# DEPARTMENT OF ARCHITECTURE AND PLANNING

Course Book for
B.Arch. in Architecture

## Visvesvaraya National Institute of Technology, Nagpur

**April 2014**

**Brief about BArchprogram:**

Department of Architecture and Planning offers two programs, namely, *B. Arch in Architecture and M. Tech. in Urban Planning*. B. Arch is a ten semester program, wherein student has to complete certain number of credits as indicated in Table 1. Each subject (or course) has certain number of credits. There are two types of subjects: Core and Elective. Core courses are compulsory and some courses from Electives are to be taken to complete the required credits.

**TABLE 1. CREDIT REQUIREMENTS FOR POST GRADUTE STUDIES**

| **Undergraduate Core (DC)** | | **Undergraduate Elective (UE)** | |
|---|---|---|---|
| Category | Credit | Category | Credit |
| Departmental Core (DC) | 240 | Departmental Electives (DE) | 54-66 |
| Building Sciences (BS) | 00 | Humanities (HM) | 06 |
| Engineering Science (ES) | 50 | Open Category (OC) | 12-24 |
| Humanities (HU) | 06 | | |
| Total | 296 | Total | 84 |
| **Grand Total UC + UE** | | | **380** |

The number of credits attached to a subject depends on number of classes in a week. For example a subject with 3-1-0 (L-T-P) means it has 3 Lectures, 1 Tutorial and 0 Practical in a week. This subject will have eight credits (3x2 + 1x1 + 0x1 = 8). If a student is declared pass in a subject, then he/she gets the credits associated with that subject. Depending on marks scored in a subject, student is given a Grade. Each grade has got certain grade points as follows:

| Grades | AA | AB | BB | BC | CC | CD | DD | FF |
|---|---|---|---|---|---|---|---|---|
| Grade Points | 10 | 09 | 08 | 07 | 06 | 05 | 04 | Fail |

The performance of a student will be evaluated in terms of two indices, viz. the Semester Grade Point Average (SGPA) which is the Grade Point Average for a semester and Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters at any point in time. SGPA & CGPA are:

$$\boldsymbol{SGPA} = \frac{\sum_{semester}(CoursecreditsXGradepoints)forallcoursesexceptaudit}{\sum_{semester}(Coursecredits)forallcoursesexceptaudit}$$

$$\boldsymbol{CGPA} = \frac{\sum_{Allsemester}(CoursecreditsXGradepoints)forallcourseswithpassgradeexceptaudit}{\sum_{Allsemester}(Coursecredits)forallcoursesexceptaudit}$$

Students can Audit a few subjects. i.e., they can attend the classes and do home work and give exam also, but they will not get any credit for that subject. Audit subjects are for self enhancementof students.

**Details about Faculty members ofArchitecture and Planning Department**

| Name of Faculty Member | Designation | Qualifications | Areas of specialization |
|---|---|---|---|
| AdaneVinayak | Professor | PhD | Urban Planning, Infrastructure Planning and financing |
| Bahadure Sarika | Assistant Professor | M Tech | Housing, Compact City Development |
| Bahadure Pankaj | Assistant Professor | M Tech | Land use planning and sustainable development |
| Bakde Vilas | Associate Professor | M Tech | Urban Planning, Housing |
| Deshkar Sameer | Assistant Professor | PhD | Environmental Planning, urban biodiversity conservation, disaster risk management |
| Deshmukh Aniket | Assistant Professor | M Tech | Urban Planning |
| Deshmukh Amit | Assistant Professor | M Tech | Development control regulations and land use planning |
| Dongre Alpana | Professor | PhD | Architecture |
| Ghuge Vidya | Assistant Professor | M Tech | Urban Planning, Planning legislation |
| Joglekar Kishore | Assistant Professor | M Tech | Urban Planning, Transportation Planning |
| Kapse Vijay | Associate Professor | M Tech | Urban Planning, Low Cost Housing |
| Khan Smita | Assistant Professor | PhD | Architectural Design |
| Kotharkar Rajashree | Associate Professor | PhD | Urban Sustainability, Energy and Urban Heat Island, Compact City Development |
| Patil Akshay | Associate Professor | M Tech | Urban Design and Informal Sector Planning |
| Sabnani Chandra | Associate Professor | M Tech | Urban Planning |
| Wahurwagh Amit | Assistant Professor | M Tech | Urban conservation& Planning for heritage |

## Scheme of Instructions for B Arch

| I Semester | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| Departmental Core (DC) | | | |
| ARL 101 | Construction-1 | 2-0-0 | 4 |
| ARL 102 | History of Architecture-1 | 2-0-0 | 4 |
| ARL 103 | Building Materials | 2-0-0 | 4 |
| ARP 101 | Construction Studio-1 | 0-0-2 | 2 |
| ARP 104 | Design Studio-1 | 0-0-6 | 6 |
| ARP 105 | Graphics Studio-1 | 0-0-4 | 4 |
| ARP 106 | Visual Arts Studio-1 | 0-0-4 | 4 |
| Engineering Arts & Science (ES) | | | |
| AML 169 | Engineering Mechanics | 3-0-0 | 6 |
| Humanities & Social Science | | | |
| HUL 179 | English (Communication Skills) | 3-0-0 | 6 |
| Additional Requirement | | | |
| PEB 169 | Physical Education | 0-2-0 | 0 |
| TOTAL CREDITS: | | | 40 |

| II Semester | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| Departmental Core (DC) | | | |
| ARL 107 | Construction-II | 2-0-0 | 4 |
| ARL 108 | History of Architecture-II | 3-0-0 | 6 |
| ARL 109 | Theory of Design-I | 2-0-0 | 4 |
| ARP 107 | Construction Studio-II | 0-0-2 | 2 |

| | | | |
|---|---|---|---|
| ARP 109 | Design Studio-II | 0-0-4 | 4 |
| ARP 110 | Graphics Studio-II | 0-0-2 | 2 |
| ARP 111 | Visual Arts Studio-II | 0-0-4 | 4 |
| ARP 112 | Modeling Workshop | 0-0-4 | 4 |
| Engineering Arts & Science (ES) | | | |
| AML 281 | Strength of Materials | 3-0-0 | 6 |
| TOTAL CREDITS: | | | 36 |

| **III Semester** | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| Departmental Core (DC) | | | |
| ARL 201 | Construction-III | 2-0-0 | 4 |
| ARL 202 | History of Architecture-III | 2-0-0 | 4 |
| ARL 203 | Basic Climatology | 2-0-0 | 4 |
| ARP 201 | Construction Studio-III | 0-0-2 | 2 |
| ARP 204 | Design Studio-III | 0-0-6 | 6 |
| ARP 205 | Graphics Studio-III | 0-0-4 | 4 |
| Humanities & Social Science (HM) | | | |
| HUL 169 | Culture & Society | 3-0-0 | 6 |
| TOTAL CREDITS: | | | 24 |

| **IV Semester** | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| Departmental Core (DC) | | | |
| ARL 206 | Construction-IV | 2-0-0 | 4 |
| ARL 207 | Theory of Design-II | 2-0-0 | 4 |

| | | | |
|---|---|---|---|
| ARL 208 | Climate Responsive Architecture | 3-0-0 | 6 |
| ARL 209 | Building Services-I | 2-0-0 | 4 |
| ARP 206 | Construction Studio-IV | 0-0-6 | 6 |
| ARP 207 | Design Studio- IV | 0-0-4 | 4 |
| ARP 210 | Graphics Studio-IV | 0-0-2 | 2 |
| Engineering Arts & Science (ES) | | | |
| AML 381 | Theory of Structures | 3-0-0 | 6 |
| CEL 283 | Surveying | 0-0-4 | 4 |
| TOTAL CREDITS: | | | 36 |

| **V Semester** | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| Departmental Core (DC) | | | |
| ARL301 | Construction-V | 2-0-0 | 4 |
| ARL 302 | General Specifications | 3-0-0 | 4 |
| ARL 303 | Building Services-II | 3-0-0 | 6 |
| ARP301 | Construction Studio- V | 0-0-2 | 4 |
| ARP 304 | Design Studio- V | 0-0-6 | 6 |
| ARP 305 | Working Drawing Studio-I | 0-0-4 | 4 |
| Engineering Arts & Science (ES) | | | |
| AML 482 | Concrete Structures | 3-1-0 | 8 |
| CEL 381 | Estimating | 3-0-0 | 6 |
| TOTAL CREDITS: | | | 42 |

| **VI Semester** | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| Departmental Core (DC) | | | |

| | | | |
|---|---|---|---|
| ARL306 | Construction-VI | 2-0-0 | 4 |
| ARL 308 | Landscape Architecture | 2-0-0 | 4 |
| ARL 307 | History of Human Settlements | 3-0-0 | 6 |
| ARP 306 | Construction Studio- VI | 0-0-2 | 4 |
| ARP 309 | Design Studio- VI | 0-0-6 | 6 |
| ARP 310 | Working Drawing Studio-II | 0-0-4 | 4 |
| ARP 311 | Interior Design Studio-I | 0-0-4 | 4 |
| Engineering Arts & Science (ES) | | | |
| AML 481 | Steel Structures | 3-1-0 | 8 |
| TOTAL CREDITS: | | | 38 |

| **VII Semester** | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| Departmental Core (DC) | | | |
| ARL401 | Advanced Construction-I | 2-0-0 | 4 |
| ARL 409 | Acoustics | 2-0-0 | 4 |
| ARL 402 | Advanced Building Services-I | 2-0-0 | 4 |
| ARL 403 | Professional Practice | 2-0-0 | 4 |
| ARL 404 | Urban & Community Planning | 2-0-0 | 4 |
| ARP 401 | Advanced Construction Studio-I | 0-0-4 | 4 |
| ARP 405 | Design Studio-VII | 0-0-6 | 6 |
| TOTAL CREDITS: | | | 30 |

| **VIII Semester** | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| Departmental Core (DC) | | | |

| | | | |
|---|---|---|---|
| ARL 406 | Advanced Construction-II | 2-0-0 | 4 |
| ARL 407 | Advanced Building Services-II | 2-0-0 | 4 |
| ARL 408 | Office Practices | 3-0-0 | 6 |
| ARL 410 | Illumination | 2-0-0 | 4 |
| ARP 406 | Advanced Construction Studio-II | 0-0-2 | 2 |
| ARP 411 | Design Studio-VIII | 0-0-6 | 6 |
| ARP 412 | Urban Planning & Design Studio | 0-0-2 | 2 |
| Engineering Arts & Science (ES) | | | |
| AML 483 | Earthquake Resistant Structures | 3-0-0 | 6 |
| Humanities & Social Science (HM) | | | |
| HUL 483 | Principles of Industrial Management & Psychology | 3-0-0 | 6 |
| TOTAL CREDITS: | | | 34 |

| **IX Semester** | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| ARC 401 | Practical Training | 6 months | 6 |
| TOTAL CREDITS: | | | 6 |

| **X Semester** | | | |
|---|---|---|---|
| **CORE** | | | |
| **Code** | **Course** | **L-T-P** | **Cr** |
| ARD 401 | Project-I (Dissertation/ Seminar) | 0-0-4 | 4 |
| ARD 402 | Project-II | 0-0-8 | 8 |
| TOTAL CREDITS: | | | 12 |

| **UNDERGRADUATE ELECTIVES** | | | |
|---|---|---|---|
| **Code** | **Course** | **L-T-P** | **Cr** |

| Departmental Electives (DE) | | | |
|---|---|---|---|
| ARL 211 | Contemporary Design Theory and Criticism | 3-0-0 | 6 |
| ARL 212 | Advanced Building Materials | 3-0-0 | 6 |
| ARL 213 | Appropriate Technology | 3-0-0 | 6 |
| ARP 214 | Arch. Photography | 0-0-4 | 4 |
| ARP 234 | Built Environment-Behaviour Studies | 3-0-0 | 6 |
| ARL 312 | Building Regulations | 3-0-0 | 6 |
| ARL 313 | Energy Efficient Architecture | 3-0-0 | 6 |
| ARL 314 | Barrier Free Architecture | 3-0-0 | 6 |
| ARL 315 | Vernacular Architecture & Settlements | 3-0-0 | 6 |
| ARP 316 | Appropriate Technology Studio | 0-0-4 | 4 |
| ARL 413 | Construction Management | 3-0-0 | 6 |
| ARL 414 | Sustainable Architecture | 3-0-0 | 6 |
| ARL 415 | Fundamentals of Real Estate | 3-0-0 | 6 |
| ARL 416 | Architectural Conservation | 2-1-0 | 6 |
| ARL 417 | Infrastructure Planning & Design | 3-0-0 | 6 |
| ARL 418 | Urban Design | 2-1-0 | 6 |
| ARL 419 | Industrial Architecture | 3-0-0 | 6 |
| ARL 420 | Valuation | 3-0-0 | 6 |
| ARL 421 | Disaster Mitigation | 3-0-0 | 6 |
| ARL 422 | Housing | 3-0-0 | 6 |
| ARL 423 | Transportation Planning | 3-0-0 | 6 |
| ARP 424 | Interior Design Studio -II | 0-0-4 | 4 |
| ARP 425 | Landscape Architecture Studio | 0-0-4 | 4 |
| ARL 426 | Computer Aided Design | 0-2-2 | 6 |
| ARL 428 | Computer Graphics | 0-2-2 | 6 |
| ARL 450 | Project Proposal & Office Documents in Large Firms | 3-0-0 | 6 |
| Humanities & Social Science (HM) | | | |

| | | | |
|---|---|---|---|
| HUL 179 | English (Communication Skills) | 3-0-0 | 6 |
| HUL 269 | Advanced communication Skills | 3-0-0 | 6 |
| HUL 469 | Management & Public Relations | 3-0-0 | 6 |
| HUL 483 | Principles of Industrial Management & Psychology | 3-0-0 | 6 |
| Additional Requirement | | | |
| PEB 169 | Physical Education | 0-2-0 | 0 |
| Open Category | | | |
| ARL 427 | Graphics & Basic Design | 3-0-0 | 6 |
| ARL 429 | Building Legislations | 3-0-0 | 6 |

# COURSE OUTLINE

**ARL 101 CONSTRUCTION-I (2-0-0-4)**

**Objective:**The course introduces the first principles of construction through simple elements of basic construction.

**Content:**

Introduction to building construction. Understanding relationship between architectural design, building construction, building materials, etc. Objective of the course is to learn in progression various construction systems, from simple building construction techniques to comprehensive, complex construction methods. Emphasis shall be on reasoning and analysis while acquainting the students with different building elements. The course shall aim at building a strong sense of visualization to enable students to evolve, apply altemative materials and methods of construction.

General idea of load transmission in load bearing & frame structures.their advantages, disadvantages and suitability.

Various types of load bearing and framed structures, their advantages, disadvantages and suitability.

Introduction to various types of foundations & elements of building from foundation to roof.

Simple foundation for load bearing walls in stone and brick, Plinth filling, steps, etc.

Various types of construction & Standard terms in brick and stone masonry.

English, Flemish, local bonds, piers, types of stone walls, composite and curved walls, lintels and arches, copingsetc

Site visits for on-site studies.

**Method of Assessment:** Notes, site visit reports, market survey and tests.

**Reference Books:**

1.Construction of Building, By R. Barry, Orient Longman lid.
2.Building Construction Handbook, By R. Chudley, British library cataloguing,
3.Building Construction IIlustrayed, By Francis DK Ching, Van Nostrand Reinhold Ltd.
4.Building Construction, By S.C. Rangwala, Charotar Publishing House.
5.Building Construction, By B.C. Punmia, Laxmi Publications Pv1. Ltd.

**Pre-requisites: Nil**

**ARL 102 HISTORY OF ARCHITECTURE-I (2-0-0-4)**

**Objective:**

Study the chronological evolution and impacts of geographic, climatic, geological and socio-cultural backgrounds of ancient architecture – in relationship to materials and techniques of construction.

**Content:**

Introduction to evolution of built form design as a result of socio cultural, physical, technological factors manifested in design attitudes during various phases in history.

Study of spatial order, structural, constructional and material order, manner of articulation, symbols, and meanings, as these evolved in time and space. Comparative study of building typologies in vernacular and monumental architecture in the different periods of history.

- Understanding of the causative forces - the cultures, history, socio religious practices and institution, political and economic conditions, issues of land, climate and technology.
- Study of architectural developments in India from Indus valley culture to rise, spread & decline of Buddhism & Jainism.
- Evolution of Hindu Temple: Gupta, Aihole, Badami, Pattadakkal, Mahabalipuram" Indo Aryan Style:
- Orrisa, Khajuraho, Gujarah, Rajasthan.
- Dravidian Style: Chola, Chalukyan, Pandya, Pallava, Vijaynagar, Mudurai. Revival Hindu architecture of South India at Vijaynagar and Madurai
- Comparisons to Mesopotamia, Egypt in the Middle East, Greece and Rome in Europe, China and Central American civilization - Classical Greek & Roman architecture.

**Method of Assessment:** Tests, Seminars and study tours

**Reference Books**:

History of Architecture, By Bannister Fletcher / Percy Brown
History of Architecture, By Satish Grover
History of Architecture, By Christopher Tadgell
History of Architecture & Ancient Building Materials in India, By Satish Chandra.

