin Zelnik, Mcgraw-Hill, 1991.

Course Name: **Building Services-II**
Course Code: **AR-313**
Course Type: **Core**

Contact Hours/Week: **3L+1T** Course Credits: **04**

Course Objective

To familiarize the students with fundamentals of electricity, illumination and acoustics in building services & their integration with architectural design

Unit Number	Course Content	Lectures
UNIT-01	Electrical energy and its generation Electrical distribution systems and safety devices Types of wiring systems, advantages and disadvantages, safety and precautions, Internal wiring, loads, demand, tariffs and rules Types of electrical equipments used in a building such as motors, fuses, switchboards etc. Introduction to Indian Electricity rules related to buildings. Introduction to wiring system in a multistoried building. Detailed studies of the electrical Fittings such as MCB's, ELCB's, fuse units, control panels etc. Standard symbols for various fixtures as per National Building Code 2005 Exercise: Preparing an electrical layout with all necessary details for a small building/residence.	**10L**
UNIT-02	Introduction to Illumination, studies of the same such as various types of artificial lighting Various Terms in lighting, standards of illumination for illumination levels, Types of artificial lighting sources, types of luminaries & fixtures. Comparative efficiency of lighting fixtures. Methods and calculation for lighting design- Inverse Square Law, Cosine Law & Coefficient of Utilization Method.	**16L**
UNIT-03	Introduction to general principles of sound such as Reverberation, Absorption, Reflection, etc.. Introduction to Building acoustics with reference to various building types such as studios, auditoriums etc. Detailed studies of various types of Acoustical materials and their application.	**10L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Learn to plan and draft the electrical layout of a building.

CO2: Identify the need of lighting for various spaces.

CO3: Understand the fundamental principles of sounds and its distribution, various acoustic material used in a building.

Books and References

1. IS 732: 1989 - Code of Practice for Electrical Wiring Installations.
2. Electrical Design & Drawing: with estimation and costing by Surjit Singh, Dhanpat Rai & Co (p) Ltd., 2007.
3. Lighting Design Handbook by Lee Watson, McGraw-Hill Inc.,USA, 1990.
4. Architectural Lighting Design by Gary R. Steffy, Van Nostrand Reinhold, 1990.
5. Fundamentals of Acoustics by Lawrence E. Kinsler, Austin R. Frey, Alan B. Coppens and James V. Sanders, John Wiley & Sons; 4th Edition, 2000.
6. Acoustics in the Built Environment: Advice for the Design Team by Peter Mapp, Peter Sacre, David Saunders and Duncan Templeton, Architectural Press, 1993.

Course Name: **Building Estimation, Costing & Specification**

Course Code: **AR-314**

Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

To familiarize the student with the commonly used methods of preparing estimates of Architectural Projects.

Unit Number	Course Content	Lectures
UNIT-01	Introduction to different types of specification and their uses. Writing specification for civil works of the design project done during the previous Semester starting with excavation, earth work, foundations, damp proof course, brick masonry work, concreting, flooring, plastering, painting, doors and windows, painting, varnishes, sanitary fixtures, electric fixtures etc. Importance of specification as part of contract documents.	**09L**
UNIT-02	Introduction to cost estimation and definitions of related to estimate. Introduction to the types of Preliminary Estimates and their preparation. Introduction to the types of Detail Estimates, methods of details of measurement and their application, item of work , measurement of typical elements, viz., arches, steps, and polygonal rooms. Introduction to Bill of Quantities of Materials for RCC work in slab, beam, column, stair cases etc. Detailed studies to preparation of estimated cost/bill of quantities use of schedule of rates, analysis of rates and break up of material required. Illustrative examples for the same.	**15L**
UNIT-03	Introduction to Standard rates and their derivation from given rates. Case studies/practical expertise in preparing detailed estimates of quantities of materials and analysis of rates of materials and labor for a small residential building.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the cost estimation process of various civil projects.

CO2: Analyze the Schedule of rates for different works in a project.

CO3: Understand the process of preparing specification report for various construction works.

Books and References

1. Estimating and Costing in Civil Engineering by B.N. Dutta, UBS Publishers & Distributors Ltd., 2006.
2. Text Book of Estimating and Costing (Civil Engineering) by G.S. Birdie, Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2015.
3. Cost Planning of Buildings by Douglas J. Ferry, Peter S. Brandon and Jonathan D. Ferry, Wiley-Blackwell; 7theditions, 1999.
4. Building Construction Estimating by Stephen D. Schuette and Roger W. Liska, Mcgraw-Hill College, 1994.

Course Name: **Design of Steel Structures** Course Code: **CE-318** Course Type: **Core**		
Contact Hours/Week: **3L + 1T**		Course Credits: **04**
Course Objective To understand the principles of design of Steel structures, IS:800-2007		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Design of connections in steel Structures: Bolted and welded connections, assumptions, different types of joints, design of various types of welded connections subjected to direct loads and moments.	**06L**
UNIT-02	Design of Tension Members: Selection of sections, IS specifications, design of axially loaded tension members, design of members for axial tension & bending, end connections, IS Code provisions for Lug angles and tension splices.	**06L**
UNIT-03	Design of Compression Members: Theory of buckling, design of column cross sections (single & built up sections); design of angle struts, eccentrically loaded columns. IS Code provisions for column splices, lacing & battens.	**06L**
UNIT-04	Design of Beams: Lateral stability, design of single & built up beams, plated beams and curtailment of flange plates. Design of Roof Trusses: Types of trusses, roofs & side coverage, types of loading and load combinations, design of members & connections.	**12L**
UNIT-05	Case studies of modern steel structures.	**06L**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Understand the designing of the tension members in structure. CO2: Understand the designing of the compression members in structure. CO3: Learn the designing process for beams and roof trusses. CO4: Learn the technical details of the various joints and connections in steel members. CO5: Understand the modern steel structures.		
Books and References 1. Bureau of Indian Standards, IS:800-2007, New Delhi, 2007. 2. Design of Steel Structures by Anand S. Arya and J.L. Ajmani, Nem Chand, 2011. 3. Design of Steel Structure, Volume 2 by D. Ramachandra and Virendra Gehlot, Scientific Publishers, 2013. 4. Design of Steel Structures by P. Dayaratnam, S. Chand Publishing; Reprint Edition, 2007. 5. Design of Steel Structure by Dr. B. C. Punmia, Ashok Kumar Jain and A. K. Jain, Laxmi Publications, 2006. 6. Design and Analysis of Steel Structures by V.N. Vazirani, Khanna Publishers, Delhi, 2012.		