**Pre-requisites: Nil**

**AML169 ENGINEERING MECHANICS [(3-0-0); Credits: 6]**

**Objective:** To introduce basic understanding requirement of structural aspect to engineering structures and to explain effect of forces on various structural elements such as beams, trusses, cables etc.

Co-planer Statics Anxioms of static and basic concepts, law of forces, force system, Resolution and resultant of forces (concurrent parallel and non-concurrent), supports-types and reactions, free body diagram, equilibrium of forces, conditions of equilibrium.

Cables Weightless flexible cables under concentrated loads and uniformly distributed load with level & non-level supports.

Friction Laws of static friction, application to inclined planes and ladder.

Properties of areas Centroid of areas, first and second moments of area about an axis in plane, parallel axis theorem, radius of gyration about an axis.

Pin jointed trusses Solution by method of joints and method of section.

Graphic Statics Force polygon and funicular polygon for coplanar forces. Conditions of equilibrium, reactions at supports of simply supported beams and trusses, centroids of planer bodies, simple trusses – Maxewell diagrams.

**REFERENCES:**

1. R.C. Hibbler, “Engineering Mechanics”, Pearson Education, Asia Pvt. Ltd.
2. J.L. Meriam & L.G. Kraige, “Engineering Mechanics”, John Wiley and Sons.
3. F.P. Beer & E.R. Johnston, “Vector Mechanics for Engineers”, Tata McGraw Hill.

**HUL 179 English (Communication Skills) (3-0-0-6)**

Course contents available on webpage of Humanities Department

**ARP 101 CONSTRUCTION STUDIO-I (0-0-2-2)**

**Objective:** The course introduces the first principles of construction through simple elements of basic construction, through studio practice.

**Content:**

Introduction to building construction. Understanding relationship between architectural design, building construction, building materials, etc. The course shall focus on application of construction theory from Construction -I, in the form of preparation of Drawings, Plates, etc.

General idea of load transmission in load bearing & frame structures.their advantages, disadvantages and suitability.

Various types of load bearing and framed structures, their advantages, disadvantages and suitability.

Introduction to various types of foundations & elements of building from foundation to roof.

Simple foundation for load bearing walls in stone and brick, Plinth filling, steps, etc.

Various types of construction & Standard terms in brick and stone masonry.

English, Flemish, local bonds, piers, types of stone walls, composite and curved walls, lintels and arches, copingsetc

Minimum of two site visits for on-site studies.

**Method of Assessment:** detail scale drawings on various construction aspects, Plates, notes, site visit reports,

**Reference books:**

**Pre-requisite: Nil**

**ARP 104 DESIGN STUDIO-I (0-0-6-6)**

**Objective:**

Design Studio I serves as the transition of young minds from varied backgrounds to a focused training in analytical abilities and communication skills, visualization and representation skills. It focuses on the basic elements of design, addressed visually, conceptually, and haptically. The main objective of this course is to enable the students to comprehend the essence of making two or three-dimensional composition and to develop sense of order with special emphasis on the principles of organization.

**Content:**

Introduction to architecture. Understanding design and creativity in architecture ,art& crafts. Understanding relationship between architectural design, visual arts, building construction, Climatology, building materials, etc.

The course shall include elementary design exercises for study and explorations in creation of space using elements like line, plane, form and their inter-relationship.

Initiation into basic & visual design principles like rhythm, harmony, contrast, balance, symmetry, direction, scale and proportions. Design aspects and issues like: Sense of enclosure-openness, spatial geometry may be introduced at later a stage.

Elementary design exercises to understand creation of space & form, using two &three dimensional compositions/forms.

The course shall involve studies on Anthropometries, ergonomies, understanding basic human activities and Design of mono-cellular architectural forms shall form the basic level of implementation and exploration for various design issues.

**Method of Assessment:**

Assignments based on elements of design, composition, anthropometrics etc. One design exercise with function as a determinent.

**Reference Books:**


1. Ching, DK Francis. Architecture: Form, Space And Order, Van Nostrand Reinhold, New York.
2. Smithies, K. W. Principles of design in Architecture, Van Nostrand Reinhold, New York
3. The Art of Seeing, Paul Zelanski, Mary Pat Fisher, Prentice Hall, 2010
4. Vision and Invention: An Introduction to Art Fundamentals, Calvin Harlan, Prentice-Hall, 1986


**Pre-requisite: Nil**

**ARP 105 GRAPHIC STUDIO -I (0-0-4-4)**

**Objective:**The subject aims at developing the drawing skills as tools for creative thinking, visualization, representation and to understand fundamentals of architectural drawing.

**Content:**

The subject is aimed at developing the drawing skills as tools for creative thinking, visualization, representation and to understand fundamentals of architectural drawing.
Introduction to Architectural Drafting, Letterings, Graphical codes, etc.
Introduction to symbols for various building materials and architectural elements.
Study of scales - Plain and Diagonal.
Orthographic Projections of point, line, planes ,and solids.
Sections and Development of surfaces of simple solids.
Three dimensional representations-isometric, axonometric and oblique view of solids composition and building.

**Method of Assessment:** Plates, sketches and tests.

**Reference Books:**


1. Perspective &Sciography, By Mulik S. H
2. Engineering Drawing, By N. D. Bhatta
3. Engineering Drawing, By Narayanan
4. Building Drawing, By Shah, Kale &Patki


**Pre-requisite: Nil**

**ARP 106 VISUAL ARTS STUDIO-I (0-0-4-4)**

**Objective:**This studio aims at polishing the skills of the hand by intensive working with different mediums to help enhance the visual presentation.

**Content:**

The subject is aimed at providing knowledge and understanding of various visual arts and their importance. It further aims at developing freehand drawing, rendering skills in different mediums and using it as tool for expression.

Techniques of drawing lines of various gradations, inclination & types.

Free hand line sketching and drawing of natural and man made, indoor and outdoor objects and situations.

Study and classification of colours with different Hues, Values & Shades Colour wheel and colour composition, properties (visual and psychological) of colour.

Study of shades and shadows, contrast of light and shades etc. Sketching of historic or new buildings of architectural importance and rendering using different mediums.

**Method of Assessment**: Line and rendered sketches, compositions etc. on sketch book, plates of half imperial size, models, composition s in 3-D using different materials and mediums, 2-D compositions using computers.

**Reference Books:**
1. Rendering with Pen & Ink, By Gill
2. Seven lamps of Architecture, By John Ruskin

**Pre-requisite: Nil**

**ARL 107 CONSTRUCTION-II (2-0-0-4)**

**Objective:**The course introduces the first principles of construction through simple elements of basic construction.

**Content:**

Introduction to building construction. Understanding relationship between architectural design, building construction, building materials, etc. Objective of the course is to lea m in progression various construction systems, from simple building construction techniques to comprehensive, complex construction methods. Emphasis shall be on reasoning and analysis while acquainting the students with different building elements. The course shall aim at building a strong sense of visualization to enable students to evolve, apply alternative materials and methods of construction.

Doors - Panelled doorin timber,joints in frame, styles, rails, panels, mouldings, fixtures and fastenings.

Windows - Fully glazed window in timber, fixing of glass, double glazing, fixtures and fastenings.

Timber Roofs - General idea of various roofs forms in timber for different spans. General information of timber trusses, fixing of mangalore tiles etc.

Timber floors - General idea of timber floors in relation to spans, load transmission. Jack arch and composite floors.

Staircase: Principles & components of staircases.

Staircase: Types of staircases, staircase in timber & stone and their types

Site visits for on-site studies.

**Method of Assessment:** Notes, site visit reports and market survey and tests.

**Reference Books:**
1. Construction of Building, By R. Barry, Orient Longman ltd.
2. Building Construction Handbook, By R. Chudley, British library cataloguing,
3. Building Construction Illustrayed, By Francis DK Ching, Van Nostrand Reinhold Ltd.
4. Building Construction, By S.C. Rangwala, Charotar Publishing House.
5. Building Construction, By B.C. Punmia, Laxmi Publications Pvt. Ltd.

**Pre-requisite: Nil**

**AML 281 – STRENGTH OF MATERIALS [(3-0-0); Credits: 6]**
**Objective:** To introduce mechanical properties of materials, concepts of stress & strain and distribution of stresses & deformations.
Simple stresses and strains, stress-strain curves for concrete and steel.
Elastic constants, Poisson's ratio, Bulk modules, Modulus of rigidity and their inter-relationship.
Temperature stresses and strains.
Hoop stresses: Stresses in thin cylinders.
Bending moment diagram, shear force diagram for simply supported and cantilever beams.
Bending stresses & Shear stresses in rectangular, I & T sections.
Torsion of solid and hollow circular shafts.
**References:**
1. Popov, E R. "Engineering Mechanics of solid", Prentice Hill of India, New Delhi, 2000.
2. Beer, Johnston, Dewolf. "Mechanics of Materials", Tata McGraw Hill, New Delhi, 2008.
3. Singer, F. L. "Strength of Materials", Harper Collins Publishers, Singapure, 1987.
4. Ramamurtham S. "Strength of Materials", Danpatrai & son, New Delhi, 2000

**ARL 108 HISTORY OF ARCHITECTURE-II (3-0-0-6)**

**Objective:**
Study the chronological evolution and impacts of geographic, climatic, geological and socio-cultural backgrounds of medieval architecture – in relationship to materials and techniques of construction.

**Content:**

The study of Hindu and Buddhist Architecture proceeds further in the study of influence of Islam. This study shall be carried out in region/century pattern to acquaint students with Indian Architecture under the influence of

Islam with reference to changing religious, political, climatic conditions with new construction materials and techniques, newerforms and Architectural features.

- ByzantineArchitecture & Romanesque Architecture
- Medieval Architecture & Gothic Architecture – Middle age Architecture.
- 11th Century AD Architectural forms conceived by Qutub Dynasties at Delhi.
- Development of regional styles noticed in various provinces such as Bengal, Jaunpur, Rajasthan, Gujarat, Mandu and Central India.
- Development of architecture under peculiar regional, climatic, physical, politico-social conditions,Influence of Hindu, Buddhist and Persian Architecture with use of local material and craftsmanship. Study of construction methods and evolution of building forms.
- Architecture under Mughals - Humayum, Akbar, Shahajahan.

**Method of Assessment:** Tests, Seminars and study tours, Documentation of historic structure.

**References:**

1. History of Architecture, By Bannister Fletcher / Percy Brown
2. History of Architecture, By Satish Grover
3. History of Architecture, By Christopher Tadgell& History of Architecture& Ancient Building Materials in India, By Satish Chandra.

**Pre-requisite: Nil**

**ARL 109 THEORY OF DESIGN– I (2-0-0-4)**

**Objective:**
Introduce the factors of Design regarding elementary forms.
Teach the basic principles of design in the context, purpose, time and technology.

**Content:**
To develop the basic understanding of the fundamentals of basic Design.
Principles of Design, elements of Design, definition of Art, Aesthetics, Principles of perception-proximity, similarity, etc.
Analysis and appreciation of 2-D and 3-D compositions.
Through lectures, Seminars, assignments, illustrations and demonstrations.

**Method of Assessment**: Tests, Seminars andAssignments

**Reference Books:**

1. Ching, OK Francis.Architecture: Form, Space And Order, Van Nostrand Reinhold, New York, 1996.
2. Pattern language, by Christopher Alexander.
3. Design Fundamentals of Architecture, By V.S. Panmar

**Pre-requisite: Nil**

**ARP 107 CONSTRUCTION STUDIO– II (0-0-2-2)**

**Objective:**The course introduces the first principles of construction through simple elements of basic construction, through studio practice.

**Content:**

Introduction to building construction. Understanding relationship between architectural design, building construction, building materials, etc. The course shall focus on application of construction theoryfrom Construction - II, in the form of preparation ofDrawings, Plates, etc.

Doors - Panelled door in timber, joints in frame, styles, rails, panels, mouldings, fixtures and fastenings.

Windows - Fully glazed window in timber, fixing of glass, double glazing, fixtures and fastenings.

Timber Roofs - General idea of various roofs forms in timber for different spans. General information of timber trusses, fixing of mangalore tiles etc.

Timber floors - General idea of timber floors in relation to spans, load transmission. Jack arch and composite floors.

Staircase: Principles & components of staircases.

Staircase: Types of staircases, staircase in timber & stone and theirtypes

Minimum of two site visits for on-site studies.

**Method of Assessment:** Plates, notes, site visit reports and market survey and tests.

**Reference Books:**

**Pre-requisite: Nil**

**ARP 109 DESIGN STUDIO – II (0-0·4-4)**

**Objective:**The course further explores the concepts introduced in Design Studio I: principles of form, pattern, color, composition, texture, shade, etc., and prepares the student for architectural design. Understanding man-space, activity-space and form-space relationships as essential design generators. It introduces the concept of function and expression as a determinant of form and space.

**Content:**

Understanding design and creativity in architecture ,art& crafts. Understanding relationship between architectural design, visual arts, building construction, climatology, building materials, etc.

Introduction to creation & use of multiple (multi-cellular) enclosures, forms/spaces in design. Introduction to basic order and organization in architectural form, its meaning in design (from part to a whole).

Design exercises to understand creation of space & form, using two &three dimensional compositions/forms. Concept of circulation patterns (single level) for both private and public buildings shall be introduced. The course shall include studies for understanding programmed human activities(defined functions I activities ), non- programmed human functions( non defined acts, movement, etc.).

Study of basic & visual design principles like rhythm, harmony, contrast, balance, symmetry, direction, scale and proportions, shall continue.

Study of material-climate-culture-construction-design relationship in creation of simple multi-cellular architectural forms.

Design of simple (single level) multi-cellular architectural form, exhibiting use of design aspects like light and ventilation, scale, and proportions in architectural design.

**Method of Assessment:**

Assignments based on elements of design, expression, scale and proportion, composition, etc. One design exercise with expression as a determinent.

**Reference Books:**


1- Ching, D.K. Francis.Architecture: Form, Space And Order, Van Nostrand Reinhold, New York, 1996.
2- Smithies, K. W. Principles of design in Architecture, Van Nostrand Reinhold, New York
3- Elements of Architectural Design: A Photographic Sourcebook, By Ernest Burden, John Wiley & Sons, 2000
4- Aesthetics of Built Form, Alan Holgate, Oxford University Press, 1992


**Pre-requisite: Nil**

**ARP 110 GRAPHIC STUDIO - II (0·0·2-2)**

**Objective:**Developing the drawing skills as tools to design thinking, visualization, representation and to understand fundamentals of architectural drawing.

**Content:**

Developing the drawing skills as tools to design thinking, visualization, representation and to understand fundamentals of architectural drawing.

Introduction to Perspective and Scio-graphy.

Perspective & Scio-graphy of simple objects

**Method of Assessment:** Plates, sketches and tests.

**Reference Books:**


1. Perspective &Sciography, By Mulik S. H
2. Engineering Drawing, By N. D. Bhatta
3. Engineering Drawing, By Narayanan
4. Building Drawing, By Shah, Kale &Patki


**Pre-requisite: Nil**

**ARP 111 VISUAL ART STUDIO- II (0-0-4-4)**

**Objective:**This studio aims to study the basic principles of art and study the relationship of the various forms of art and their contributions in the enrichment of architectural expression.

**Content:**

Subject is aimed at providing knowledge and understanding of various visual arts and its importance. It further aims at developing the freehand drawing and rendering skills in different medium and using it as tool for architectural expression.

Briefhistorical review of development of fine arts (visual and performing arts)
Introduction to famous works of art, photography and sculpture by the artists famous in India and abroad.
(use of audio and visual equipment for explanation)

Interdependency of visual arts, crafts, Architecture, Painting and Sculpture.

Principles of visual arts.

Study of visual properties of two-dimensional forms of both geometric and non-geometric surfaces and visual texture, optical illusion etc.

**Method of Assessment:** Line and rendered sketches, compositions etc. on sketch book, plates of half imperial size, models, compositions in 3-D using different materials and mediums, 2-D compositions using computers.

**Reference Books:**

1. Rendering with Pen & Ink, By Gill
2. Seven lamps of Architecture, By John Ruskin

**Pre-requisite: Nil**

**ARP 112 MODELLING WORKSHOP (0-0-4-4)**

**Objectives:**
To enable students to understand the properties of different materials (emphasis is given on wood work).
To equip students to work on three dimension medium.
To explore the possibilities of generating alternatives on rectilinear and curved surfaces**.**

**Contents**
Types of timber and their identification, detection of faults and uses of timber.
Carpenter's tools used for sawing, planning, shaping etc. making of selected joints, polishing etc.
Introduction of carpentry instruments, their uses and applications. Names and uses of different kinds of tools used for cutting, drilling, grinding, slotting, shaping, bending and measuring instruments, care and maintenance practices in chipping, filing ,scraping and fitting etc.
Exploring different materials like paper, foam sheet, oasis, thermocol, etc. for architectural models

**Method of Assessment:** Practical and Job work for plainer and volumetric members

**Reference Books:**
Wood Working by L. Kreindlin, publisher MIR Publishers, Moscow
A Timber Framer's Workshop: Joinery, Design & Construction of Traditional Timber Frames by Steve Chappell
Forty lessons in carpentry workshop practice by C. F. Mitchell and G.A. Mitchell

**Pre-requisite: Nil**

**ARL 201 CONSTRUCTION-III (2-0-0-4)**

**Objective:**Objective of the course is to learn in progression various construction systems, from simple building construction techniques to comprehensive, complex construction methods.