Course Name: **Architectural Design-VI** Course Code: **AR-321** Course Type: **Core**		
Contact Hours/Week: **3L + 5D**		Course Credits: **06**
Course Objective To understand the importance of services and structures in design of building complexes.		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Design of Auditorium, or Hospital etc. with emphasis on structure and services. (Water supply, Electrification, Acoustics, Air conditioning, Firefighting etc.)	**15L**
UNIT-02	Design of a multi-storied office-cum-commercial complex, exhibition pavilions, or industrial buildings, etc.	**18L**
UNIT-03	Time Problem related to acoustical design process.	**3L**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Learn about various services and the provision of spaces for them in a building. CO2: Understand the working of the structure system with respect to design. CO3: Understand the acoustical design process.		
Books and References 1. Landscape Architecture: A manual of Site planning and design by John Ormsbee Simonds, McGraw Hill Professional, 1998. 2. Public Municipal and Community buildings by Charles K. Hoyt, Mcgraw-Hill Book Company, 1978. 3. Commercial Spaces – Cerver by FransciscoAsensio, Rotovision, 1995. 4. Cinema builders by Edwin Heathcote, Wiley-Academy, 2001. 5. Campus Architecture: Building in the Groves of Academe by Richard P. Dober, 1996.		

Course Name: **Building Construction and Materials-VI** Course Code: **AR-322** Course Type: **Core**		
Contact Hours/Week: **2L + 4D**		Course Credits: **04**
Course Objective To familiarize the student with the system of making detailed working drawings required for construction on site.		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Introduction to methodology of preparing working drawings, Systems of dimensioning, writing specifications, etc. Preparation of various working drawings civil work and services of a building.	**08L**
UNIT-02	Preparation of working drawings of toilets, modular kitchen, built- in furniture, Shop fronts, display units, counter (shops, Bank, hotel etc.) and other furniture items.	**08L**
UNIT-03	Introduction to glass as building material; its types, manufacturing process and applications.	**08L**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Understand the various details in a working drawing. CO2: Prepare a detailed drawing for various spaces and components. CO3: Understand the process of manufacturing of glass and its applications.		
Books and References 1. Construction Planning and Management by U.K.Shrivastava, Galgotia Publications, 2009. 2. Building drawing with an integrated approach to Built Environment by M. G. Shah, C. M. Kale, S. Y. Patki, Tata McGraw-Hill Education, 2002. 3. Building Construction Drafting and Design by John Molnar, Van Nostrand Reinhold, 1986. 4. Building Construction Details by Hans Banz, Van Nostrand Reinhold Co., 1983. 5. Building Construction by Sushil Kumar, Standard Publishers Distributors, New Delhi, 2006.		

Course Name: **Building Services-III** Course Code: **AR-323** Course Type: **Core**		
Contact Hours/Week: **3L + 1T**		Course Credits: **04**
Course Objective To familiarize the students with fundamentals of air conditioning, firefighting and vertical Transport systems building services & their integration with architectural design.		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Detailed studies of Natural and Artificial ventilation. Introduction to the concept of Air-conditioning and detailed studies regarding different types of Air-conditioning systems and their working- window, split, Central systems etc.	**12L**
UNIT-02	Introduction to firefighting systems Fire detection, Fire sprinklers, Fire extinguishers and Fire Hydrants system, Their system of working and design calculations	**12L**
UNIT-03	Lifts- Types, Parts, Dimensions and design of lift system in a building Escalators- Types, Parts, Dimensions and design of lift system in a building	**12L**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Understand the concept of ventilation and Air-conditioning system in a space. CO2: Understand how to provide Fire safety in a building. CO3: Understand the various types of lifts and escalators.		
Books and References 1. Heating, Ventilating and Air Conditioning: Analysis and Design, 6th Edition by Faye C. McQuiston, Jerald D. Parker and Jeffrey D. Spitler, John Wiley & Sons, 2004. 2. SP 7: 2005 "National Building Code of India" 3. IS 3534: 1976 "Outline dimensions of electric lifts" 4. IS1860: 1980 "Code of Practice for Installation, Operation and Maintenance of Electric Passenger and Goods Lifts"		

Course Name: **Hill Architecture**
Course Code: **AR-324**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To impart a comprehensive knowledge of the vernacular architecture, historical and environmental aspects for building up on the hills.

Unit Number	Course Content	Lectures
UNIT-01	Historical perspective of hill architecture and its unique attributes and concerns. Major hill settlements in various regions of the world. A broad view of traditional hill architecture of medieval European settlements and other places.	**12L**
UNIT-02	Traditional hill settlements in India. An overview of vernacular hill architecture of Himachal Pradesh. Building Types, techniques and materials of vernacular architecture of Himachal Pradesh. Lessons from vernacular architecture and their time-tested indigenous technology.	**12L**
UNIT-03	Modern buildings on hills in India. Constraints of climate, topography and availability of materials. Design factors such as access, circulation, gradients, slope analysis, grading and interpolation of contours. Structural aspects of modern buildings and necessary safeguards. Environmental and ecological concerns and safeguards.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the importance of hill architecture.
CO2: Learn the vernacular and traditional architecture of Himachal.
CO3: Understand the role of context for modern development.

Books and References

1. The Architectural Heritage of Himachal Pradesh: Origin and Development of Temple Styles", Laxman S. Thakur, Munshiram Manoharlal Publishers, 1996.
2. Environment Protection of Himalaya: A Mountaineer's View by Aamir Ali, Indus Publishing Company, 1998.
3. The Survival of the Himalaya, Eco-systems- A scenario of Unsustainability by Sunder LalBahuguna, Tej Vir Singh and M.L.Sharma.
4. Himalayan Ecology, Transhumance and Social Organization Gaddis of Himachal Pradesh by Veena Bhasin, Kamla-Raj Enterprises, 1988.
5. Ecological Hazards in the Himalayas by S.K. Chadha, Pointer Publishers, 1989.
6. Temples of the Western Himalayas by Penelope Chetwode, The Architectural Review, London.
7. Site Engineering for Landscape Architects by Steven Strom, Kurt Nathan and Jake Woland, Wiley; 6thedition, 2013.