**Content:**

Introduction to building construction, Understanding relationship between architectural design, building construction, building materials, Climatology, etc. Objective of the course is to learn in progression various construction systems, from simple building construction techniques to comprehensive, complex construction methods, Emphasis shall be on reasoning and analysis while acquainting the students with different building elements, The course shall aim at building a strong sense of visualization to enable students to evolve, apply alternative materials and methods of construction,

R.C.C: Introduction to RCC, Its potential & applications, Typical details for RC,C, Columns, Footings, Lintels, Beams Slabs,

R.C.C: Chajjas, Balconies, Canopies, Fins, Parapets etc.

R.C.C: RC,C, roofing types: Flat slabs (one way & two way), Vaults, domes, Grid slabs

Timber Doors: Design considerations, single and double shutters, partly glazed and partly panelled shutters, flush shutters, ledged, braced, battened and framed shutters,

Timber Windows: Louvered, centrally pivoted, top hung windows, Side hung, Partly glazed, Fully glazed window,

Timber partitions: Design considerations, simple partitions, connections with floors, ceilings and walls, partly panelled and partly glazed, flush, louvered type, corner junctions, access doors etc.

Minimum of two site visits for on-site studies,

**Method of Assessment:** Notes, reports etc

**Reference books:**

1. Construction of Building, By R, Barry, Orient Longman ltd,
2. Building Construction Handbook, By R Chudley, British library cataloguing,
3. Building Construction Illustrayed, By Francis OK Ching, Van Nostrand Reinhold Ltd.
4. Building Construction, By S,C, Rangwala, Charotar Publishing House,
5. Building Construction, By B,C. Punmia, Laxmi Publications Pvt. Ltd.

**Pre-requisite: Nil**

**ARL 202 HISTORY OF ARCHITECTURE-III (2-0-0-4)**

**Objective:** This course is in continuation of the previous course and aims to understand the evolution of architecture and its transformation in its movement into the contemporary times, both at the international end as well as at the national end.

**Contents**

Proceeding further, Colonial Architecture under British, Portuguese and French with reference to industrial revolution and emergence of new materials and construction techniques shall be studied,

- British and Portuguese, Dutch and French colonial Architecture
- Palaces and Fort Architecture in India,
- Industrial revolution in Europe and emergence of the modern movement. Impact of Industrial revolution in European on contemporary Indian Architecture,
- Study of various schools of thoughts, philosophies of modern architects and their impact on contemporary architecture.
- Architecture in post independence era, Study of architectural developments at Chandigarh, Ahmedabad, Delhi and study of important buildings.
- Contemporary Architecture in India, Study of works of Indian Architects, Currents architectural trends and approach in Indian context.

**Sessional work:** Notes, reports, tests, Seminars, etc.

**References:**

1. History of Architecture, By Bannister Fletcher / Percy Brown
2. Space time and Architecture, by Sigfried Gideon
3. Architecture since 1900, by William JR Curtis
4. Monologues of Contemporary Architects
5. Magazines and Journals on Architecture

**Pre-requisite: Nil**

**ARL203 BASIC CLIMATOLOGY (2-0-0-4)**

**Objective:** To study the fundamentals of climatology and its application in climate responsive building design

**Contents**

Introduction to climatology. Understanding relationship between architectural design, building construction, building materials and climatology, etc.

Introduction to climate, weather, earth sun relationship,

Brief study of global climatic zones, climatic behaviour, Elements of climate such as temperature, precipitation, humidity, wind, and solarradiation

Study of solar geometry and solar loads

Shadow formation, sun control and shading devices

Heliodon and its use in laboratory exercise,

Macro and microclimate

Concept of Human comfort,

Principles of Heat Transfer in the Building,

Fundamentals of Air movement around and through the building

Daylight factor,

Study of climatic elements prevailing in tropical and sub tropical zone

**Sessional work:** Reports, Plates, class tests,

**Reference Books**


1. Introduction to building Climatology, Antony Sealey
2. Manual ofTropical Housing and Building, O,H. Keonigsberger, T. G.Ingersoll, Alan Mayhew, S. V.Szokolay
3. Climate & Architecture, Jefferey EllisAronin
4. General Climatology, Howard J, Crichfield
5. Housing, Climate and Comfort, Martin Evans
6. TropicalArchitecture, C, P Kukreja
7. Man, Climate and Architecture, B. Givoni
8. Solar Control and shading Devices, Olgyay and Olgyay
9. Climatological and Solar Data for India, CBRI Publication Roorkee


**Pre-requisite: Nil**

**ARP 201 CONSTRUCTION STUDIO-III (0-0-2-2)**

**Objective:** The objective of course is to learn in progression various construction systems, from simple building construction techniques to comprehensive, complex construction methods through studio practice.

**Contents**

Introduction to building construction. Understanding relationship between architectural design, building construction, building materials, etc. The course shall focus on application of construction theory from Construction -III, in the form of preparation ofDrawings, Plates, etc.

R C, C: Introduction to RCC, Its potential & applications, Typical details for R.C.C, Columns, Foolings, Lintels, Beams Slabs.

R.C.C: Chajjas, Balconies, Canopies, Fins, Parapets etc.

R.C.C: R.C.C. roofing types: Flatslabs (one way & two way), Vaults, domes, Grid slabs

Timber Doors: Design considerations, single and double shutters, partly glazed and partly paneled shutters, flush shutters, ledged, braced, battened and framed shutters.

Timber Windows: Louvered, centrally pivoted, top hung windows, Side hung, Partly glazed, Fully glazed window.

Timber partitions: Design considerations, simple partitions, connections with floors, ceilings and walls, partly panelled and partly glazed, flush, louvered type, corner junctions, access doors etc.

Minimum of two site visits for on-site studies.

**Sessional work:** Plates, notes, reports etc

**Pre-requisite: Nil**

**ARP 204 DESIGN STUDIO·III (0·0·6·6)**

**Objectives:** Understanding inter- relationship between architectural design, visual arts, building construction, climatology, building materials, structure, etc

**Contents:**

Understanding inter- relationship between architectural design, visual arts, building construction, climatology, building materials, structure, etc

The course for the semester shall include design studies for increased understanding of programmed human activities (defined functions / activities), non-programmed human functions( non defined acts, movement, etc.).

Design studies and explorations in understanding of complex architectural spaces and forms shall continue. Creation of architectural compositions / forms exhibiting use of principles of massing, use of voids, semi-enclosed spaces, etc. Study and explorations in architectural masses, volumes, their applicability and meaning in design.

Introduction to architectural relationships between various part/component spaces & forms and their integration into a unified holistic design. Understanding of basic order and organization in architectural form, its meaning in design shall be further developed.

Concept of circulation patterns (multi-level) for both private and public buildings shall be developed. Use of staircase and other means of vertical movement.

Study & design of various methods for effecting natural light, ventilation, to be introduced

Study of material-climate-culture-construction-design relationship in creation of simple multi-cellular architectural forms shall culminate in design of simple (multi-level) multi-cellular architectural form.

**Sessional work:** One design project, along with other design tasks and assignments.
Suggested design projects: school, hostel, library, residence, etc.

**Reference books**


1. Antoniades, C. Anthony: Epic Space: Towards roots of Western Architecture.
2. Ching, D.K. Francis Architecture: Form, Space And Order, Van Nostrand Reinhold, New York, 1996.

**Pre-requisite: Nil**

**ARP 205 GRAPHIC STUDIO - III (0-0-4-4)**

**Objectives:** To develop drawing skills as tools to design thinking, visualization, representation and to understand fundamentals of architectural drawing.

**Contents**

Development of drawing skills as tools to design thinking, visualization, representation and to understand fundamentals of architectural drawing.

A principle of conventional angle of light and its rays acting as a projector to cast a shadow on simple geometrical object including shadow cast partly on horizontal and vertical plane.
Study of combination of solids casting or receiving shades and shadows.
Sections and Development of surfaces of complex solids.
Interpenetration of solids.

**Sessional work:** Plates and tests on above.

**Reference Books**

1. Perspective &Sciography, By Mulik S.H.
2. Engineering Drawing, By N.D.Bhatta
3. Engineering Drawing, By Narayanan
4. Building Drawing, By Shah, Kale &Patk

**Pre-requisite: Nil**

**ARL 206 CONSTRUCTION - IV (2-0-0-4)**

**Objectives:** Understanding relationship between architectural design, building construction, building materials, etc.

**Contents:**

Introduction to building construction. Understanding relationship between architectural design, building construction, building materials, etc.

Objective of the course is to learn in progression various construction systems, from simple building construction techniques to comprehensive, complex construction methods. Emphasis shall be on reasoning and analysis while acquainting the students with different building elements. The course shall aim at building a strong sense of visualization to enable students to evolve, apply alternative materials and methods of construction.
Steel Roofing: Simple ridge roof trusses for various spans, design considerations, advantages, connections of various members supported on RC.C. columns, Brick piers, fixing of G.I and A.C. and Aluminium sheets, gutter types, wind bracing etc.

Steel North Light Roofing System: North light steel trusses, Connections, Gutters, Patented glazing etc.

Steel Monitor roofs: On steel stanchions, connections, Gutters, Patented glazing etc.

Steel doors: Steel doors with reference to BIS, methods of fixing and glazing, fixtures and fastenings, windows with M.S./T.W.surround, pressed metal frames for doors

Metal Casement: Steel windows with reference to BIS, methods of fixing and glazing, fixtures and fastenings, windows with M.S./T.W.surround, pressed metal frames for windows.
Minimum of two site visits for on-site studies.

**Sessional work:** Plates, notes, reports, etc.

**Reference Books**

1. Construction of Building, By R Barry, Orient Longman ltd.
2. Building Construction Handbook, By R Chudley, British library cataloguing,
3. Building Construction Illustrayed, By Francis OX Ching, Van Nostrand Reinhold Ltd.
4. Building Construction, By S.C. Rangwala, Charotar Publishing House,
5. Building Construction, By B.C. Punmia, Laxmi Publications Pvt. Ltd.

**Pre-requisite: Nil**

**ARL 207 THEORY OF DESIGN - II (2-0-0-4)**

**Objective:** To make students understand therelationship between basic design and architectural design, comprehensive understanding of space, form, order and design.

**Content**

To enable the students to develop an understanding of basic design elements and forms as a basis for subsequent architectural design.

Relationship between basic design and architectural design, comprehensive understanding of space, form, order and design.

Study of space, its scale, proportions and form, conception and space breaking through compositions and models in different media and materials.

Ordering principles and their application in building through exercises in design of murals, screens and voids in walls.

Three dimensional organization of a variety offorms to create built forms, importance of shades and shadows in the entire composition, layout of repetitive units within a site to create interesting and functional compositions.

**Sessional work:** Tests, Seminars and Assignments

**References Books**


1. Ching, D.K. Francis Architecture: Form, Space And Order, Van Nostrand Reinhold, New York, 1996.
2. Pattern language, by Christopher Alexander.
3. Design Fundamentals of Architecture, By V. S. Parmar


**Pre-requisite: ARL 109**

**ARL 208 CLIMATE RESPONSIVE ARCHITECTURE (3-0-0-6)**

**Objective:** To understand the relationship between climate and architecture and to study various tools and techniques of designing climate responsive buildings.

**Contents**

Methods of application of basic climatology for designing buildings in different climatic conditions,
Study of aspects of natural ventilation and air movement,
Day lighting techniques,
Study of passive cooling techniques and techniques of solar radiation control,
Energy conservation through building design and techniques of reducing solar heat gain in low rise &high rise buildings.
Introduction to climatic considerations in site analysis and site planning
Study of architectural examples through the history- TraditionalVemacular as well as Contemporary (from various climate types)

**Sessional work:** Case study, Reports

**Reference Books**


1. Introduction to building Climatology, Antony Sealey
2. Manual ofTropical Housing and Building, O.H. Keonigsberger, T. G.Ingersoll,Alan Mayhew, S. V Szokolay
3. Climate &Architecture, Jefferey EllisAronin
4. General Climatology, Howard J. Crichfield
5. Housing, Climate and Comfort, Martin Evans
6. Tropical Architecture, C. P. Kukreja
7. Man, Climate and Architecture, B. Givoni
8. Solar Control and shading Devices, Olgyay and Olgyay
9. Climatological and Solar Data for India, CBRI Publication Roorkee


**Pre-requisite: ARL 203**

**ARP 206 CONSTRUCTION STUDIO-IV (0-0-2-2)**

**Objectives:** This course focuses on application of construction theory from Construction -IV, in the form of preparation of Drawings, Plates, etc.

**Contents**

Introduction to building construction. Understanding relationship between architectural design, building construction, building materials, etc. The course shall focus on application of construction theory from Construction -IV, in the form of preparation of Drawings, Plates, etc.

Steel Roofing: Simple ridge roof trusses for various spans, design considerations, advantages, connections of various members supported on R.C.C. columns. Brick piers, fixing of G.I and A.C. and Aluminium sheets, gutter types, wind bracing etc.

Steel North light Roofing Systems: Steel Roofing: North light steel trusses, Connections, Gutters, Pat e n t e d glazing etc.

Steel Monitor roofs: On steel stanchions, connections, Gutters, Patented glazing etc.

Steel doors: Connections, Steel doors with reference to BIS, methods of fixing and glazing, fixtures and fastenings, windows with M.S.ITW. surround, pressed metal frames for doors

Metal Casement: Steel Windows: Connections, Steel windows with reference to BIS, methods of fixing and glazing, fixtures and fastenings, windows with M.S.ITW. surround, pressed metal frames for windows.

Minimum of two site visits for on-site studies.

**Sessional work:** Plates, notes, reports etc

**Reference Books**

1 Construction of Building, By R Barry, Orient Longman ltd.
2 Building Construction Handbook, By R Chudley, British library cataloguing,
3 Building Construction IIlustrayed, By Francis OX Ching, Van Nostrand Reinhold Ltd.
4 Building Construction, By S.C. Rangwala, Charotar Publishing House,
5 Building Construction, By B.C. Punmia, Laxmi Publications Pvt. Ltd.

**Pre-requisite: Nil**

**ARP 207 DESIGN STUDIO-IV (0-0-4-4)**

**Objectives:** This course aimsfor increased understanding of architectural relationships between various part/component spaces & forms and their integration into a unified holistic design.

**Contents:**

The course of the semester shall include studies for increased understanding of architectural relationships between various part/component spaces & forms and their integration into a unified holistic design.
Introduction to climate, as a determinant of architectural form. Design considerations for climate, surrounding physical environment, light, ventilation, etc., under various situation to be studied and adopted in design.

Design studies and explorations in understanding of complex architectural spaces and forms shall continue.
Introduction to Concept of circulation patterns (multi-level) for medium scale public buildings shall be developed.
Study and explorations in architectural image & meaning of form.
Study _of material-climate-culture-construction-design relationship in creation of complex multi-cellular architectural forms shall culminate in design of complex (multi-level) multi-cellular architectural form.
Introduction to relationship between building materials, their structural applications and resulting applications (elementary) in creation of architectural form.
Brief introduction to architectural design approach in rural context.
Minimum of two site visits for on-site studies.

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**Sessional work**: One design project, along with other design tasks and assignments.

**Suggested design projects**: Small public building (climate responsive design)

**Reference Books**

1. Antoniades, C.AnthQny: Epic Space: Towards roots of Western Architecture.
2. Broadbent, Geoffery: Emerging Concepts in Urban Space Design, Van Nostrand Reinhold, New York, 1990.
3. Brolin, Bren!: Failure of Modem Architecture
4. Ching, D.K. Francis.Architecture: Form, Space And Order, Van Nostrand Reinhold, New York, 1996.
5. Giedion, Siegfried; Space, Time and Architecture. ,Harvard University Press, 1963

**Pre-requisite: Nil**

**ARP 210 GRAPHIC STUDIO-IV (0-0-2-2)**

**Objectives:** This subject is aimed at developing the drawing skills as tools to design thinking, visualization and representation.

**Contents:**

This subject is aimed at developing the drawing skills as tools to design thinking, visualization and representation.

1. Methods of drawing Perspective
2. Measure Drawing of a tables, chairs and Buildings.

Sessional work: Plates on each topic.

**Reference Books**

1. Perspective&Sciography, ByMulikS. H
2. Engineering Drawing, By N. D. Bhatta
3. Engineering Drawing, By Narayanan
4. Building Drawing, By Shah, Kale &Patki

**Pre-requisite: Nil**

**CEL 283 SUREYING (0-0-4-4)**
Course contents available on webpage of Civil Engineering Department

**ARL209 BUILDING SERVICES -I (2-0-0-4)**

**Objective:** To teach basic services essential for buildings

**Contents**
Sources of water supply, various impurities, standards for qualitative and quantitative aspects, schematic description of water treatment plant.
Down take supply, Water demand and consumption in different types of buildings, domestic water supply systems, connection from Municipal supply. type, design and construction of suction and storage cisterns- tanks.
Water distribution pipes, their sizes, jointing, fixing and laying, various valves, various fittings & fixtures like taps, showers, domestic hot water supply systems, water heaters, boilers etc.
Principles of sanitation, concept of conservancy & water carriage system, collection waste matter in buildings, sewage collection and disposal systems for individual buildings, manholes, inspection chambers, intercepting chambers.
Various traps and their working, various types of sanitary pipes and their laying, jointing, fixing, different sanitary appliances & fittings like- water closets, urinals, wash-hand basins, sinks, flushing Cisterns, shower trays, bath tubs, bidets, drinking waterfountains etc.
Self cleansing velocity, inverts, drains on sloping sides, testing of drains, sewage disposal systems in un-severed localities - septic tank, soak-pits, cesspools, aqua-privy, leeching pits for individual building.

**Sessional work:** Notes, Plates, and Presentations on the above topics.

**References:**
1. WaterSupply and Sanitary Engineering, By S.C. Rangwala, CharotarPublishing House.
2. WaterSupply and Sanitary Engineering, By Birdie, DhanpatRai and Sons.
3. Building Services, By Mrs.ShubhangiBhide,
4. Water Supply and Sanitary Engineering, By Kshirsagar,
5. Water Supply and Sanitation, ByCharanjit Shah (Architectural Handbook Services)
6. VastuParisevaVaSadhane by Prof.A.L.Chhatre&Prof. M.W. Indapawar

**Pre-requisite: Nil**

**AML381 – THEORY OF STRUCTURES [(3-1-0); Credits: 8]**
**Objective**: The objective of this course is to introduce students various methods of discrimination of structural internal forces of deformations.
Combined stresses: Direct and bending stresses
Stability of dams and retaining walls: Stresses at base, minimum base width (derivation and application)
Columns and struts: Euler's theory and Rankine's theory for columns
Deflection of beams: Deflection of simply supported and cantilever beam by double integration method
Fixed beams: Analysis of fixed beam with UDL and concentrated loads
Arches: Three hinged circular arch (application only)
Moment distribution method: Moment distribution method for continuous beams and simple non-sway frame.
**References**:

1. Popov, E R. "Engineering Mechanics of solid", Prentice Hill of India, New Delhi, 2000.
2. Beer, Johnston, Dewolf. "Mechanics of Materials", Tata McGraw Hill, New Delhi, 2008.
3. Singer, F. L. "Strength of Materials", Harper Collins Publishers, Singapure, 1987.
4. Ramamurtham S. "Strength of Materials", Danpatrai& son, New Delhi, 2000
5. Timoshenko S. P.; & Young D.H. "Theory of Structures", International edition, McGraw Hill, 1965.
6. Jain, O.P. &Arya, A.S. "Theory and Analysis of Structures; Vol. I & II", Nemchand Brothers; Roorkee.
7. Krishnamurthy D., "Theory of Structures", J.K. Jain Brothers, 1976.
8. Ramamurtham S. "Theory of Structures", Danpatrai& son, New Delhi, 2000


**ARL 301 CONSTRUCTION - V (2-0-0-4)**
**Objectives**
1. Acquiring knowledge of soil characteristics and suitability of foundation types.
2. Understanding various advanced foundation types and their suitability for different soil types and loading patterns.

3. Understanding the concept of temporary support systems required during the construction stage of buildings; and during carrying repairs, modifications and additions in buildings.
4. Understanding the suitability, function, mechanism, details, etc. of various types of doors and windows
5. Understanding and illustrating the details of metal partitions for interior spaces

**Contents**

Introduction to building construction. Understanding relationship between architectural design, building construction, building materials, etc.

Advanced Foundations: Study of soil conditions and suitability of foundations on particular type of Soil, Steel grillage footing, R.C.C. Strip, Raft and Cellular foundation. Machine Foundation.

Pile Foundation, Types of Piles in Timber, Steel & R.C.C. (Pre-cast & Cast-in-Situ), RC.C. Under-Reamed Piles, Pile Caps, etc.

General idea of Ranking, Flying and Dead shores, Floor Strutting, underpinning, timbering for deep trenches and basements. Design & detailing of "addition & alteration" in existing buildings put to new use, process of modifications precautions to be taken.

Centering and form work for R.C.C. works like columns, beams, slabs, stairs, arches etc.

Advanced Doors & Windows: Sliding doors (Manual and Automatic), sliding and folding doors, Aluminium sliding windows. Revolving doors, rolling shutters, collapsible gates etc.

Glazed, Panelled partitions using Aluminium sections and Timber. Glass block partition. Glazed panelled partitions using Aluminium sections and Timber. Glass block partition.

**Method of Assessment:** Notes, Plates, Assignments and Tests on above topics.

**Reference Books:**


1. Construction of Building, By R Barry, Orient Longman ltd.
2. Building Construction Handbook, By R Chudley, British library cataloguing,
3. Building Construction IIIustrated, By Francis OK Ching, Van Nostrand Reinhold Ltd.
4. Building Construction. By S.C. Rangwala, Charotar Publishing House.
5. Building Construction, By B.C. Punmia, Laxmi Publications Pvt. Ltd.
6. Building Construction Handbook, By W B Mckay, Longmans Green and Co, London, New York
7. Advanced Building Construction By Mitchell, Allied Publishers Pvt. Ltd.


**Pre-Requisites:** *Nil*

**ARL302 GENERALSPECIFICATIONS (3-0-0-6)**

**Objectives:** The course aims at understanding the importance of specifications in construction and working drawings. It also aims at studying and writing specifications in a sound technical manner.

**Contents**

Study and writing of specifications for materials and works with emphasis on the required qualities of materials, process of construction and proper sequence of execution shall be studied.

Introduction, importance of specifications, method of writing specifications and use of IS codes, NBC and Standard Specifications by various Govt. and other Organizations.

Classification, types of specifications and their applications and study of contract document.

Study and writing specifications for basic materials and other involved materials of construction.

Specifications of materials involved in paving, floor finishing, dado, roofing, ceiling and specifIcations for fixtures and fastenings.

Specifications for water supply, sanitary and electrical installations.

Survey of proprietary materials along with manutacturer's specifications.

**Sessional work:** Notes and test on above topics.

**References**:


1. Estimating & costing, ByB. N. Dutta, B. S. Publishers
2. Estimating and Costing By S. C. Rangwala, Charotar Publishing House.
3. Red Book of Public Works Department, Government of Maharashtra.
4. Estimating and Costing in Civil Engineering, By Chakravarti, Bhaktivedanta Book Trust.
5. IS-1200


**Pre-Requisites:** *Nil*

**ARL 303 BUILDING SERVICES - II(3-0-0-6)**

**Objective:** To teach basic services essential for buildings

**Contents**

This second part of subject continues with the services related to solid waste or garbage refuse, storm water drainage, waste water recycling, electricity power services. The subject further deals with the services on a larger

magnitude, where the students getting information on the services related to large campuses, complexes, high rise buildings.

Solid Waste or Refuse Disposal - Types, sources, composition, collection, processing, storage and transport, and disposal methods. Refuse collection and disposal at individual building level, refuse chutes, grinders, incinerators, etc.

Storm water drainage - collection and disposal, combined & separate systems, runoffs, etc. Schematic layouts of water supply systems, sewage disposal system, and storm water drainage for a residential building.

Schematic layouts of treated water supply to a township, area, or a group housing, etc ESRs, water demand and method of storage & distribution systems for housing schemes & high rise buildings, etc. Hot water supply in building, boilers, furnaces, solar water heaters, demands of water for swimming pools, air-conditioning plants, .fire fighting, street washing, fountains and gardens etc.

Electrical power service - Power transmission and supply, sub stations, transformers, feeder, circuit breakers, bus bars, types of conductors, method of earthing, lightening arresters, electrical load, etc.

Consumer control assembly, various electrical fittings and appliances, telephone and television services, typical schematic layout of electrical power service in a residence, method of electrical power supply for large campuses and multistoried buildings.

Schematic idea of primary, secondary and tertiary stages of treatment of sewage, oxidation ponds, imhoff tank, recycling and reuse, DEWATS method, mechanical methods for removal of sewage from special areas like basements (shone's ejector), etc.

**Internal Sessional work:** based on Notes, Plates, and Presentations on the above topics.

**References**:


1. Water Supply and sanitary Engineering By S. C. Rangwala, Charotar Publishing House.
2. Water Supply and Sanitary Engineering By Birdie, DhanpatRai and Sons.
3. Building Services By Mrs.ShubhangiBhide.
4. Water Supply and Sanitary Engineering BY Kshirsaqar.
5. VastuParisevaVaSadhane by Prof.A.L.Chhatre&Prof.M.w.Indapawar


**Pre-Requisites:** *Nil*

**CEL 381 ESTIMATING (3-0-0-6)**

Course contents available on webpage of Civil Engineering Department

**AML482 – CONCRETE STRUCTURES [( 3-1-0); Credits: 8]**

**Objective** : To introduce structural material i.e. structural steel, reinforced concrete and concrete making material and their mechanical properties, familiarize various elements/ component of RCC structures, analysis of structure and behavior of each element under static gravity loading and introduce the concept of design of structural members RCC building subjected to tension, compression, shear and bending.

IS456: Study of IS456, Material, General design requirement and design methodology

IS875: Dead load, Live load and Wind load, Load calculations as per IS875 (for buildings only)

Limit State Method of RCC Design, All type of Limit State of Collapse and Serviciability

Singly and doubly reinforced beams: Design and investigation of singly and doubly reinforced rectangular beams, singly reinforced T and L beam sections.

Slabs: Design of one-way and two-way slabs

Columns and footings: Design of axially loaded columns and footings

Detailing of structural elements: Conceptual reinforcement detailing for various structures i.e. buildings (Beams, Slabs, Columns, Footings, Staircase, etc).

**References**:


1. Sinha,S.N., “Reinforced Concrete Design”, Tata McGraw Hill Publishing company ltd., New Delhi.
2. Pillai, S.U.; &Menon, D., “Reinforced Concrete Design”, Tata McGraw Hill Publishing company ltd. India, 1998.
3. “IS: 456; Code for Practice: Plain and Reinforced Concrete”, Bureau of Indian standards; New Delhi, 2000.
4. “IS: 875 (Part 1 to 4); Code for Practice for Design Loads (Other than Earthquake) For Buildings & Structures; Second Revision (5th Reprint)”, Bureau of Indian Standards; New Delhi, 1987.
5. “IS: 13920; Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces- code of Practice; Second reprint-1996”, Bureau of Indian Standards; New Delhi, 1993.
6. “SP- 34; Handbook on Concrete Reinforcement & Detailing and other relevant codes”, 1987.


**ARP 301 CONSTRUCTION STUDIO -V (0-0-2-2)**

**Objectives**

1. Illustrating various advanced foundation types and their details by preparing drawings, plates and model.
2. Illustrating temporary support systems (Shoring, Timbering to Trenches, Formwork, etc.) required during the construction stage of buildings; and during carrying repairs, modifications and additions in buildings, by preparing drawings, plates and model.
3. Illustrating the details of various types of doors and windows through drawings and plates

4. Illustrating the details of metal (aluminium) partitions through drawings and plates
5. Exposure to all the above through visit to ongoing construction sites

**Contents**

The course shall focus on application of construction theory from Construction - V, in the form of preparation of Drawings, Plates, etc.

Advanced Foundations

Study of soil conditions and suitability of foundations on particular type of Soil. Steel grillage footing, R.C.C. strip, raft and cellular foundation. Machine Foundation.

Pile Foundation, Types of Piles in Timber, Steel and R.C.C. (Pre-cast and Cast-in- Situ), R.C.C. under-reamed piles, pile caps etc.

General idea of Ranking, Flying and Dead shores, Floor Strutting, underpinning, timbering for deep trenches and basements. Design & detailing of addition & alteration in existing buildings put to new use, process of modifications precautions to be taken.

Centering and form work for R.C.C. works like columns, beams, slabs, stairs, arches etc.

Advanced Doors & Windows

Sliding doors (Manual and Automatic), sliding and folding doors, Aluminium sliding windows. Revolving doors, rolling shutters, collapsible gates etc.

Glazed, Panelled partitions using Aluminium sections and Timber. Glass block partition. Glazed, Panelled partitions using Aluminium sections and Timber. Glass block partition.

**Reference Books:**


1. Construction of Building, By R Barry, Orient Longman ltd.
2. Building Construction Handbook, By R Chudley, British library cataloguing,
3. Building Construction IIIustrated, By Francis OK Ching, Van Nostrand Reinhold Ltd.
4. Building Construction. By S.C. Rangwala, Charotar Publishing House.
5. Building Construction, By B.C. Punmia, Laxmi Publications Pvt. Ltd.
6. Building Construction Handbook, By W B Mckay, Longmans Green and Co, London, New York
7. Advanced Building Construction By Mitchell, Allied Publishers Pvt. Ltd.


**Method of Assessment**: Notes, Plates, Scaled Models and Tests on above topics.

**Pre-Requisites:** *Nil*

**ARP 304 DESIGN STUDIO - V (0-0-6-6)**

**Objectives:** Design studies and explorations in understanding of complex architectural spaces and forms under circumstances detailed below.

**Contents**

The course of the semester shall include studies for development of design skill and creative abilities ,to understand, explore and create duality, multiplicity and complex architectural relationships of design elements ( parts) toa designed environment (unified whole).

The course of the semester shall include, design considerations for climate, surrounding physical environment, light, ventilation, etc., under various physiographic& climatic situations to be studied and adopted in design. Introduction to specialized building types, their circulation, design needs, services and structure.

Design studies and explorations in understanding of complex architectural spaces and forms on contoured sites shall be introduced. Introduction to Concept of circulation patterns (multi-level) for medium scale public buildings shall be developed.

Study and explorations in architectural image & meaning of form, and its organization.

Development of architectural design approach in rural context.

Introduction to integration of basic building services in architectural design, design implications of structural systems and local byelaws.

Study of material-climate-culture-construction-design relationship in creation of complex multi-cellular architectural forms shall culminate in design of complex (rnulti-level multi-cellular architectural form.)

**Sessional work:** One design project, along with other design tasks and assignments.

**Suggested design projects:** Commercial, recreational, multifunctional buildings

**References**:


1. Antoniades, C. Anthony: Epic Space: Towards roots of Western Architecture
2. Broadbent, Geoffery: Emerging Concepts in Urban Space Design, Van Nostrand Reinhold, New York, 1990.
3. Brolin, Brent: Failure of Modern Architecture
4. Ching, OK Francis.Architecture: Form, Space And Order, Van Nostrand Reinhold, New York, 1996.
5. Doxiadis, C. A.: Architectural Space in ancient Greece

6. Giedion, Siegfried; Space, Time and Architecture. ,Harvard University Press, 1963
7. Jain, K. B.: Indian Cities of the Arid West

**Pre-Requisites:** *Nil*

**ARP 305 WORKING DRAWING STUDIO -I (0-0-4-4)**

**Objectives**

1. To make students aware about the importance of Working Drawings for a flawless execution of project, quality construction, preparation of estimate and tender documents, etc.; and accordingly draw architectural detailing for their projects.
2. Understanding of byelaws and development control rules and learn to prepare drawings for approval by authorities.
3. Learning to draw site plan, column and structural layout for buildings, detailed floor plans, elevations and sections with the help of which execution of work is to be done.
4. Learning to show details of materials, masonry, building components like, foundation, floors, parapets, various levels, compound wall, staircase, slope allocation, etc.
5. Learning to prepare a set of drawings for easy and smooth construction work of buildings.

**Contents**

The objective of this subject is to train student for the preparation of (a) Building permit drawings, Submission drawings, as per the local building Byelaws (b) Working drawings required for construction work.

Study of building Byelaws, building regulations, requirements of parts of buildings etc. as per the National Building Code, Built-up area, FSIIFAR etc. the course shall include the following:

Preparation of submission drawings for private or a public building.

Preparation of working drawings for the same building. The set of drawings to be prepared shall include Foundation/ Centerline plan (considering Load Bearing as well as R.C.C. frame structure type), Floor Plan, Lintel level plan, terrace Plan showing roof drainage arrangement, Sections, All elevations, Details of stair, Doors and Windows, Flooring pattern, Kitchen, Architectural features etc. (set of min. 10 drawings of imperial size prepared to facilitate the execution of building).

Study and use of building specifications in formulation of working drawings.

Detailed specifications to be part of architectural working drawings.

Part of working drawing portfolios on AutoCAD.