Course Name: **Theory of Design** Course Code: **AR-325** Course Type: **Core**		
Contact Hours/Week: **3L + 1T**		Course Credits: **04**
Course Objective To understand the development of Architecture in 20th century.		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Study of work of the early 20th century architects like Richard Neutra, Philip Johnson, Eero Sarrinen, Oscar Niemeyer, Jorn Utzon, Bruce Goff, P.L. Nervi and other architects. Study of Late and Post Modernism through the work of Richard Meier, Arata Isozaki, Michael Graves, Robert Venturi, Norman Foster, Richard Rogers, Renzo Piano etc.	**12L**
UNIT-02	Introduction to Post Independence (Modern) architecture in India. Contribution of Le Corbusier and Louis Khan. Study of the works done by the pioneers in Indian Architecture: Raj Rewal, Charles Correa, B.V. Doshi, A.P. Kanvinde, Ananth Raje, Louis Kahn, Joseph Allen Stein, U.C Jain, Laurie Baker etc. Study of the works done by Dean D Cruze, Hafeez Contractor, Nari Gandhi, Hasmukh Patel, & Chandravarkar & Thacker,etc.	**12L**
UNIT-03	Study of the works done by Contemporary western architects: Norman Foster, Frank O Gehry, Zaha Hadid, Moshe Safdie, etc.	**12L**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Understand the architectural characteristics of Late and Post Modernism. CO2: Understand the architectural characteristics of Modern architecture in India. CO3: Understand the evolution of architecture from 20th century & architectural styles of various modern architects.		
Books and References 1. A History of Architecture by Sir Banister Fletcher, CBS Publisher, 1999. 2. Housing and Urbanisation: Building Ideas for People and Cities by Charles Correa, Thames & Hudson Ltd., 2000. 3. Documenting Chandigarh by Kiran Joshi, Mapin Publishing, 1999. 4. Modern Architecture: A Critical History by Kenneth Frampton, Thames & Hudson; 4thEdition, 2007. 5. The Details of Modern Architecture (Volume 1) by Edward R. Ford, The MIT Press, 2003. 6. Twentieth Century Architecture: A Visual History by Dennis Sharp, Images Publishing, 2006. 7. Architecture and Independence: The Search for Identity--India 1880 to 1980 by Jon Lang, Madhavi Desai and Miki Desai, Oxford University Press, 1998. 8. Architecture in the Twentieth Century by Peter Gössel and Gabriele Leuthäuser, Taschen, 2001. 9. History of Architecture: From Classic to Contemporary by Barbara Borngasser, ParragonInc; Reprint edition, 2010.		

Course Name:	**Architectural Design-VII**
Course Code:	**AR-411**
Course Type:	**Core**
Contact Hours/Week: **3L + 5D**	Course Credits: **06**

Course Objective

To make the students aware of design issues related to problems of Housing/ Institutional complex in context to Site Planning.

Unit Number	Course Content	Lectures
UNIT-01	Designing & planning of Neighborhood Unit in urban area or suburbs with respect to: Unit orientation, Cluster formation, Open space: size, hierarchy & township. Circulation: Pedestrian, walkway, cycle tracks, hierarchy of roads, road layout system. Integrating building services in a unit cluster.	**18L**
UNIT-02	Design of a University Campus / redevelopment projects etc. Site may be chosen in different climatic conditions in India.	**18L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the basics of neighbourhood planning.

CO2: Understand the basics of campus planning.

Books and References

1. "Mane" A New Initiative in Public Housing, Hudco Publication, New Delhi.
2. Housing and Urbanization by Charles Correa, Thames & Hudson, 2000.
3. Time saver standards for Housing and Residential development by De Chiara, Panero & Zelnik, Tata McGraw-Hill Education, 2009.
4. Time Saver Standards for Building Types by John Hancock Callender, Joseph De Chiara, McGraw-Hill, New York, 1983.
5. Campus Architecture: Building in the Groves of Academe by Richard P. Dober, 1996
6. Campus & Community, Moore Ruble Yudell Architecture and Planning by Rockport Publishers, Inc., 1997.
7. People Places: Design guidelines for urban open spaces by Clare Cooper Marcus, Carolyn Francis (Eds.), John Wiley & Sons, 1998.

Course Name: **Building Construction and Materials-VII** Course Code: **AR-412** Course Type: **Core**		
Contact Hours/Week: **2L + 4D**		Course Credits: **04**
Course Objective To make the students learn about all the aspects of advanced building construction techniques.		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Introduction to advanced structural forms like shell structures, Pneumatic Structure, geodesic domes, space frames, filler slab, waffle slab, coffer slab, flat slabs and folded plates.	**08L**
UNIT-02	Detailing of structural glazing, curtain walls, triple glazing windows, aluminium composite panels, etc. Details of aluminium doors and windows, and roof gardens.	**08L**
UNIT-03	Prestressed Concrete Structures: Introduction, method of pre – stressing, losses of prestress, designing of rectangular beams. Introduction of Prefabrication- Advantages and disadvantages of on-site and off-site prefabrication; Prefabrication in Indian construction industry. Emerging trends in building construction and materials.	**08L**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Learn the different types of advanced structural systems. CO2: Understand the working and joinery details of glass and aluminum sections. CO3: Learn the importance of pre- fabrication and prestressed components of buildings.		
Books and References 1. Steel Structure and Architecture by Arne Petter Eggen, Bjørn Normann Sandaker, Whitney Library of Design, 1995. 2. Structural Analysis and Design of Tall buildings by Bungale S. Taranath, CRC Press, Florida, 2012. 3. Handbook of Designing and Installation of services in Building complex by Highrise Buildings, V.K.Jain, Khanna Tech., 1990. 4. Building Structures by James Ambrose, Patrick Tripeny, John Wiley & Sons, 2011. 5. Handbook of Building Construction, Vol-1&2 by MM Goyal, Thomson Press, 2006.		

Course Name: **Landscape Architecture**
Course Code: **AR-413**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

This course is aimed at providing a comprehensive knowledge regarding ecological aspects and environmental concerns in landscape design besides the advanced knowledge of elements of landscape design.