**Reference Books:**

1. Architectural Detailing by E. Allen and P. Rand
2. Principles of Architectural Detailing by S. Emmitt
3. Modern Architectural Detailing by K. Gatz
4. Working Drawing Handbook by R.C. Mchugh
5. All reference books mentioned for course Construction-V & VI

**Method of Assessment:** Manual & Computer Aided Working Drawings portfolio.

**Pre-Requisites:** *Nil*

**ARL306 CONSTRUCTION - VI (2-0-0-4)**

**Objectives**

1. Understanding various types of RCC roofs possible for buildings, their suitability for different loading patterns and functional requirements.
2. Acquiring knowledge to make interior spaces well lit by natural light admitted from roofs. Exposure to various types of skylights and fixing of glazing in skylights.
3. Understanding the function, mechanism, details, etc. of suspended ceilings for indoor spaces
4. Understanding the mechanism of preventing ingress of moisture and rain water inside buildings to protect buildings from deterioration.
5. Understanding the function, mechanism, details, etc. of various types of joints required in buildings
6. Understanding possibilities of cladding the building with various materials. Study of details of fixing of various cladding materials and systems.
7. Understanding the causes of defects in buildings and the preventions required; knowledge of various tests to control quality of construction work and tests to be carried out to find defects in buildings.

**Contents**

Introduction to building construction. Understanding relationship between architectural design, building construction, building materials, etc.

R.C.C. roofing systems, North light roofing, Skylights in R.C.C., Coffered/Grid slabs, Flat and Flat plate slabs, Lift slab etc.

False ceiling: Types, Materials & Construction details.

Waterproofing, old and new materials and methods, water proofing of roofs, slabs, foundations, basements, swimming tanks etc.

Expansion Joints, considerations, materials and methods of constructing expansion joints in buildings. General study of various external cladding materials and systems, curtain walling in various materials, construction details of glass curtains.

Study of causes of defects in building such as cracks, seepage, deflection etc. and their remedies. General idea of non-destructive tests such as Rebound Test, Penetration and Pullout Test etc., rehabilitation methods - Grouting, Guniting, Jacketing etc. General study of special chemicals used in construction and repairing work.

**Method of Assessment:** Notes, Plates, Assignments and Tests on above topics.

**Reference Books:**


1. Construction of Building, By R Barry, Orient Longman ltd.
2. Building Construction Handbook, By R Chudley, British library cataloguing,
3. Building Construction Illustrated, By Francis OK Ching, Van Nostrand Reinhold Ltd.
4. Building Construction. By S.C. Rangwala, Charotar Publishing House.
5. Building Construction, By B.C. Punmia, Laxmi Publications Pvt. Ltd.
6. Building Construction Handbook, By W B Mckay, Longmans Green and Co, London, New York
7. Advanced Building Construction By Mitchell, Allied Publishers Pvt. Ltd.


**Pre-Requisites:** *Nil*

**ARL 307 HISTORYOF HUMAN SETTLEMENTS (3-0-0-6)**

**Objectives:**

The course is intended to give insight into the practice of settlement planning, its emergence over time in India and abroad. Further course is intended to explore the physical structure of human settlements as a resultant of various factors (physical and non-physical).

**Contents**

Introduction to relationship between Man, Nature, Culture and city forms.
Study offactors influencing, growth & pattern of human settlements.Types of settlement forms, etc.
City planning in Indian context from Pre-historic to ancient to colonial.
Comparative study of City planning concept from ancient to contemporary period, in Western context.
City planning in post Independence India.

**Sessional work:** Notes, Seminars, assignments on above topics.

**Reference**:


1. Begde, Prabhakar: Ancient and Medieval Town Planning in India
2. Broadbent, Geoffery: Emerging Concepts in Urban Space Design, Van Nostand Reinhold, 1990
3. Gallion,Arthur& Eisner, Simon: The Urban Pattern
4. Jain, Kulbhushan: Indian Cities in Arid West
5. Kostoff, Spiro: City Shaped: The elements of Urban Form through history, Little Brown, 1992 Boston.


**Pre-Requisites:** *Nil*

**ARL 308 LANDSCAPE ARCHITECTURE (2-0-2-4)**

**Objectives:** Subject aimsto make students aware of architecture beyond building, in the outdoor , environment and spaces.

**Contents**

The scope of the subject is to make students aware of architecture beyond building, in the outdoor . environment and spaces, and, the role and importance of landscaping and site planning in enhancing and improving the quality of building environs, functionally and aesthetically.

Introduction to Landscape Architecture, definitions, importance, need and scope. Levels of landscape planning and design.Relationship between landscape design and architectural design.Historical development of landscape architecture.Origin of gardens. Design principles, salient features and elements of various gardens in history-like Egyptian, Persian, Spanish, Italian, French, English,American, Japanese, Moghul, Indian etc.

Modern garden development.Changed scenario for contemporary garden designs.Effect of industrialization on garden designs.Company towns, Parks movement, green belts, urban parks, residential gardens, Small gardens.

Different factors and components of a landscape.Social and economical factors.Psychological considerations of spaces and enclosures. Brief idea about man made components like walls, fences, entrances,

“gates, barriers, screens, planters, roads & pathway, street furniture, signage’s, services - electrical, water supply" and drainage. Basic natural components-land trees, water and climate.

Land: Different aspects of land as a landscape element - soils, geology, topography, earth forms, levels, foundations, grading, drainage, paved and un paved surfaces. The importance and use of the aspects as a landscape design element.

Plants: Different aspects of trees, shrubs, climbers, hedges, lawns as landscape elements. Basic horticultural idea about plants, plant selection, planting design and care of plants. Importance and use of the aspects as a landscape design element.

Water: Various forms of water elements in a landscape - fountains, waterfalls, pools, cascades, channels, irrigation etc. importance and use of water as a landscape design element. Construction of various water elements

Climate: Macro and micro-climatic considerations in landscape architecture. Effect of climate on the landscape and various components of landscape on the microclimate.Relationship between climate, landscape and architecture.

**Sessional work:** Notes, sketches, tests and seminars based on the above topics! task related to Design Studio Project.

**References**:


1. LandscapeArchitecture By JO. Symonds, McGraw Hill Publications.
2. Earthscape BY JO. Symonds, McGraw Hill Publications.
3. Architecture -A manual of site planning and design By J O. Symonds, McGraw Hill Publications.
4. Site Planning By Kevin Lynch.
5. Site Planning By R. Genebrooks, Prentice Hall Publication.


**Pre-Requisites:** *Nil*

**AML481 – STEEL STRUCTURES [( 3-1-0); Credits: 8]**

**Objective**: To introduce structural material i.e. structural steel and their mechanical properties, familiarize various elements/ component of steel structures, analysis of structure and behavior of each element under static gravity loading and introduce the concept of design of structural members of steel structure building subjected to tension, compression, shear and bending.

IS800: Study of IS800

IS875: Study of IS875- Part 3, wind loads for trusses and industrial buildings

Tension members: Design of tension members

Compression members: Design of compression members

Flexural members: Design of bending members with standard rolled section

Connections: Design of simple connections, splices.

**References**:


1. Duggal, S.K. “Design of Steel Structure”, Tata McGraw Hill, New Delhi, 2005.
2. Negi, L. “Design of Steel Structure”, Tata McGraw Hill.


**ARP 306 CONSTRUCTION STUDIO- VI (0-0-2-2)**

**Objectives**

1. Preparing drawings and plates of various types of RCC roofs with details.
2. Drawings sectional details of glazing systems for skylights in RCC roofs
3. Learning to design false ceilings for required functions and drawings fixing details of suspended ceiling components
4. Plates showing different building components installed with water proofing and damp proofing layers and methods
5. Illustrating joints types and joint filling materials and methods
6. Understanding and preparing fixing details of cladding with various materials and systems
7. Learning to spot various building defects through visual survey and tests; illustrating on plates showing causes and prevention of defects

**Contents**

The course shall focus on application of construction theory from Construction - VI, in the form of preparation of Drawings, Plates, etc.

R.C.C. roofing systems, North Light Roofing, Skylights in R.C.C., Coffered/Grid slabs, Flat and Flat plate slabs, Lift slab etc.

False ceiling: Types, Materials & Construction details.

Waterproofing, old & new materials & methods, water proofing of roofs, slabs, foundations, basements, swimming tanks etc.

Expansion Joints, considerations, materials and methods of constructing expansion joints in buildings.

General study of various external cladding materials and systems, curtain walling in various materials, construction details of glass curtains.

Study of causes of defects in building such as cracks, seepage, deflection etc. and their remedies. General idea of non-destructive tests such as Rebound Test, Penetration and Pullout Test etc., rehabilitation methods - Grouting, Guniting, Jacketing etc. General study of special chemicals used in construction and repairing work.

**Method of Assessment:** Notes, Plates, Scaled Models and Tests on above topics.

**Reference Books:**


1. Construction of Building, By R Barry, Orient Longman ltd.
2. Building Construction Handbook, By R Chudley, British library cataloguing,
3. Building Construction Illustrated, By Francis OK Ching, Van Nostrand Reinhold Ltd.
4. Building Construction. By S.C. Rangwala, Charotar Publishing House.
5. Building Construction, By B.C. Punmia, Laxmi Publications Pvt. Ltd.
6. Building Construction Handbook, By W B Mckay, Longmans Green and Co, London, New York
7. Advanced Building Construction By Mitchell, Allied Publishers Pvt. Ltd.


**Pre-Requisites:** *Nil*

**ARP 309 DESIGN STUDIO - VI (0-0-6-6)**

**Contents**

The course of the semester shall include development of design skill and creative abilities ,to understand, explore and create duality, multiplicity and complex architectural relationships of design elements ( parts) to a designed environment (unified whole).Design considerations for climate, surrounding physical environment, light, ventilation, etc., under various physiographic& climatic situations to be studied and adopted in design.

Introduction to specialized building types, their design needs, services and structure.

Understanding of culture as a major determinant of architectural form.

Introduction to complex functional organization of activities with respect to: Nature of site and topography, Climatic influence on form, Traditional Cultural attitudes and construction-structural possibilities.Design studies and explorations in understanding of complex architectural spaces and forms on contoured sites shall continue.

Study and explorations in architectural image & meaning ofform, and its organization. Complex multi-cellular architectural forms shall culminate in design of Integration of building services in architectural design, structural Concept of space module, modular repetition, in design, its relation with structural and aesthetical form of the building.

**Sessional work:** One design project, along with other design tasks and assignments.

**Suggested design projects:** Commercial, recreation, hospital & other public, religious, cultural, multifunctional buildings (Multi level / contoured site)

**References**:


1. Antoniades, C.Anthony: Epic Space: Towards roots of Western Architecture
2. Ching, D.K. FrancisArchitecture: Form, Space And Order, Van Nostrand Reinhold, New York, 1996.
3. Gibbered, Fredrick: Town Design
4. Giedion, Siegfried; Space, Time and Architecture. ,Harvard University Press, 1963


**Pre-Requisites:** *Nil*

**ARP 310 WORKING DRAWING STUDIO-II (0-0-4-4)**

**Objectives**

1. To make students aware about the importance of Working Drawings for a flawless execution of project, quality construction, preparation of estimate and tender documents, etc.; and accordingly draw architectural detailing for their projects.
2. Understanding the complexities of large scale projects and preparing working drawings as per a standard method / system by a team of architects and draftsmen
3. Learning to prepare architectural details of toilets, bathrooms, kitchens, etc.
4. Learning to prepare architectural details for installing plumbing, sanitary waste water disposal systems, electrical installations, etc. in buildings
5. Learning to show details of site development and landscaping
6. Learning to prepare a set of drawings for special architectural components, such as grills, railings, other fabrication work, doors and windows details, etc.

**Contents**

In continuation of previous semester, students shall be required to handle the projects of greater magnitude in this semester and they shall be trained to prepare working drawings of a class problem already completed in design class having multi storied R.C.C. framed structure. A set of working drawings shall contain the followings.

Centerline plan, all floor plans, lintel and slab level plans,

Sections, elevations and large scale details.

Site development plan showing landscaping, roads.

Toilet details, Drainage Layout showing soil, waste and rain water drainage system. Sanitary fittings, traps, inspection chambers etc.

Water supply layout indicating supply tapping point with meter, supply line to storage tanks and connections to different equipment's in building.

Electrical layout showing meter board and power supply lines to different parts of building and different equipment's.

**Reference Books:**

1. 'Architectural Detailing' by E. Allen and P. Rand
2. 'Principles of Architectural Detailing' by S. Emmitt
3. 'Modern Architectural Detailing' by K. Gatz
4. 'Working Drawing Handbook' by R.C. Mchugh
5. All reference books mentioned for course Construction-V & VI

**Method of Assessment:** Manual & Computer Aided Working Drawings portfolio.

**Pre-Requisites:** *Nil*

**ARP 311 INTERIOR DESIGN STUDIO – I (0-0-4-4)**

**Objectives:** This subject aims to deal in detail with various aspects of space interiors.

**Contents**

This subject deals in details with various aspects of space interiors. Students get opportunity to understand qualities of spaces and develop their skills in designing for functional and meaningful interior space.
Principles of Interior Design, Theory of colours, Function and character of space.

Meaning and significance of interior design, Historical review of Interiors in Indian & Western context as regards to concepts, Understand terms like Style, Fashion, Decoration etc.

Anthropometry and ergonomics study, Parameters of comforts, Human space relationship

Study offurniture designs, Built-in furniture, Movable furniture, Modularfurniture.

Qualities and settings of interior space, Historical settings, Regional setting & ethnic settings, Contemporary interiors for creating image and identity.
Interior design project and case study.

**Sessional work:-** Sketches, reports and design problems based on the above topics like theme based interior design.

**References**:

1. Understanding Human Engineering: an Introduction to Ergonomics by John Hammond
2. Interior Design in the 20th Century by Alien Tate, C. Ray
3. Interior Graphic & Design Standards by S. C. Reznikoff

**Pre-Requisites:** *Nil*

**ARL 401 ADVANCE CONSTRUCTION - I (2-0-0-4)**

**Objectives:**

- To understand and utilize advanced and complex aspects of construction.
- To make students aware of systems and techniques of construction used to cover large spans

**Contents**

- Introduction to space structures, possibilities in different materials, types of space structures and possibilities in different materials to cover large spans.
- General study of shell structures and folded plate structures in concrete: Their types, constructional aspects, merits and demerits etc.
- General study of Grid structure and Skeletal structures, space frames, domes etc. in steel: Their types, constructional aspects, merits and demerits etc.
- Precast concrete: Design considerations and constraints, advantages over cast in situ construction, construction technique, jointing details and applications.
- Study of Prestressed concrete, principles and methods of Prestressing, systems of prestressing, advantages, disadvantages and applications.
- Modular coordination, RCC fabricated roofing system to cover large span, with or without North light. Construction of Basement in R.C.C.
- Temporary structures: Materials and techniques used, constructional aspects using timber and Steel.

**Method of Assessment:**Notes, Plates, Assignments (Problems) and tests

**References:**
1. Principles of Space Structures by N. Subramanian, A. H. Wheelers.
2. The Construction of Buildings 1-5 Vol. By R. Barry, Orient Longman Ltd.
3. Construction Technology 1-4 Vol. By R. Chudley, British Library cataloguing.
4. Building Construction By S. P. Arora& S. P. Bindra, Dhanpatrai& Sons, Delhi.
5. A.J. handbook of Building Structures by A. Hodgkinson.
6. Advanced Building Construction BY Mitchell.

**Pre-Requisites:** *Nil*

**ARL402 ADVANCE BUILDING SERVICES -I (2-0-0-4)**

**Objective:**
The aim of the course is to respond to the demand for building services and space provisions to be made therein. It includes the basic knowledge of engineering and management principles of the services like electro-mechanical means of vertical transportation in buildings and air conditioning systems along with the code requirements as applicable. The subject being multi-disciplinary in nature,focuses on the basic technical understanding and expertise across the multi-disciplines of building services and architect as the co-ordinator of the design of space.

**Contents**

Study of Electro-mechanical means of vertical transportation in buildings, requirements, occupancy, load etc. study of elevators, various components of elevators, standard space requirements, various types of elevators and architectural implications.

Escalators: Their components, arrangement and functioning, space requirements, constructional detailing.

Ventilation of buildings, Natural and mechanical ventilation, need of mechanical ventilation, Exhaust fans, Axial flow fans, Blowers for Industrial ventilation.

Principles of Psychometrics and heat transfer. Study of Air Conditioning systems and their applicability, Unit AC's, Central AC's, Split AC's

Components of AC systems such as chilling plants, cooling towers, air handling units, Calculation of AC loads.

Air distribution systems, ducts and ducting layouts, Space requirement. Integration of AC system in design.Water demand for Air Conditioning.

**Method of Assessment:** Term tests along with the site visit studies and assignment based on the air-conditioning provision of a small space.

**References**:
1. Indian Practical Civil Engineers Hand Book by P. N. Khanna, Engineers Publishers, New Delhi.
2. Buildings Services and Equipment's-I & 11 Vol. By F. Hall, Longman Group Ltd.
3. Basic Refrigeration and Air Conditioning by P. N. Ananthanarayan, Tata McGraw-Hill Education, 2013
4. Mitchell'sAdvanced Bldg. Construction (components, services & finishes), Allied publishers.
5. National Building Code.

**Pre-requisite: Nil**

**ARL 403 PROFESSIONAL PRACTICE (2-0-0-4)**

**Objectives:** to acquaint the students, with various aspects of the profession and his responsibilities towards profession, clients and society.

**Contents**

The study of this subject is to acquaint the students, while giving basic information, with various aspects of the profession and his responsibilities towards profession, clients and society.

Introduction, Nature of profession and its importance in Indian context.Architect's responsibilities and relationships.Important considerations for engaging Architectural services.

Education of an Architect and various avenues open. Setting up of practice, various forms and their important considerations.

Responsibilities and liabilities of, and relationship between, consultant, client and contracting organization.

Conditions of engagement and scale of charges.Stages of Architectural services.

The Architects Act 1972 & its effect on profession and education.Registration of Architect, code of professional conduct.

Professional organizations, Architectural competitions.

The architect and his organisation. Objectives, management and administration, job organisation, and office set up. Human relations and personal management, Professional promotion and other important considerations.

**Sessional work:** Notes,Assignments and Class Tests.

**References**:

1. Handbook on Professional Practice, By The Indian Institute of Architects
2. Handbook of Professional Documents, By Council of Architecture, New Delhi
3. Professional Practice by RoshanNamavati

**Pre-requisite: Nil**

**ARL404 URBAN AND COMMUNITY PLANNING (2·0·0·4)**

**Objectives:** The objective of the course is to introduce students to the field of urban planning through deliberations on emerging issues in urban areas, conventional planning principles and approaches and emerging ideologies, tools and methods for design and development of urban areas.

**Contents**

Modern urban planning concepts & ideas
Principles of City planning, contemporary city form & structure.
City Planning process & implementation frame work.
Types, levels and methods of planning.
Introduction to planning legislation.
Contemporary city planning: Concern & experiences in Indian context, learning from Chandigarh, Delhi, etc.
Contemporary urbanization trends in India, Urban & rural housing, Current urban issues.

**Sessional work:** Notes, Seminars, assignments on above topics.

**References**:
1. Begde, Prabhakar: Ancient and Medieval Town Planning in India
2. Broadbent, Geoffery: Emerging Concepts in Urban Space Design, Van Nostand Reinhold, 1990
3. Gallion,Arthur& Eisner, Simon: The Urban Pattern
4. Jain, Kulbhushan: Indian Cities in Arid West
5. Kostoff, Spiro: City Shaped: The elements of Urban Form through history, Little Brown, 1992 Boston.
6. Siddhartha, K &Mukhe~ee S: Cities, Urbanization & Urban Systems

**Pre-requisite: Nil**

**ARP 401 ADVANCE CONSTRUCTION STUDIO I (0-0-4-4)**

**Objectives:**
- To understand and utilize advanced and complex aspects of construction.
- To make students aware of systems and techniques of construction used to cover large spans
- The course shall focus on application of construction theory from Advanced Construction – I, in the form of preparation of Drawings, Plates, etc.

**Contents**
- Introduction to space structures, possibilities in different materials, types of space structures and possibilities in different materials to cover large spans.
- General study of shell structures and folded plate structures in concrete: Their types, constructional aspects, merits and demerits etc.
- General study of Grid structure and Skeletal structures, space frames, domes etc. in steel: Their types, constructional aspects, merits and demerits etc.
- Precast concrete: Design considerations and constraints, advantages over cast in situ construction, construction technique, jointing details and applications.
- Study of Prestressed concrete, principles and methods of Prestressing, systems of prestressing, advantages, disadvantages and applications.
- Modular coordination, RCC fabricated roofing system to cover large span, with or without North light. Construction of Basement in R.C.C.
- Temporary structures: Materials and techniques used, constructional aspects using timber and Steel.

**Method of Assessment:**Notes, Plates, Case study Reports, Assignments (Problems) and tests

**References:**
1. Principles of Space Structures by N. Subramanian, A. H. Wheelers.
2. The Construction of Buildings 1-5 Vol. By R. Barry, Orient Longman Ltd.
3. Construction Technology 1-4 Vol. By R. Chudley, British Library cataloguing.
4. Building Construction By S. P. Arora& S. P. Bindra, Dhanpatrai& Sons, Delhi.
5. A.J. handbook of Building Structures by A. Hodgkinson.
6. Advanced Building Construction BY Mitchell.

**Pre-requisite: Nil**

**ARP 405 DESIGN STUDIO· VII (0-0-6-6)**

**Objective:** To make student understandcomplex architectural relationships of design elements (parts) to a designed environment (unified whole).

**Contents**

Development of design skill and creative abilities, to understand, explore and create duality, multiplicity and complex architectural relationships of design elements (parts) to a designed environment (unified whole).

Introduction to specialized building types, their design needs, services and structure.

Understanding design relationship between structural possibilities & architectural form.

Initiation to multi-level, high rise, building complexes and building regulations, Bye laws, norms & development controls for their design.

Study and analysis ofTraditional architectural environments.

Integration of building services and climatic concerns in architectural design, under varying conditions.

**Sessional work:** One Design project alongwith two small tasks / assignments.

**Suggested Projects:** Cultural center, Hospital, Museum, Group housing, Institutional building, etc

**References**:


1. Antoniades, C. Anthony:Epic Space: Towards roots of Western Architecture
2. Broadbent, Geoffery: Emerging Concepts in Urban Space Design, Van Nostrand Reinhold, New York, 1990
3. Brolin, Brent: Failure of Modern Architecture
4. Ching, D. K. Francis. Architecture: Form, Space and Order, Van Nostrand Reinhold, New York, 1996
5. Gibbered, Fredrick: Town Design
6. Giedion, Siegfried; Space, Time and Architecture, Harvard University Press 1963


**Pre-requisite: Nil**

**ARL 406 ADVANCE CONSTRUCTION - II (2·0-0·4)**

**Objective:** Aims at familiarizing students to complex and advanced systems of construction

**Contents:**

General study of construction techniques to cover large spans using short length timber and laminated timber material, lamella roofing, portal frames, solid beams and web beams.

General study of suspension structures & Catenary structures.

Membrane structures and pneumatic structures: Types, materials used, merits, demerits and examples.

High rise building: Foundations, structural systems and architectural design considerations.

Construction project: Design & detailing of long span structure in steel or RCC using advanced light weight construction system.

Earthquakes and its effect on buildings, Earthquake zones in India, Architectural design considerations and constructional detailing for Earthquake resistance.

**Sessional work:** Sketches, reports, based on the above topics.

**References**:


1. Structure in Architecture by M. Salvadorri.
2. Advances in Tall Buildings by I. S. Beedle.
3. The Construction of Buildings 1-5 Vol. By R. Barry, Orient Longman Ltd.
4. Construction Technology 1·4 Vol. By Chudley, British Library Cataloguing.
5. Building Construction by S. P. Arora& S. P. Bindra, Dhanpatrai& Sons, Delhi.
6. Advanced Building Construction By Mitchell.
7. Building Construction Illustrated by Francis D. K. Ching, Van Nostrand Reinhold Ltd.
8. National Building Code
9. Concrete Technology by M. S. Shetty - S. Chand & Co.
10. Explanatory Handbook on Codes for Earthquake Engineering, IS -1893 -1975 & IS - 4326 -1976, Bureau of Indian Standards.


**Pre-requisite: Nil**

**AML483 – EARTHQUAKE RESISTANT STRUCTURES [( 3-1-0); Credits: 8]**

**Objective**: This course is aimed at introducing the basic principles of earthquake resistant structures to Architecture students. With the help of past performances, the effect of various architectural features on seismic behavior of structures will be explained.

Introduction on Earthquakes, Magnitude and Intensity, Zones, etc
Seismic Effects on Structures, Calculation of Seismic forces on simple regular buildings, factors affecting seismic loads.
Architectural features affecting buildings during earthquakes, building irregularities,
Introduction to IS:1893 and IS:13920.
Building behavior during past earthquakes
Earthquake effect on RCC, Steel and masonry buildings, precautions, dos and donts.
Introduction to earthquake effect on non-structural elements.

**References**:


1. Dowrick, D. L. "Earthquake Resistance Design for Engineers and Architects", John Willey & Sons, 2nd Edition, 1987.
2. Agarwal, P. and Shrikhande, M., "Earthquake Resistant Design of Structures", Prentice Hall of India, New Delhi, 2006
3. _____"IITK-BMTPC Earthquake Tips", National Information Center of Earthquake Engineering, IIT Kanpur. www.nicee.org
4. _____"Guidelines for Earthquake Resistant Non-Engineered Construction", National Information Center of Earthquake Engineering, IIT Kanpur. www.nicee.org


**ARL407 ADVANCE BUILDING SERVICES - II (2·0·0-4)**

**Objective:**
This course aims to provide a broad basis of advanced understanding in the areas of building services and energy management, with particular emphasis on fire fighting services, electrical services for larger premises, other low voltage systems and Building Automation system. It focuses on the preparation of integrated service layouts and the co-ordination from the architect.

**Contents**

Introduction to fire safety in buildings, causes of fire in buildings, types of fire, spread of fire, production of smoke and poisonous gases. Fire safety and preventive measures. Fire fighting regulations with reference to National Building Code. Fire escape, Stairways and escape routes, Dry and wet risers, water demand for fire fighting, storage tanks, fire hydrants, etc.

Study of fire detection systems, Smoke detectors, heat detectors, fire alarms, etc, Fire extinguishing systems, Unit fire extinguishers, Chemical and foam extinguishers, Automatic sprinkler system.

Services for special building types (Hospitals, Laboratories, Industries)

Electric supply and distribution for group housing projects, Urban Complexes, High rise buildings etc. Study of load calculations and distribution systems for larger areas as mentioned above. Importance and function of - Bus-Bar, Step up/down transformer, Electric substation, Lightning conductors, standby generators, Automatic relays, Inverters, Circuit breakers, etc.

Telephone and communication systems, Intercommunication systems in building, Telephone wiring systems, Video conferencing, Computer networks, Cable ducts and trenches and conduits to accommodate the systems.

Introduction to Building Automation Systems, components and application of BAS and architectural implications.

**Method of Assessment:** Term tests along with the site visit studies and assignment based on the integrated drawing of the service layout for a space design.

**References:**


1. Electrical systems for Architects By Aly S. Dadras,
2. Building Engineering and System Design be F.S. Merritand J. Ambrose.
3. Indian Practical Civil Engineers Hand Book by P. N. Khanna, Engineers Publishers, New Delhi.
4. Building Services and Equipment's-I & 11 Vol. ByF. Hall, Longman Group Ltd.
5. Life Safety Code, National Fire Protection Association.
6. National Building Code.


**Pre-requisite: Nil**

**ARL 408 OFFICE PRACTICES (3-0-0-6)**

**Objective:** To acquaint the students with various techniques and specialized areas of profession.

**Contents**

The study of this subject is to acquaint the students with various techniques and specialized areas of profession.
Project management.

Tender: Types, tendernotice, tender documents, and various procedures.

Contract: Types, procedures, document, and various conditions of contract with special reference to responsibilities and liabilities of Architect, contractor and client.

Arbitration and its proceedings, Fire insurance and Architectural Copyright.

Easement rights, Dilapidations, repairs and fair rent.

General introduction to various Acts and Laws related to Land acquisition, Town planning, Urban land ceiling and Conservation of Architectural heritage.

**Sessional work:** Notes, Tutorials & Report Writing on above topics.

**References:**

1. Handbook on Professional Practice, ByThe Indian Institute of Architects
2. Handbook of Professional Documents, By Council of Architecture, New Delhi
3. Professional Practice by RoshanNamavati

**Pre-requisite: Nil**

**ARL 409 ACOUSTICS (2-0-0-4)**

**Objectives:**
The focus of this course is on Architectural acoustic theory and practice. This course will explore the physics and perception of sound, the characteristics of sound and vibration in spaces, and their place in the development of holistic design concepts. Qualitative and quantitative and standard measurement methods in acoustic quality measurement & analysis will be presented and discussed thus providing an introduction to the acoustic design spaces along with appropriate building constructions for the solution of practical noise problems.

**Contents**

The Study of this subject will make students realise the importance of sound in architectural spaces and necessity of manipulating acoustical environment in buildings.

Introduction and Fundamentals, Human ear, Sensitivity of hearing, inverse square law, Decibel scales for intensity, pressure and power, Loudness perception. Sound Level meters.

Sound absorption, Absorbing materials and their classification, sound reflection, diffusion, diffraction.

Reverberation and reverberation time calculation. Dead and live rooms, Speech interference criteria and noise criteria, Acoustics of classrooms. Articulation index. Constructional and planning measures for good acoustical design of concert halls, Acoustical defects and remedies.

Sound Isolation, Transmission loss, Mass law, STC rating, TL for single and double walls, composite transmission loss, sound leaks and flanking. Broadcasting studios.

Noise and Noise Control: Noise and people, noise criteria curves, noise from ventilating and air conditioning systems. Floor and ceiling construction for noise isolation. Floating floors, outdoor barriers for noise control.

Sound Reinforcement Systems, Central and Distributed loudspeaker systems, Components, Design Criteria.

**Method of assessment :**Term tests and exercise based on acoustic measurement / simulation of a space.

**Reference books :**
1. Concepts in Architectural Acoustics By D. Egan
2. Architectural physics By B. G. Hopkinson
3. Architectural acoustics by Marshall Long
4. Environmental Science in Building By Mac Millan
5. Auditorium Acoustics and Architectural Design by M. Barron.
6. Acoustics in Building Design by K.A. Sirsikar
7. Architectural Acoustics and Illumination by Dr. R. G. Edkie

**Pre-requisite: Nil**

**ARL 410 ILLUMINATION (2-0-0-4)**

**Objectives**
This course aims to develop a comprehensive understanding of illumination design practice for buildings and surroundings. It familiarizes the student with lighting units, lighting equipment, lighting design, and lighting calculations. It also aims to explore some lighting design software.

**Contents**

The scope of the subject is to impart knowledge of basic Illumination Engineering and prepare the students to design illumination system for the common indoor and outdoor spaces.
Light radiation, its units, Laws of illumination, Inverse Square law and Cosine law.
Artificial light calculation by Lumen Method and Point by point method.
Light sources & lighting systems.
Luminaries their types and uses.
Exterior lighting for monuments, gardens, fountains, sculptures etc.

**Method of assessment:** Term tests and Design exercise on Illumination for indoor spaces.

**References:**
1. Handbook of Architectural Technology By H. J. Cowan
2. Architectural Interior Systems By J. E. Flynn
3. Day lightening Design and Analysis ByC. L. Robbins
4. Architectural Acoustics and Illumination by Dr. R. G. Edkie, EkweeraPrakashan

5. Lighting Design Basics, Mark Karlen, James R. Benya, Christina Spangler, John Wiley & Sons, 2012

**Pre-requisite: Nil**

**ARP 406 ADVANCE CONSTRUCTION STUDIO – II (0-0-2-2)**

**Objective:**Aims at familiarizing students to complex and advanced systems of construction

**Contents**

The course shall focus on application of construction theory from Advanced Construction -11, in the form of preparation of Drawings, Plates, etc.

General study of construction techniques to cover large spans using short length timber and laminated timber material, lamella roofing, portal frames, solid beams and web beams.

General study of suspension structures & Catenary structures.

Membrane structures and pneumatic structures: Types, materials used, merits, demerits and examples.

High rise building: Foundations, structural systems and architectural design considerations.

Construction project: Design and detailing of long span structure in steel or R.C.C using advanced light weight construction system.

Earthquakes and its effect on buildings, Earthquake zones in India, Architectural design considerations and constructional detailing for Earthquake resistance.

**Sessional work:** Sketches, reports, based on the above topics.

**References**:


11. Structure in Architecture by M. Salvadorri.
12. Advances in Tall Buildings by l. S. Beedle.
13. The Construction of Buildings 1-5 Vol. By R. Barry, Orient Longman Ltd.
14. Construction Technology 1·4 Vol. By Chudley, British Library Cataloguing.
15. Building Construction by S. P. Arora& S. P. Bindra, Dhanpatrai& Sons, Delhi.
16. Advanced Building Construction By Mitchell.
17. Building Construction Illustrated by Francis D. K. Ching, Van Nostrand Reinhold Ltd.
18. National Building Code
19. Concrete Technology by M. S. Shetty - S. Chand & Co.
20. Explanatory Handbook on Codes for Earthquake Engineering, IS -1893 -1975 & IS - 4326 -1976, Bureau of Indian Standards.


**Pre-requisite: Nil**

**ARP 411 DESIGN STUDIO – VIII (0-0-6-6)**

**Objective:** To make student understandcomplex architectural relationships of design elements (parts) to a designed environment (unified whole).

**Contents**

Development of architectural response in context of Change and continuity, as a co-existing and continuous phenomena in architecture.

Development of architectural response in strong contextual situations. Design of multiple built-forms / building complexes for residential, commercial or institutional functions.

Development of design skill and creative abilities to design complex muni-level, high rise, specialized building complexes. Integration of advanced building services & climatic concerns in architectural design, under varying conditions.

Understanding the relationship between local level architectural issues & surrounding urban environment.