Unit Number	Course Content	Lectures
UNIT-01	Introduction to the elements of landscape such as Earth form, Water and Vegetation, etc. and their effects in relation to the built environment. Plant types, characteristics, structure and color of foliage.	**06L**
UNIT-02	History, nature, scope and purpose of designed open space. Exposure to historical landscape (English, French, Italian, Chinese, Japanese, Mughal, Ancient India) and their relevance in their time, context and social needs. Introduction to ecology and its importance to Landscape designers.	**06L**
UNIT-03	Site analysis and site structure unity. Advanced knowledge of elements of Landscape Design and their effects in context to the environmental concerns. Basic knowledge of contour/mapping and various methods of documentation of physical features, topography and landscape elements.	**12L**
UNIT-04	Case studies of varied urban situations having typical landscape characters. Study of Chandigarh and Delhi region to analyze and assess their present landscape status by applying knowledge and techniques acquired as above. Landscape design proposal based on above mentioned analysis as an exercise.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the elements of landscape.
CO2: Understand the origin and evolution of landscape design.
CO3: Understand importance of site analysis.
CO4: Apply process of landscape design.

Books and References

1. Time-saver standards for landscape architecture: design and construction data by Nicholas T. Dines, Kyle D. Brown; McGraw-Hill, 1998
2. Landscape design: a practical approach by Leroy G. Hannebaum; Reston Pub. Co., 1981
3. Landscape design: an international survey by Ken Fieldhouse; Overlook Press, 1993
4. Landscape Detailing, Micheal Littlewood; Routledge, 2001
5. Planting Design by Theodore D. Walker; John Wiley & Sons, 1991
6. Landscape Architecture Construction by Harlow C. Landphair, Fred Klatt; Prentice Hall PTR, 1999
7. Landscape As Inspiration by Hans Dieter Schaal; Academy Editions, 1994
8. Introduction to Landscape Design by John L. Motloch; John Wiley & Sons, 2000
9. Landscape Architecture: A Manual of Site Planning and Design by John Ormsbee Simonds; McGraw Hill Professional, 1998
10. Trees of Chandigarh by Chhatar Singh, Rajnish Wattas, Harjit Singh Dhillon; B.R. Publishing Corporation, 1998

Course Name: **Low Cost Building**
Course Code: **AR-414**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To make the students aware of the use of conventional and non-conventional resources for low cost construction.

Unit Number	Course Content	Lectures
UNIT-01	Need for low cost construction, both in the rural and the urban sectors. An introduction to various building techniques adopted in different climatic zones of the country, which result in varied vernacular expressions. Use of cost effective technologies including the use of local materials, up gradation of traditional technologies, prefabrication etc.	**15L**
UNIT-02	Innovations of building techniques for low cost construction. Analysis of space norms for low cost buildings.	**09L**
UNIT-03	Study of usage pattern of low cost buildings by the habitants. Comparative analysis of building materials and costing. Works of Laurie Baker, Hassan Fathy and other prominent architects.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand low cost building materials and techniques in construction.

CO2: Learn the space norms for low cost buildings.

CO3: Understand the works of architects working in field of Low cost buildings.

Books and References

1. Building Systems for Low Income Housing by Ashok Kumar Jain; Management Publishing House, 1992

2. Low Cost Housing in Developing Countries by Guru Charan Mathur; For Centre for Science & Technology of the Non-Aligned and Other Developing Countries, Oxford & IBH Publishing Company, 1993

Course Name: **Ekistics**
Course Code: **AR-415**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

This course intends to develop an understanding the evolution of settlement planning.

Unit Number	Course Content	Lectures
UNIT-01	Introduction: Meaning and Scope in Relation to town planning and architecture. Settlement patterns in later periods of history; Changing form and pattern of human settlements in ancient, medieval, colonial and modern India.	**06L**
UNIT-02	Role and contribution of the following towards contemporary town planning thought- Patrick Geddes, Patrick Abercrombie, Daniel Burnham, Soria Y Mata, Frederick Olmstead, Ebenezer Howard, Clarence Perry, Clearance stein, CA Doxiadis, Le Corbusier, Frank Lloyd Wright	**12L**
UNIT-03	Globalization and its impact on cities – Urbanization, emergence of new forms of developments – self sustained communities – SEZ – transit development – integrated townships – case studies. Scope and Content of Master plan – planning area, land use plan and Zoning regulations – zonal plan – need, linkage to master plan and land use plan – planned unit development (PUD) – need, applicability and development regulations - Urban Renewal Plan – Meaning, Redevelopment, Rehabilitation and Conservation – JNNURM – case studies. Definition and explanation of the concepts of density, FAR, land use and zoning.	**12L**
UNIT-04	Emergence of the metropolitan phenomenon; Planning problems of cities and Solutions Rural and regional Systems: The rural-urban relationships; Problems of rural systems.	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the process of evolution of a settlement of various historical settlements.
CO2: Identify the role of settlements growth in Modern day town planning and various new forms of developments.
CO3: Learn about the technicalities in drafting a Master plan and implementation of various government schemes.
CO4: Understand the concept of design regulations like FAR, land use etc. and various problems of rural and urban cities.

Books and References

1. Ekistics - An Introduction to the Science of Human Settlements by C.L. Doxiadis, Hutchinson, London, 1968.
2. Housing and Urban Renewal by Andrew D. Thomas, George Allen and Unwin, Sydney, 1986.
3. Ministry of Urban Affairs and Employment by Government of India, New Delhi, 1999.
4. Town and Country Planning by Patrick Abercrombie, 3rd Edition, Oxford University Press.
5. Design of Cities by Edmund N. Bacon, Penguin Books; Revised edition, 1976.
6. An Introduction to Town & Country Planning by A.J. Brown and H.H. Sherrard, Angus and Robertson, Sydney, 1969.

Course Name: **Office Training** Course Code: **AR-421** Course Type: **Training**		
Contact Hours/Week: **-**		Course Credits: **8**
Course Objective To make student learn the intricacies of Architectural Profession by joining and working with practicing Architect registered with the CoA, New Delhi or Architect's registering authority of the respective country. The training will be of 16 – 18 weeks minimum.		
WORK TO BE DONE	**Course Content**	**Lectures**
DURING OFFICE HOURS	The work to be done during office hours will include: Drafting, Tracing, Sketch designs, Presentation drawing, Perspectives, Models, documentation etc. Working Drawing and details. Preparing a study report on Building design, Analysis incorporating Site visits, recording Observations etc.	**-**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Learn from firsthand experience of work done by professionals and industry experts. CO2: Experience and gain Knowledge of changing industrial needs. CO3: Develop better group working abilities.		