Settlement level issues like traffic & transportation, slums, architectural conservation, development controls, etc, to be part of the holistic design approach.

Introduction to contemporary architectural issues and concerns in terms of:

Cultural aspects and issues, in architectural design

Emerging construction techniques, services and their impact on architectural form

Energy conservation,Utilization techniques in architecture: Issues & aspects

**Sessional work:** One major Design project, along with two tasks! assignments, etc.

**Suggested projects:** Community group housing, Institutional complexes, Civic centers, High rise Commercial! Residential buldings, Sports complexes, etc.

**References**:


1. Antoniades, C. Anthony:Epic Space: Towards roots of West em Architecture
2. Broadbent, Geoffery: Emerging Concepts in Urban Space Design, Van Nostrand Reinhold, New York, 1990

3. Brolin, Brent: Failure of Modem Architecture
4. Ching, D. K. Francis. Architecture: Form, Space and Order, Van Nostrand Reinhold, New York, 1996
5. Gibbered, Fredrick: Town Design
6. Giedion, Siegfned; Space, Time and Architecture, Harvard University Press 1963

**Pre-requisite: Nil**

**ARP 412 URBAN PLANNING & DESIGN STUDIO (0-0-2-2)**

**Objective:** Relationship between architecture, urban design and planning; city as a three dimensional entity; study of volumes and open spaces at all levels

**Content:**

Study of appropriate planning standards, techniques of population projection, identification of the data to be collected and the
Sources thereof, organizing surveys and collecting socio-economic, traffic and other data

Relationship between architecture, urban design and planning; city as a three dimensional entity; study of volumes and open spaces at all levels

Projecting the future with different scenarios and identification of 'action areas' (i.e., specific problems related with housing, services, circulation, etc.), Study of urban design aspects and their integration in plan preparation, Formulation of development and design strategies and guidelines for the selected area.

**Sessional work:** One major Urban Planning & Design project, along with two tasks & assignments, etc.

**Suggested projects:** Documentation and analysis of any significant area emphasizing on prevalent planning issues and urban design characteristics, Preparation of Action Area Plans, Urban Design Guidelines for selected precincts, etc.

**References**:
1. Edmond Bacon: Design of cities
2. Rob Krier : Urban space
3. Kevin Lynch: Image of City
4. Geoffery Broadbent: Emerging Concepts in Urban Space Design
5. Planning for Conservation

**Pre-requisite: Nil**

**ARC 401 PRACTICAL TRAINING (0-0-0-4)**

**Objective:** Practical training of Six months duration (under a Registered Architect only) envisages the following varied experience in order to ensure the exposure of a student to various tasks.

**Contents**

Practical training of Six months duration (under a Registered Architect only) envisages the following varied experience in order to ensure the exposure of a student to various tasks.

a. Office experience in respect of preparation of Working drawing, Detailing drawing, perspectives, preparation of architectural models, study of filling systems of documents, Drawings, Ammonia prints and preparation of tender document
b. Site experience in respect of supervision of construction activity, observation, layout on site, study of stacking methods of various building materials, taking the measurement and recording.

Students will have to maintain record of their engagement for the period of training. This will be recorded in an log-book to be counter signed by Architect.

At the end of training period student will have to procure a certificate of training and satisfactory performance from the concerned office in the prescribed format.

Certificate of satisfactory completion of training shall be submitted to the Institution immediately after the training through the Head, Department of Architecture & Planning along with the report and drawings made during the training period. The student shall appearfor Viva - Voce at a date prescribed by V.N.I. T.

*Faculty member from Department of Architecture & Planning shall visit &apprise himself of the student's performance, at his or her office.

**Pre-requisite: Nil**

**ARD 401 PROJECT PHASE – I (0-0-0-4)**

**Objective:** This course is to equip the students to present project efficiently and effectively.

**Contents**

Seminars are intended to develop the capacity of students to work either in group or individually, undertaking research in a given subject relating to architecture and presenting observations graphically and through seminars presented at different stages. This is to equip the students to present project efficiently and effectively.

**Seminar-I:**

Subject shall be allotted, to group of students! individuals, from the following categories
History of Architecture, traditional architecture
Appreciation! Critical Appraisal of Architectural projects
Research in Architecture.
Role of allied! applied sciences in Architecture.
Contemporary architecture.
Any other subject (as approved by the faculty)

**Seminar-II**

This seminar shall be presented by individual student on the subject related to his! her Thesis project or, of his/ her choice (as approved by the faculty). The said Seminar would include analytical study of the subject, supported by drawings, etc. Marks shall be granted on the basis of documentation & seminar presentation, contents etc.

**Pre-requisite: Nil**

**ARD 402 PROJECT PHASE - II (0-0-0-8)**

**Objectives:** This marks the culmination of five years of study. It aims to examine how well the student can apply the knowledge gained to the complete architectural design.

**Contents**

The subject of the thesis project shall be selected by the student and approved by the Department. The project selected may be either a live one or a research-oriented one or one pertaining to urban design or of a conceptual nature relating to building or allied programmes. The project and its programming shall be worked out by the student himself or herself under the guidance of the thesis advisor(s).

The project work shall include an intensive study of relevant literature, case studies, Climatology and analysis of problems concerned with the development of functional organisation of space form and structure, based on correlation and interpretation of the social, economic and physical data.

*Project evaluation shall be done as per the guidelines issued by the department."Project work shall be periodically & regularly evaluated as per Project (Thesis) programme.

**Pre-requisite: Nil**

**DEPARTMENTAL ELECTIVES**

**ARL211 CONTEMPORARY DESIGN, THEORY & CRITICISM (3-0-0-6)**

**Objectives:** Understanding of the philosophy and concepts underlying the contemporary architectural thoughts and their expression. This courses also aims to sensitize students to the many lateral issues that have come into focus in contemporary times which require exploration and application to the betterment of the field of architectural design.

**Contents:**

The course shall involve study of spatial order, structural, constructional and material order, manner of articulation, symbols, and meanings, as these evolved in time and space. The course shall include comparative study of building typologies in vernacular and monumental architecture in Modern period.
The elective shall encourage an in-depth study of

- Study of various schools of thoughts.
- Contemporary materials and building processes.
- Contemporary Architecture Expression not limited to any particular period of time, subjects generally focus on contemporary understandings relevant to the basic premises held by architects in their historical settings.

Theory and criticism provides the methodological basis for evaluating the premises, the process, the final product, and the implications (social, formal, conceptual and other) of practices in these artistic and architectural domains.

Alternative vocabularies.

Detail study and analysis oflooks of contemporary Indian and foreign architects.

**Sessional work:** Tests, notes, study.
**References**:

1. Theory of Architecture ByChristian Norbert Schluz
2. A Theory of Architecture by NikosSalingaros
3. A timeless way of building by Christopher Alexander
4. Pattern Language by Christopher Alexander
5. Journal publications on the subject

**Pre-requisite: ARL202**

**ARL 212 ADVANCED BUILDING MATERIALS (3-0-0); CREDITS: 6**

**Objectives:**

- **To select and use the appropriate materials for the real time structures.**
- **To introduce materials used for modern buildings and structures especially for services and finishing**
- **To understand basic principles, appropriate application and performance of construction materials, products, components and assemblies including their environmental impact and reuse.**

**Contents**

- **Finishing Materials: Interior and exterior for various architectural and interior components.**
- **Insulating materials: Organic binders and bitumen & tar based materials like Bitumen, tars, emulsions, mastics, waterproofing items, steam-proofing and sealing materials.**
- **Polymers and polymer-based materials & components - polymers and plastics, polymer based building materials for walls, pipes, sanitary-ware, glues, and mastic.**
- **Metals in advanced building systems: steel cables, structural glazing and curtain walling.**
- **Light weight roofing materials: asbestos, galvanized iron, acrylic, polycarbonate.**
- **"Green" Materials Selection: Factors in material selection, Resources to assist in determining materials appropriateness, Analytical process to evaluate materials for a project, Material considerations when using the LEED rating program.**

**Method of Assessment: Notes, Market survey reports, Presentations, Sessional and End Term Tests**

**Pre-requisite: ARL 103 Building Materials**

**HUL 169 (3-0-0-6)**
Course contents available on webpage of Humanities Department

**ARL213APPROPRIATE TECHNOLOGY (3-0-0-6)**
**Pre-requisite: Nil**
**Contents**

Introduction to the concept of appropriate building technology and services suitable in Indian context, for both rural and urban applications. The subject shall endeavor to enrich the conventional knowledge with alternative / innovative material and construction techniques. The subject shall involve both theoretical and practical aspects of

altemative materials and construction techniques developed in recent past. Traditional building knowledge systems shall also be studied for their contemporary applications.

Study of soil & its composition & properties, suitability of soil for mud walls, soil composition test, plasticity test, test for optimum water content, soil stabilization, etc.

Wattle & daub walls, rammed earth walls, adobe walls.

Walls, vaults, domes using soil cement, compressed mud blocks, Nubian arch roof.
Use of bamboo as building material its properties, available in country.
Burnt clay tile roofing, ferro cement roofing units, doubly curved tile roofing, pre-cast joists.
Minimum of two site visits for on-site studies.

**Sessional work:** Assignments, Tests on above topics.

**Reference Books**

1. Venubharati, By Shri. Vinoo Kale,AproopNirman. Nagpur.
2. Research notes and digest, By CB RI Roorkee

**ARP 214ARCH. PHOTOGRAPHY (0-0-4-4)**
**Pre-requisite: Nil**
**Contents**

Introduction to photography and study of principles. Study of contemporary equipment, films, paper and chemicals.

Darkroom practice, BM' film processing and printing.
Photography practical on:
Simple objects, still life composition with the play of light and shadow.
Historical and modem buildings with surrounding landscape. ;, .,
Architectural details such as staircases, brackets, cornices, louvers columns, inlay design etc.
Indoor/outdoorsculptures, murals etc.
Preparation of BM' slides.
Introduction to modern photography tools and techniques such as digital camera etc.

**ARL 426 COMPUTER AIDED DESIGN (0-2-2-6)**
**Pre-requisite: Nil**
**Contents**

Introduction to Computers, Software, Peripherals and current trends etc.

Use of computers for graphical applications and allied disciplines, various packages in general and their applications.

Use of Computer as a tool for imagination and design.

Introduction to Computer Aided Drawing, various software used such as AutoCAD, Revit, Archicad, Google Sketch, 3-D studio Max etc.

Basics of 2-D drafting, Drawing simple objects, projections and plans etc.
Preparation of 2- dimensional drawings with dimensioning.
Advance AutoCad 2D commands like Dimension, Hatch, Pedit, Array etc.
Creating Layers. Styles, Blocks, Line types etc
Plotting/Printing drawings,Importing& exporting drawings, sending drawings via net.

**Sessional Work:** Exercise on 2-D composition and computer graphics etc.
Drafting plans of simple small objects with details.

**ARL428 COMPUTER GRAPHICS (0-2-2-6)**
**Pre-requisite: Nil**
**Contents**

Introduction to advance 3 D drawing commands used for increasing speed, presentation. Students shall also be exposed to the software of graphical relevance to understand its utility in general practice. The course work shall include.

Drawing 3D Standard Solid models
Drawing 3D planes and surfaces
Complex 3D commands such as Extnude, revolve, meshes and solids
Working in Various UCS
Solid editing in 3D such and add subtract, advanced modification in 3D
General introduction to 3D rendering and light effects

**Sessional work:** Creating 3D compositions, creating simple 3D view of objects etc.

**ARL 312 BUILDING REGULATIONS (3-0-0-6)**
**Contents**

Need ofiegislation in the building industry
Background of controls and regulations.
Need for controls at various levels of City development.

Study ofDevelopment Control Rules & Regulations for A, B & C Class Municipal Councils
Broad Understanding of National Building Code.
Study of requirements of submission drawings with services as required by various sanctioning authorities

**References**:


1. National Building Code
2. Development Control Rules & Regulations for Nagpur.
3. Building Regulations for Class B & C Municipalities.


**ARL 313 ENERGY EFFICIENT ARCHITECTURE (3-0-0-6)**

**Objective:** To study principles of energy efficiency in building design with special emphasis on ECBC
**Contents:** Building design in response to various climates and its impact upon requirements of energy in building
Low energy building strategies and guidelines
Assessment of Energy in building using computer software
Non conventional energy sources and system integrated in building design
Study of Building Envelope Section of ECBC (Energy Conservation Building Codes)
**Sessional work:** Case study, Reports
**References**:


1. Introduction to building Climatology, Antony Sealey
2. Manual ofTropical Housing and Building, O.H. Keonigsberger, T. G.Ingersoll, Alan Mayhew, S. V Szokolay
3. Climate &Architecture, JeffereyEllisAronin
4. General Climatology, Howard J. Crichfield
5. Housing, Climate and Comfort, Martin Evans
6. Tropical Architecture, C. P. Kukreja
7. Man, Climate and Architecture, B. Givoni
8. Solar Control and shading Devices, Olgyay and Olgyay
9. Climatological and. Solar Data for India, CBRI Publication Roorkee
10. http://www.eco3.org/downloads/002-ECBC/ECBC-User-Guide(Public).pdf


**ARL314 BARRIER FREE ARCHITECTURE (3-0-0-6)**
**Objectives**

1. To make students aware about the concept of universal access to public buildings and universal design and sensitising students to understand the importance of designing barrier free environments.
2. Understanding the term disability and barrier, various types of disabilities and the problems faced by the people with disabilities.
3. Principles of barrier free design, guidelines and norms and standards, PWD Act, etc.
4. Study of best practices and examples of barrier free cities and buildings from all over the world
5. Learning the architectural details for creating barrier free built environments
6. Learning to assess and audit the premises and buildings to find problems and solutions, through a case study
7. Providing design interventions for the existing as well as proposed buildings and premises to create barrier free built environment

**Contents**
Definition & categorization of physically challenged people.Need for a barrier free Architecture.
Typical barrier problems of the physically challenged people- parking & approaches to buildings, travel within buildings, etc.
An introduction to minimum standards - Objectives & contents of the standards related to barrier free architecture.
Legislation related to Barrier Free Architecture.
**Reference Books:**


1. 'Barrier Free Environments' by M.J. Bednar, Dowden, Hutchngon& Ross Inc., Stroudsburg, Pennsylvania
2. 'Building Without Barriers for the Disabled' by S.P. Harkness& J.N. Groom
3. 'Barrier-Free Exterior Design: Anyone Can Go Anywhere' by Gary O. Robinette
4. 'Guidelines and Space Standards for Barrier-Free Built Environment for Disabled and Elderly' by CPWD


**Method of Assessment:** Notes, Assignments, Field Surveys, Tests on above topics
**Pre-Requisites:** *Nil*

**ARL 315 VERNACULAR ARCHITECTURE & SETILEMENTS (3-0-0-6)**

**Objective:** To study and understand the principles of Design in Vernacular Architecture and its relevance in contemporary context.

**Contents:**
Defining Vemacular.
Culture, Tradition, Society, Climate and Shelter.
VemacularArchitecture in India.

Study of traditional Building materials and Techniques.
Study of Vernacular Settlement Patterns.

**References**:


1. Fathy, H (1973), 'Architecture for the Poor: An Experimentin Rural Egypt", The University of Chicago Press, USA.
2. Fathy, H (1987), 'Natural Energy and Vernacular Architecture', The University of Chicago Press, USA.
3. Girhe, K.M. (2004), 'Architecture of BhosalasofNagapr- Vol.I", Bharatiya Kala Prakashan, New Delhi, India.
4. Gupt, C. (1996), 'Vidarbha:AitihasikavamBhaugolikPrishthabhumi', VishwarbharatiPrakashan, Nagpur.
5. Jain, K.B. and Jain, M. (2000), 'Architecture of the Indian Desert",AADICentre,Ahmadabad, India.
6. Jain, K.B. (2002), 'Thematic Space in Indian Architecture', AADI Centre,Ahmadabad, India.
7. Jain, U. (1985), "Regionalism - Resource for Identity", Regionalism in Architecture (Exploring Architecture in Islamic Cuhures 2), The Aga Khan Award for Architecture, Bangladesh.
8. Norberg - Schulz, C (1979), "Genius Loci', Riuxxoli, New York.
9. Rapoport,A. (1969), "House Fonn and Culture', Prentice- Hall, Inc. Englewood Cliffs, N.J.
10. Rapoport, A. (1977), 'Human Aspects for Urban Fonn - Towrda a Man-EnvironmentApproach to Urban Fonn and Design', Pergamon Press, UK.
11. Rapoport, A. (1980), "Vemacular Architecture and Cultural Determinants of Form', Building and Society: Essays on Social Development of Built Environment, edited by Anthony D. King, 1980, Routiedge and Kegan Paul Ltd. London.
12. Rudofsky, B. (1964), "Architecture without Architects - A Short Introduction to Non-Pedigreed Architecture', The Museum of Modern Art, New York.
13. Steele, J. (1988), 'Hassan Fathy',AcademyEdititons.
14. Edwards, B., Sibley, M., Hakim, M and Land, P (Ed. 2006), 'Courtyard Housing: Past, Present and Future', Taylorand Francis, New York, USA.