Course Name: **Architectural Design - VIII**

Course Code: **AR-511**

Course Type: **Core**

Contact Hours/Week: **3L + 5D** Course Credits: **06**

Course Objective

To make the students aware of Urban Design issues.

Unit Number	Course Content	Lectures
UNIT-01	Design an urban design scheme for any urban problem with emphasis to contextual issues. Design & plan of Urban agglomeration, Urban Haat etc.	**18L**
UNIT-02	Design of a Transport Terminal, Convention centre etc.	**18L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand urban spaces and theories.

CO2: Design an urban facility.

Books and References

1. The Image of the City by Kevin Lynch, The MIT Press, First Edition, 1960

2. The Urban Pattern: City Planning and Design by Arthur B. Gallion & Simon Eisner, Van Nostrand, Second Edition, 1963

3. People Places: Design Guidelines for Urban Open Space by Clare Cooper Marcus & Carolyn Francis, Van Nostrand Reinhold Company, First Edition, 1990

4. Urban Design: Green Dimensions by J.C. Moughtin & Peter Shirley, Architectural Press, First Edition, 1996

5. City Planning: Arco colour Urban Architecture (Arco colour collection) by Asensio Cerver& Francisco, Arco Editorial, 1996

Course Name: **Energy Efficient Architecture**

Course Code: **AR-512**

Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To familiarize the students with role of energy in built environment and ways to achieve energy efficiency in design process.

Unit Number	Course Content	Lectures
UNIT-01	Types, availability and resources of conventional and non-conventional energy sources. Energy Conservation, Indian Energy Conservation Act 2001 Features, Energy Star Rating of buildings and equipment's, Bureau of Energy Efficiency.	**12L**
UNIT-02	Energy Conservation Building Code (ECBC). Energy Building Code, Guidelines: Thermal Insulation, Heating, Ventilation and Air-Conditioning System, Building Lighting Design: lighting levels, efficient light options, CFL, LEDs, Fixtures, Day lighting timers, Building Energy Management.	**12L**
UNIT-03	Introduction to Building rating systems in India. Detailed study on LEED and GRIHA (Green Rating for Integrated Habitat Assessment). Case study: National and International examples.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the concept and need of energy efficiency.

CO2: Understand ECBC, ECA 2001, LEED, GRIHA.

CO3: Learn the different case studies on energy efficient buildings in India and abroad.

Books and References

1. Renewable Energy Sources and Their Environmental Impact by Shahid A. Abbasi, NaseemaAbbasi; PHI Learning Pvt. Ltd., 2004

2. Energy efficient buildings: architecture, engineering and environment by Dean Hawkes, Wayne Forster; W.W. Norton & Company, 2002

3. Indian Energy Conservation Act 2001, GoI

4. Energy Conservation Building Code Manual, GoI

5. GRIHA Manuals, The Energy and Resources Institute (TERI), 2011

6. Energy-efficient Buildings in India, The Energy and Resources Institute (TERI), 2001

Course Name: **Urban Design** Course Code: **AR- 513** Course Type: **Core**		
Contact Hours/Week: **3L + 1T**		Course Credits: **04**
Course Objectives To understand the principles and applications of urban design.		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Introduction to Urban Design, its Principles and Techniques, Scope of Urban Design. Emergent concepts in Urban Design, History & Heritage of Urban Design. Urban Design vocabulary, Elements of Urban Design. Concept of Urban Redevelopment, Urban Renewal and Urban Regeneration.	**08L**
UNIT-02	Importance of context in Urban design (Context analysis, regional study and project understanding). Impact of Factors such as economy, politics, religion and regional on urban design. Gentrification and social Imbalance. Concepts to be kept in mind (Gender issue, elderly People and Child) while designing. Study of Futuristic city and new urbanism.	**08L**
UNIT-03	Concept of Neighbourhood planning. Study of existing urban developments. Urban design exercises.	**20L**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Understand the introduction to urban design CO2: Understand the concepts of urban design CO3: Understand urban spaces and theories		
Books and References 1. Urban Design: Green Dimensions by J. C. Moughtin& Peter Shirley, Architectural Press, First Edition, 1996 2. A New Theory of Urban Design (Center for Environmental Structure Series, Vol 6) by Christopher Alexander, HajoNeis, Artemis Anninou& Ingrid King, Oxford University Press, 1987 3. The Urban Design Handbook: Techniques and Working Methods by Ray Gindroz, Urban Design Associates,2003 4. Urban Design: Street and Square by J. C. Moughtin, Architectural Press ,Third Edition", 2003 5. Urban Spaces, No. 4 by John Dixon, Visual reference publication, 2006		

Course Name: **Earthquake Resistant Building Design**
Course Code: **AR- 514**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

To let the students understand the terminology used in Earthquake and its effects on structural and non-structural elements.

Unit Number	Course Content	Lectures
UNIT-01	Earthquake occurrence in the world, plate tectonics, faults, earthquake hazard map of India and the states. Causes of earthquake, seismic waves, magnitude, intensity, epicenter and energy release, characteristics of strong earthquake ground motion.	**09L**
UNIT-02	Earthquake effects: On ground, soil ruptures, liquefaction and landslides. Behavior of various types of Buildings, structures, power plants, switchyards, equipments, life lines and collapse patterns. Behavior of Non-Structural Elements like services, fixtures, mountings.	**09L**
UNIT-03	Building forms: Horizontal and Vertical eccentricities, mass and stiffness distribution, soft storey, etc. Plan and vertical irregularities, redundancy and setbacks. Concept of Seismic design, stiffness, strength period, ductility, damping, hysteric energy dissipation, center of mass, center of rigidity, torsion, design eccentricities. Ductility based design: Design of energy absorbing devices. Seismic based isolation and seismic active control. Contemporary international approaches.	**09L**
UNIT-04	Introduction to various IS codes. Various types and construction details of Foundation, Soil stabilization, retaining walls, underground and overhead tanks, staircases and isolation of structures.Methodologies for seismic retrofitting.	**09L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the concept of earthquake and its effect on buildings

CO2: Understand the building forms and seismic design

Books and References

1. Disaster Management in the Hills by Dr. Satendra, Concept Publishing Company, 2003.
2. Disaster Management by Harsh K. Gupta, Universities Press, 2003.
3. Natural Hazards and Disaster Management: Vulnerability and Mitigation by R. B. Singh, Rawat; Reprint edition, 2006.
4. Proceedings of the National Conference on Disaster & Technology, 1998, Manipal, India", NirmitaMehrotra, 1998.
5. Disaster Risk Reduction in South Asia by Sahni, Pardeep, Ariyabandu and Madhavi Malalgoda, PHI Learning, 2003

Course Name: **Architectural Design (Major Project)** Course Code: **AR-521** Course Type: **Core**		
Contact Hours/Week: **0L + 16D**		Course Credits: **08**
Course Objective To make student synthesize and use knowledge of various disciplines gained during entire study in an architectural project of his choice.		
STAGES	**Course Content**	**Lectures**
STAGE-01	Site Analysis, Case Studies, Data Analysis, Library study, tentative space requirement in the form of rough report. Concept, Pre-Final design proposal and Block Mode on drawing sheets. Stage-01 to be evaluated during mid semester.	-
STAGE-02	Detailed working drawings showing any two of the following services: Air-conditioning, Landscape, Structure, Interior detailing, Water supply & Sanitation or any other detail (Drawing sheets). Hard Bound report on A4 size paper. Final design proposal along with model/views. Stage-02 to be evaluated in the end semester	-
Course Outcomes Upon successful completion of thesis, the students will be able to CO1: Improve upon their creative and technical skills. CO2: Understand user and project requirements. CO3: Develop a good understanding of building services and its integration into the design.		

Course Name: **Professional Practice**
Course Code: **AR-522**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

Introduction to the professional, vocational and legal aspects of architectural practice and profession

Unit Number	Course Content	Lectures
UNIT-01	Architectural professional association, its role and responsibilities. Introduction of Architects Act 1972. Council of Architecture – its role and responsibilities. Code of professional conduct. Condition of engagement and scale of professional fees. Copyright Act as applicable to architectural work. Architectural competitions.	**12L**
UNIT-03	Contract –Types, Preparation of contract documents general conditions of contract, interim certificates defect liability period, retention amount and virtual completion. Duties and liabilities of architects, contractors. Articles of agreement, execution of work payment and Arbitration. Tenders – types and the process of calling, security and selection system. Pre- Tender qualifications and registration of contracts. Office organizations and management, Role of design staff and supporting managerial staff; Personal management.	**12L**
UNIT-04	Human Values: Morals, Values and Ethics, Integrity, Work Ethics, Service Learning, Civic Virtue, Respect For Others, Living Peacefully, Caring, Sharing, Honesty, Courage, Valuing Time, Co-Operation, Commitment, Self Confidence, Spirituality. Professional Ethics: Senses of 'Professional Ethics', Variety of model issues, types of inquiry, Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan theory, Consensus and controversy, Profession and Professionalism, Professional Ideals And Virtues, Theories About Right Action, Self-Interest, Customs And Religion, Uses Of Ethical Theories. GLOBAL ISSUES: Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors - moral leadership. Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island and Chernobyl case studies.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to:

CO1: Develop a good understanding of professional practices employed in design process and construction of projects.

CO2: Develop a comprehensive understanding of the obligations and responsibilities as a professional to the clients.

Books and References

1. Ethic in Engineering by Mark Martin and Roland Schinzinger, Mecgrew hill,1999
2. Architects Handbook, A Ready Reckoner by CharanjitS.Shah, 2000
3. Town Planning by Rangwala, 2001
4. Handbook on Professional Practice by The Indian Institute of Architects.
5. Professional Practice by Roshan Namavati, 2004
6. Estimation, Costing and Valuation (Professional Practice) by Rangwala, 2002
7. Directory of Architects, List of Architects and Professional documents by Council of Architecture
8. Professional Practice & Management by Apte V S

Course Name: **Research Methodology** Course Code: **AR- 523** Course Type: **Core**		
Contact Hours/Week: **3L + 1T**		Course Credits: **04**
Course Objectives To appreciate the process of research and make the students aware of its potential in the field of architecture.		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Research in architecture – its nature, purpose and scope. Basic and applied research. Technical and behavioural – oriented research.	**09L**
UNIT-02	Science and scientific method – various steps in scientific method: hypothesis, research design, data collection & analysis, conclusion and implications with special reference to architectural research.	**12L**
UNIT-03	Methods of conducting research. Selection of topics and its relevance. Identification and formulation of problem. Compiling and analyzing existing research database. Research design, research instruments and analysis. Presentation of results. Evaluation of findings, conclusions and recommendations. Techniques of research – report writing.	**15L**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Understand the importance of research in architecture. CO2: Learn the methodology followed in research.		
Books and References 1. Research : How to Plan, Speak and Write about it by C. Hawkins & M. Sorgi, Springer-Verlag, 1985 2. Research Methodology by Rajagopalan, Mathews and Ramamurthy		

Course Name: **Project Management** Course Code: **AR- 524** Course Type: **Core**		
Contact Hours/Week: **3L + 1T**		Course Credits: **04**
Course Objectives To let the students understand the onsite problems related to building construction and causes of delay in construction, as well as to inculcate the skills as a team manager.		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Aim, objectives and functions of Construction Management. Construction stages, Construction team Role of an architect in construction management. Management techniques and tools.	**12L**
UNIT-02	Bar charts and limitations of bar charts. Program Evaluation and Review Techniques (PERT). Critical Path Method (CPM) for project management. Development and analysis of CPM net work. Cost time analysis in network planning. Scientific methods of construction management.	**12L**
UNIT-03	Project management for repetitive types of buildings. Line of balance method – its working knowledge with exercises. Resource scheduling methods through Bar charts, CPM and Line of Balance method. Inspection and quality control. Safety in Construction.	**12L**
Course Outcomes Upon successful completion of the course, the students will be able to CO1: Learn the techniques of project management. CO2: Understand the role of an architect in construction management. CO3: Understand the safety measure to be followed in construction.		
Books and References 1. Construction Planning and Management by U.K.Shrivastava 2. Total Construction Project Management by George J Ritz		