**ARP 316APPROPRIATE TECHNOLOGY STUDIO (0-0-4-4)**

**Contents**

Study of traditional building knowledge systems fortheircontemporary applications.
Types of Bio gas plants, design considerations and construction methods.
Solar energy, its advantages and limitations, solar collectors, solar water heaters, photovoltaic cells, solar lanterns and its applications.
Study of rural Architectural and construction techniques.
Case study of new buildings constructed with improved/appropriate/unconventional techniques and their analysis.
Costing and marketing of APT products. Issues related to transfer of building technology from Lab. to land

**Sessional work:** Visit to building centers engaged in research and development of appropriate technology. Seminars, Reports and Studiodesignproblems using appropriate construction techniques and materials.

**References**:


1. VenuBharati, By Shri. Vinoo Kale, AproopNirman, Nagpur.
2. Research notes and Digest, By CBRI Roorkee


**ARL413 CONSTRUCTION MANAGEMENT (3-0-0-6)**

**Contents**

Historical review of large construction projects and management techniques. Fundamentals of project management, relationship of work, time and cost, stages of project management, (Planning, Scheduling and Evaluation)
Study of bar charts, Milestone charts, Gaunt chart its application in construction process, Work Breakdown Schedule.
Fundamentals of CPM (Critical Path Method), activity, events, floats and slacks, network Construction, time computation, Project completion period.
Introduction to PERT (Project Evaluation and ReviewTechnique), probability, standard deviation etc.
Construction Machinery and Equipments.
Construction site practices, site inspection and instructions for quality control.

**Sessional work:** Sketches, reports and problems on networks.

**References**:


1. Project Planning & Control with PERT & CPM.
2. Construction Planning &Equipments By B. Satyanarayana, S. C. Saxena.


**ARL414 SUSTAtNABLE ARCHITECTURE (3-0-0-6)**

**Contents**

A broad understanding of sustainability and what it means at all levels of society and the concept of building green and the design ,construction and long term impacts on the environment and civilization.
Introduction to the issues and concepts of sustainable architecture, global environment and built environment.
Study of principles of environmental and ecologically sensitive architecture namely energy efficiency, indoor air quality, green materials, green building systems as related to the construction and operation of buildings.

Sustainable and conservation practices - water conservation, sewerage treatment, solid waste treatment, economics and management.

Low energy design, hybrid systems, modeling and simulation of energy systems, integration of PV and wind systems in the building, wind solar and other non conventional energy systems, solar thermal applications for heating and cooling, electricity generation in buildings

Acts, norms, rating systems and assessment tools for sustainable architecture.

Case studies on specific contemporary sustainable architecture/green buildings.

**References**:


1. JooHwa Bay & Boon Lay Ong ,Tropical sustainable architecture(social and environmental dimentions) , London,Arch.Press.
2. Evans.M ,Housing ,Climate and Comfort,London,TheArchitectural Press.
3. Givoni B.,ManClimateandArchitecture,N.Y.VanNostrandReinold
4. GivoniB.Climate considerations in buildings and urban design,NYVanNostrandreinold.
5. FangerM ,Thennalcomfort:Analysis and applications in Environmental engineering,London:Macgraw Hill.
6. Managing the Riaks and Opprtunities of climate Change (www.cers.org)
7. Passive solar design (www.eere.org)
8. ASHRAE(www.ashrae.org)
9. LEED-Guidelines from (www.usgbc.org)


**ARL415 FUNDAMENTALS OF REAL ESTATE (3-0-0-6)**

**Contents**

Introduction to real estate. Relation between real estate and design/planning; site evaluation, location parameters and development planning; Principles. methods and tools for property investment decisions and risk analysis.

Project feasibility, joint ventures, marketing, transfer of property procedures and laws. Approval processes, construction planning and scheduling. Choice of technologies, data bases, inventories, cost controls and pricing mechanism, budgetary planning, etc.

Urbanization - trends and relevance to property management. Urban policies and implications to real estate. Land use structure, Community and neighborhood dynamics.

Govt. policies on public & private housing, infrastructure and its impact on real estate.Fiscal policies, taxation, property taxes, development credit policies and impact on real estate.

Public private participation models and experiences in housing and real estate.

Environmental assessment techniques, components, principles for real estate projects

**Sessional work**: Case studies, reports, etc.

**ARL 416 ARCHITECTURAL CONSERVATION (2-1-0); Credits: 6**

**Objective:**

Explain the significance of built heritage as resource
Identify causes of deterioration and suggest remedial measures
Provide guidelines for designing a new building in a historic context or extension of a historic structure

**Contents**

Conservation, concepts, history, principles and methods.Pioneers of conservation. Definition sand terminology, continuity, change Transformation, Historicity, Values, Authenticity, Preservation, Restoration, and Conservation. Conservation management.

Broad concepts of terms such as Reuse, Rehabilitation, Revitalization, Regeneration, Up gradation, etc. Concept of integrated conservation, related problems, Issues and solutions.

Inventory and Documentation Techniques. Adaptation and introduction of change at site level, urban level, regional level, etc.

Conservation scene in India, Recent works done by various agencies in India: International, National & local, International charters ITC, UNESCO, etc., pertaining to area conservation and historic cities. Approaches to conservation with examples from India and abroad.

Development of conservation in Europe.Pilot projects in Britain during thp-1960's and later. Comprehensive scope of Architectural conservation, Lessons for Indian situation.

The scope of the profession.Legislation and International charters pertaining to conservation of area (urban and renewal) conservation, world heritage sites.

**Sesisonal work:** Case studies, notes and reports.

**References**:


1. Conservation of Historic Buildings Jeilden. M
2. Encyclopaedia of Archaeology Picard Gilbert, Charles.
3. Conservation of cultural property in India A. S. Bizht, I.K Bhatnagar


**Pre-requisite: Nil**

**ARL417 INFRASTRUCTURE PLANNING & DESIGN (3-0-0-6)**

**Contents**

Concepts in urban infrastnucture.Social and physical infrastructure.

Necessity and Importance of Infrastructure.

Intluence of Economic and related development policies, urban agenda, resource development options and strategies on urban infrastructure.

Urban social infrastnucture - qualitative and quantitative techniques of assessing requirements, Planning Amenities and institutions.

Public and private sector role in resource mobilization and infrastructure development and related issues.

Current National and International trends in Infrastnuctural Planning. Technology for execution of such Infrastructure.

**ARL418 URBAN DESIGN (2-1-0-6)**

**Objectives**

The primary objective of the course is to introduce students to prevailing ideas in the field of urban design and its role in improving the quality of life in public realm of urban areas.

**Contents**

Introduction to Urban design, its scope and relevance, relation between Urban design and Urban planning. Level of Urban design - City level, Neighbourhood level, Street level, Individual site level, City planning and Site planning.

Urban form and its elements, Grain, texture, skyline, massing, urban structure, users and activities, communication systems, residential areas, work places and their interrelationships.

Components of Urban design, urban aesthetics and image, Built form and open space, scale, urban spaces and urban places, concept of pedestrianisation, malls and plazas, and various design elements.

**Sessional work-** Study of existing, new and historical urban setups, presentation of study in the form of seminars, and reports. Design proposal for an urban situation.

**References**:


1. Imageofcity – KevinLynch.
2. Site planning - Kevin Lynch
3. Urban Design: Architecture ofTowns and Cities, Paul D. Spreiregen
4. Urban Space-Rob Krier
5. Pattern Language: Christopher Alexander
6. Emerging Concepts of Urban Space - G. Broadbent.


**ARL 419 INDUSTRIAL ARCHITECTURE (3-0-0-6)**

**Contents**

Locational & planning aspects of industrial areas with specific emphasis on selection of site for an industry and site planning of an industry in a comprehensive manner with varied considerations.

Planning considerations for industrial working areas, study of indoor and outdoor working environment as related to industrial process of manufacture, human component as related to illumination, ventilation noise control, role of color in working environment.

Relationship between industrial spaces and structure. Review of structural systems used for industry with general idea about materials used for various components

Services essential for industries, Demand calculation and system detailing of services like water supply, electricity, effluent treatment, communication, etc.

Study of environmental pollution as resultant of industrial activity, review of enactment for controlling the pollution and methods of treatment of industrial pollutants.

Study of various acts as applicable to construction and utilization of industrial structures such as Factory act, Pollution Control Act, Explosives Act and review of legal formalities to be completed by Architect while working on an industrial project.

Considerations of aspects of industrial safety as related to the hazards of fire and industrial process prove to be hazardous to persons working within the industrial spaces and industrial structures.

Architectural design considerations integrating aesthetic qualities in the designing and detailing of industrial structures with meaningful choice of architectural treatments utilizing materials on the cost, ease of maintenance and upkeep.

**Sessional Work:** Notes, report on case study of an industry, drawing and filing various proformas to various authorities.

**ARL420VALUATION (3-0-0-6)**

**Contents**

The aim of this subject is to expose the student to an important part of his profession which is known as valuation. The study shall include the topics as under

Aims & objectives ofvaluafion in respect of Building and Land.

Essential characteristics of value, regarding the building.

Factors affecting the value of built up property - supply and demand, cost of reproduction, occupation of value, Gild edged Security.

Methods of valuation, such as rental method of valuation, land building basis, development method of valuation, valuation for rating purpose, valuation for Governmenttaxation, valuation for mortgage.

Considerations for valuables in Town planning, regarding the plots and development.

Objectives and principles of valuation tables.

**Sessional work:** Notes, exercises on above topics. Study and preparation of valuation report.

**Reference Book**

1. Theory & Practice of Valuation by R. Namavati
2. Valuation of Real Properties by S. C. Rangwala.

**ARL 421 DISASTER MITIGATION (3-0-0-6)**

**Contents**

Disaster - concepts, processes and perceptions - natural and man-made - cause and consequences.

Disaster and natural environment, floods and drainage - soil erosion and landslides - earthquakes,land and building hazards.

Disaster and man-made environment - industrial pollution and health hazards - natural resources damage - social unrest and damage to people and property.

Disaster Management Plans- structure and process, elements of comprehensive disaster management (Preparedness, Response, Recovery and Mitigation), phases for plan making (pre-disaster, durtng and post-disaster), the techno-legal regime- standards for urban development and building construction.

Measures for mitigation and rehabilitation, damage assessment- some issues.

Disaster education - community awareness and action - NGO role and management after disaster, people's participation and self-help measures of mitigation.

Problems of financing and insurance, Role of the Civil Defense during disasters. Case studies - prevention and corrective measure implemented to face natural disasters.

National policies, objectives & standards government structures for warning and Emergency Response; Other external and national assistance organizations.

**Sessional Work:** Notes, seminars, short exercise on plan preparation etc.

**References**:

1. B K Prasad: Sustainable Rural Development for disaster mitigation

**ARL 422 HOUSING (3-0-0-6)**

**Contents**

Housing and human needs, influences on housing. Housing as an integral part of urban & rural development.

Study of housing concepts (e.g. Mass housing, low cost housing, self help housing, Co-operative housing, housing based on income groups and density patterns) and the study of transition from traditional to contemporary pattern of Housing in India.

Space standards for housing schemes and design concepts for cost reduction, use of prefabrication, modular eo- ordination and pre-stressed components etc.

Concept of density standards and relationship of built and unbuilt in housing layouts.

Understanding of Basic infrastructure at layout level.

**ARL 423 TRANSPORTATION PLANNING (3-0-0-6)**

**Contents**

Understanding of the external effects inherent in planning transportation facilities and operations.

Introduction to topics including interaction with land use, economic development, transportation demand, sustainability, safety and security, intelligenttransportation systems (ITS), and context-sensitive solutions.

Brief review of major issues in urban transportation planning. Introduction to Planning process and transportation models. Uses a systems framework, including goals and objectives, evaluation, implementation, and monitoring.

Study of vehicular transportation fundamentals including geometric design, pavement design, traffic flow concepts, level of service analysis, intelligent transportation systems, travel demand prediction methods, and management of transportation systems.

Current and developing procedures for the structural thickness design of pavements. Bituminous and concrete pavements for highways, airports, and special heavy loading.

**References**:

1. Transport Planning and Policy in India by M.a.Dalvi

**ARP 424 INTERIOR DESIGN STUDIO-II (0-0-4-4)**

**Contents**

Study of Interior Design Elements such as flooring, carpets, rugs, tapestry, colour, texture, plants, sculptures, paintings, murals,etc.

Study of lighting such as physical and psychological aspect oflight, Lighting type and use, Lighting fixtures.

Study offlooring, wall paper, paneling and cladding materials, glass and metals etc.

False ceilings, Space dividers, screens, partitions in interiors.

Civil work, General Services, special services and its integration with interior design scheme.

Interior design project and case study.

**Sessional work:** Notes, sketches, Seminars and studio problems on large interior projects such as commercial, residential, hospitality spaces etc.

**ARP 425 LANDSCAPE ARCHITECTURE STUDIO (0-0-4-4)**
**Contents**

Site Planning, Methodology and process of site study. Site survey, data collection, compilation, presentation and analysis techniques.Importance of site planning for landscape design and architecture.

Principles oflandscape design. Functional and aesthetic considerations. Interrelationship and use of various landscape elements/ factors / aspects to form a comprehensive landscape proposal. Landscape design at community and individual house level.

Landscape construction and detailing for the various landscape elements. Their importance and uses.

Specially landscaped places like interiors, terrace gardens, wall gardens, window landscaping etc. - their designing and detailing.

**Sessional work:** Case Studies & Site visits, reports and design problems based on the above topics.
**References**:


1. Introduction to Landscape Architecture By M. Laurie
2. LandscapeArchitecture By J.O. Simonds, McGraw Hill Publications.
3. Earthscape By J.O. Simonds, McGraw Hill Publications.
4. LandscapeArchitecture-Amanual of site planning and design By J.O. Simonds, McGraw Hill Publications.
5. Site Planning By Kevin Lynch.
6. Site Planning By R. Genebrooks, Prentice Hall Publication .


**HUL 483 Subject: Principles of Industrial Management and Psychology:**
**Content**:

- Industrial management, scope and relevance, ailed disciplines, psychology, industrial sociology and management, evolution of management thoughts, principles of industrial management, planning, co-ordination and communication, types of communications.
- Industrial psychology, basic concepts of psychology, learning, perception and motivation. Causes of behaviour, individual differences, intelligence and personality, history of industrial psychology in India.
- Understanding world of work, personnel and human resource management, fundamentals of marketing management, consumer behaviour and advertising, material management, ABC Analysis, ISO 9000 and ISO 14000.
- Foundation of group behaviour, work teams, team morale, motivation, importance and nature, theories of motivation, Maslow, Alder, Herzberg theory of motivation, leadership in industry, nature and types, theories of leadership.
- Conflict and negotiation, conflict management, fatigue in industry, work stress, nature and sources of stress, individual differences, coping strategies, employee counselling, quality of work life.

**ARL 427 GRAPHICS & BASIC DESIGN (3-0-0-6)**
**YEAR OF ADMISSION 2009**
**Pre-requisite: Nil**
**Contents**

The subject is aimed at providing knowledge and understanding of various visual arts and their importance. Understanding design principles and to enhance creativity

1. Enhance creativity through various arts like, painting, crafts, sculpture, graphics, etc.
2. Study of Basic & visual design principles like rhythm, harmony, contrast, balance, symmetry, direction,repetition, pattern, grouping, interruption, scale and proportions
3. Elemenlary design exercises for study and explorations in creation of space using elements like line, plane, form and theirinter-relationship
4. Elementary design exercises to understand creation of space & form, using two & three dimensional compositions/forms
5. Introduction to Drafting, Letterings, Graphical codes, etc.
6. Three dimensional representations-isometric, axonometric and oblique view of solids composition
7. Free hand line sketching and drawing of natural and manmade, indoor and outdoor objects and situations.
8. Study and classification of colours with different Hues, Values & Shades Colour wheel and colour composition, properties (visual and psychological) of colour.
9. Exploring crafts by anyone medium: Clay and pottery workshop, Paper craft and paper machine, Bamboo basket and mat making, Wires sculpture, Wood and thermocol art models, Block making and printing

**Sessional work:** sketches, plates, visual presentation of any art form, compositions (2d-3d), models, using different materials and mediums, 2-D
**References**:


1. Ching, DK Francis. Architecture: Form, Space And Order
2. Rendering with Pen & Ink, By Gill


**ARL 429 BUILDING LEGISLATIONS (3-0·0-6)**
**Pre-requisite: Nil**
**Contents**

The intent of the subject is to make the students familiar with the byelaws to control and promote the ordered growth of a city/town. This section is to be taught keeping in view the fact that, one must know the judicial powers and the effect of byelaws on the development of an urban environment or a human habitation.

Need of legislation in the building industry

Background of controls and regulations.

Need for controls at various levels of City development.

Study ofDevelopment Control Rules & Regulations for Nagpur City.

Study of National building code in relation to specific definitions, architectural controls, services, fire protection etc. (Governing for various public building).

Study of requirements of Buildings with services as required by various sanctioning authorities in Maharashtra.

**References**: National Building Code

Development Control Rules & Regulations for Nagpur.