Course Name: **Art and Architecture** Course Code: **AR-430** Course Type: **Professional Elective-I**		
Contact Hours/Week: **3L + 1T**		Course Credits: **04**
Course Objectives This course covers topics on in the development of human settlements in relation to infrastructure. The objective of the course is to make students aware about infrastructure as important part in analyzing planning problems.		
Unit Number	**Course Content**	**Lectures**
UNIT-01	Introduction to application of art in Architecture, purpose of Applied Art, Principles and nature. Paintings, Murals and Sculptures; Materials and techniques study of styles and changing trends in India from ancient times.	**12L**
UNIT-02	Decorative elements such as Jali Design; Inlay work; Relief art work; Study of changing needs in different periods- Dravidian, Gandhara, Gupta, Mughal, Rajput; Materials and techniques. Application of colors and textures in sculptures, murals, paintings, fountains etc., psychological effects of colors and textures. Art expression, appreciation and symbolism; two and three dimensional forms; Aesthetic order; functional Importance.	**12L**
UNIT-03	Interior and exterior space organization, graphic techniques of communication, form-space relation. Modern trends in applied art, contribution of science and technology in terms of new materials. Styles and techniques of modern masters.	**12L**
Course Outcomes Upon successful completion of the course, the student will be able to: CO1: Develop an artistic understanding. CO2: Learn compositions, color combinations and geometric patterns. CO3: Learn the style and techniques around the world.		
Books and References 1. Architecture/ Art/ Parallels/ Connections- Barry A. Berkus AIA, the Image Publication Group Pvt. Ltd. 2. Design Fundamentals by Scott R.G.; McGraw Hill, 1951 3. Prebles' Artforms: An Introduction to the Visual Arts by Patrick Frank, Duane Preble, Sarah Preble; Pearson College Division, 2013 4. Architecture: Form, Space, and Order by Francis D. K. Ching; John Wiley & Sons, 2014		

Course Name:	**Architectural Photography and Journalism**
Course Code:	**AR-431**
Course Type:	**Professional Elective-I**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

This course covers topics on in the photography in relation to Architecture & Journalism. The objective of the course is to make students aware about the importance of visual analysis of the architecture and its interpretation through journalism.

Unit Number	Course Content	Lectures
UNIT-01	General introduction to the art of photography; concept of color; concepts of lighting, distance, visual angle, Frames; media.	**12L**
UNIT-02	Types of camera, properties and priorities; Exposure, Aperture, Speed; Photographic films, Film processing color, black and white, printing techniques, developing.	**12L**
UNIT-03	Analysis of recent historical and contemporary examples of written and journalistic criticism of architecture, including selected writings by Indian and overseas critics; discursive techniques, analysis of major critical themes, thematic categories in architectural writing over the past three centuries. Works of Indian and international writers and critics will be presented and discussed. Seminars on Indian architectural writers, journalists and critics. Exercise on integrating photography in architectural journalism.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the basics of architectural photography.

CO2: Explore the field of architectural journalism.

Books and References

1. Professional Secrets of Advertising Photography by Paul Markow; Amherst Media, 1998
2. Encyclopaedia of practical photography, Eastman Kodak Company; Amphoto, 1979
3. The New 35mm Photographer's Handbook: Everything You Need to Get the Most Out of Your Camera by Julian Calder, John Garrett; Three Rivers Press, 1999
4. Digital Photography for Dummies by Julie Adair King;John Wiley & Sons, 2012

Course Name:	**Sustainable Vernacular Practices in Himachal Pradesh**
Course Code:	**AR-432**
Course Type:	**Professional Elective-I**
Contact Hours/Week: **3L + 1T**	Course Credits: **04**

Course Objective

To make students aware about traditional/vernacular best practices of built-form and its transformation for mitigating climate change impact in hilly region.

Unit Number	Course Content	Lectures
UNIT-01	Hill architecture and its unique attributes and concerns. Major hill settlements in various districts of Himachal Pradesh. A broad view of sustainable vernacular hill architecture.	**12L**
UNIT-02	Building Types, techniques and materials of vernacular architecture of Himachal Pradesh. Study of vernacular construction techniques of Himachal Pradesh; Koti Banal Architecture (Kath-Kuni), Thathara houses, Dhajji construction etc. Resilience of Vernacular construction techniques.	**12L**
UNIT-03	Vernacular & Contemporary Construction techniques as adopted in the Zone-4 & 5, of Earthquake region of the Himachal State. Study of Vernacular/village settlement of hilly region preferably Himachal Pradesh.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the Vernacular practices in Himachal Pradesh.

CO2: Analyze the sustainability of vernacular construction techniques.

CO3: Understand to resilience of vernacular construction techniques.

Books and References

1. Mud wall construction in Spiti Valley (Himachal Pradesh) by W. H. Encyclopedia, 2012.
2. World Housing Encyclopedia HOUSING REPORT Dry stone construction in Himachal Pradesh Housing Sub-Type Stone Masonry House: Rubble stone without mortar by Sood, A. Rahul, Y. Singh, and D. H. Lang, 2013.
3. Timber-reinforced Stone Masonry (Koti Banal Architecture) of Uttarakhand and Himachal by P. Rautela, G. C. Joshi, Y. Singh, and D. Lang, World Hous. Encycl., 2008.
4. DHAJJI CONSTRUCTION: For one and two storey earthquake resistant houses - A guidebook for technicians and artisans by T. Schacher and Q. Ali 2009.

Course Name: **Building Maintenance**
Course Code: **AR-433**
Course Type: **Professional Elective-I**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To understand historical building types and their conservation and a thorough knowledge of Building Maintenance can substantially contribute towards adequacy of design and suitability of materials.

Unit Number	Course Content	Lectures
UNIT-01	Introduction: Maintenance defined. Need and Importance of building maintenance. Its economic and social significance. Categories of maintenance: Planned maintenance, preventive maintenance, running caretaker maintenance, PWD patter of maintenance; A/R and S/R, maintenance cycles, maintenance profiles.	**12L**
UNIT-02	Maintenance Generators: Climatic conditions; usages, defects in original design/construction, changing standards and tastes. Maintenance standards, determinants of maintenance standards, statutory standards, defective premises act, building bylaws & act, legislative controls, building & housing act. Organizing Maintenance; Managing maintenance, Financing & Budgeting for maintenance. Understanding technology and techniques involved in maintenance. Execution of maintenance work. Controlling costs. Information systems in maintenance. Inspections: annual, periodical, special, checklist and proformas.	**12L**
UNIT-03	Creating database for maintenance, maintaining building registers, inventories, inspection reports, records, User complaints, buildings in danger. Understanding building defects & ailments, examining symptoms of various types and patterns of buildings disease and ailments, structural, non-structural finishes, stains, services ailments, leakages & dampness, corrosion protection, Sulphate attacks. Diagnosing & determining causes, prescribing effective remedial action.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the importance of building maintenance.
CO2: Learn the standards, financing, and budgeting for maintenance.
CO3: Diagnose the causes of building defects and apply the ailment methods.

Books and References

1. Repair and Renovation of Modern Buildings by Ian Chandler
2. A Manual of Maintenance Engineering by B. S.Nayak
3. Maintenance and Repairs of Buildings by P.K.Guha
4. Building Services Handbook by Hall, Fred

Course Name: **Architectural Conservation**
Course Code: **AR-530**
Course Type: **Professional Elective-II**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To equip students to deal with Architecture conservation, along with the related design issues of existing Architecture, old Monuments, and natural and urban heritage areas.

Unit Number	Course Content	Lectures
UNIT-01	Interactive session of History of heritage Buildings and cities. Introduction to conservation of Historic Buildings. The concepts and approach's to conservation in India and other countries.	**12L**
UNIT-02	Institutional Aspects of Conservation, Conservation related Charters, World Heritage legislation. Conservation Acts & Legislation and Archaeological Acts	**12L**
UNIT-03	Conservation Area practice, adaptive reuse, up gradation programs in old areas, infill design. Conservation of traditional water systems. Upgrading infrastructure, financing and implementation framework for redevelopment and revitalization projects.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Learn the history of heritage buildings.
CO2: Understand the legislations and acts on Conservation.
CO3: Understand the Conservation related Charters
CO4: Understand the methods of conservation of heritage buildings and sites.

Books and References

1. Architecture in Conservation: Managing Development at Historic Sites (Heritage: CarePreservation - Management) by James Strike
2. Protection, Conservation and Preservation of Indian Monuments by Shanti Lal Nagar
3. Architectural and urban conservation by Santosh Ghosh, Ranajit Gupta, and Sumita Gupta
4. History of Architectural Conservation by Jukka Jokilehto

Course Name: **Housing**
Course Code: **AR-531**
Course Type: **Professional Elective-II**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To equip students to deal with housing, along with the related issues of existing Housing stock and its future requirement.

Unit Number	Course Content	Lectures
UNIT-01	Introduction to housing & human settlements, Housing policies and programs, settlements in the development of human civilization, role of Housing in social and economic development of the nation. Housing in five-year plans & Social Housing plans. National housing Policy	**12L**
UNIT-02	Major elements of housing policy: land, finance, material, technology & legislation. Development concepts and human settlement planning. Slum area development.	**12L**
UNIT-03	Housing design & standards, units of housing design form and structure of housing as shaped by Socio-economic and physical parameters, housing systems & sub systems. Partial and integrated environment quality; post occupancy evaluation, housing Satisfaction, housing demand and policy analysis.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand theories of human settlement.
CO2: Learn the government policies and programs on Hosing development.
CO3: Apply the methods of housing planning.

Books and References

1. Developing Affordable Housing: A Practical Guide for Nonprofit Organizations by Bennett L. Hecht (1990), Wiley Nonprofit Law Finance and Management Series
2. The Housing Boom and Bust by Thomas Sowell (2009)
3. The Architecture of Affordable Housing by Sam Davis (1995)
4. Housing and Dwelling: Perspectives on Modern Domestic Architecture by Barbara Miller Lane (2009)
5. Affordable Housing and Public Policy: Strategies for Metropolitan Chicago (Assembly Book) by Lawrence B. Joseph (Editor)

Course Name: **Sustainable Settlement Pattern for Climate Resilience**
Course Code: **AR- 532**
Course Type: **Professional Elective II**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

To explore the existing vernacular settlement pattern for climate resilience and risk impacts on settlements over the time.
Studying the urban settlement pattern and pertaining issues.

Unit Number	Course Content	Lectures
UNIT-01	Climatically Resilient planning for hill settlements; Introduction, Components of natural and built environment, Eco-systems and their relevance to environment, human settlements, Modifications in natural environment, causes and consequences, evolution and significance.	**12L**
UNIT-02	Existing Scenario: Case Studies, Impact of urbanization on settlements, Urban ecosystem approach	**12L**
UNIT-03	Site Study I: Urban Settlement Pattern of any town in Hilly region. Site Study II: Vernacular Settlement Pattern of any village in Himachal.	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the Impact of Inorganic growth patterns in Hilly region.
CO2: Understand the climate resilience and its importance in growing settlements.
CO3: Understand the vernacular settlement examples and implementations.

Books and References

1. Town & Country Planning office Shimla, Draft Development plan for Manali Planning area 2021, 2005.
2. Kullu District Disaster Management Plan 2017.
3. Human Settlements and Climate Change, Jelena Živković.
4. Planning strategies for hill stations in eco-sensitive zones by S.P. Sekar, M. Thirumeni, Spatio-Econ. Dev. Rec., 9 (2) (2002), pp. 35-37.
5. Introduction to Settlement Geography by V.N.P. Sinha, Usha Verma, Anuradha Sahay.

Course Name: **Interior Design**
Course Code: **AR-533**
Course Type: **Professional Elective -II**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objective

To equip the students with varied aspects of theory and practice of Interior Design, and develop skills to deal with diverse interior spaces.

Unit Number	Course Content	Lectures
UNIT-01	Introduction: Purpose, scope, objectives and history of Interior Design.	**06L**
UNIT-02	Principles and Elements of Interior Design: Space making elements like wall, column, partition screen, floor, furniture, interior landscaping etc., their design value, colour theories and schemes, light.	**06L**
UNIT-03	Interior-Design: Exposure to diverse traditional, folk and contemporary crafts and their role in creating and enhancing interior spaces. Surface treatments, materials and their application techniques.	**09L**
UNIT-04	Innovative trends and technologies, materials and interior construction, visual merchandising, acoustics and lighting. Interior services, functional importance, bylaws, supervision and fees.	**09L**
UNIT-05	Case Studies: Examples of selected interiors.	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the concept and principles of interior design.
CO2: Apply the methods and techniques of interior designing.
CO3: Learn the innovative trends and materials for interior design.

Books and References

1. Designing Interior Architecture: Concept, Typology, Material, Construction by Birkhauser Verlag AG, 2013
2. Form + Structure: the organization of interior space by Brooker, Graeme, AVA Publishing SA, Switzerland, 2007.
3. Elements of Space Making by Pandya, Yatin, Mapin Publishing Pvt., 2007