

## AR1301 ARCHITECTURAL DESIGN – II

Teaching Scheme: 0(L) - 0(T) - 10(P)Credits: 5

### Course Objective:

- To understand space requirements related to human activities and study anthropometric data*
- To introduce students to rules and regulations related to building design*
- To introduce concept to the process of design*
- To introduce students to standards and norms related to different functions*
- To conceive 3 dimensional forms and establish relation to functional requirements which will result in optimal utilization of space*
- To develop a basic understanding of building materials*

### Course Outline

The students are required to do one major project and one minor project.

**Short project-** Multiuse, single unit spaces such as cafeteria, prayer hall, cottage etc.

**Major Project** - Design of a residence within a set of limited specific requirements.

### Course Outcome

*At the end of the course, the students shall have acquired knowledge of the process involved in addressing a design problem.*

*Note: Students are required to give importance to climate responsive & environment friendly buildings, meet the needs of physically challenged.*

*Design solutions shall be worked out using study models from the initial stage of design. All design sheets should be manually drafted.*

### References:

1. Graves M., *Treat of colour and design*, McGraw Hill, 1951
2. Mills E. D., *Planning: Architect's Handbook*, 10/e, Butterworths, 1985.
3. De Chiara J. and J. H. Callender, *Time Saver Standards for Building Types*, McGraw Hill, 2001.
4. Alpern A., *Handbook of Speciality Elements in Architecture*, McGraw Hill, 1982.
5. Panero J. and M. Zelnick, *Human Dimensions and Interior Space*, Watson Guptill Publications, 1979.
6. Neufert E., P. Neufert, B. Baiche and N. Walliman, *Neufert Architects Data*, Blackweill Publishers, 2002.
7. Time saver standards for housing and residential development, De Chaira, Joseph, Ed, et al.,

### Internal Continuous Assessment

CUSAT BARCH SYLLABUS -2014 SCHEME

20% - Tests (minimum 2)  
70% - Class work  
10% - Regularity in the class

**University Examination Pattern**

Course work will be assessed by a panel of Jury as per approved manual of B.Arch. course.

## AR1302 BUILDING MATERIALS AND CONSTRUCTION II

Teaching Scheme: 1(L) - 0(T) - 3(P)

Credits: 4

### Course Objective:

To introduce the study of building materials, their applications and construction methods.

To familiarize the students with market study of building components and details.

To understand conventional as well as vernacular and traditional building materials and practices.

To understand prevailing BIS specifications.

### Module-I

Soils – Their classification, physical properties and behaviour – Bearing capacity, safe bearing capacity, Determination of SBC, Standard Penetration test – Sand – fineness, bulking qualities -Methods of improving bearing capacity.

Cement-Varieties of cement, composition, properties and uses-tests for cement- mortar for various applications in buildings.

### Module-II

Concrete- ingredients- suitability- requirements for aggregates, grading of aggregates- water cement ratio- reinforcements- admixtures- properties of concrete  
Concreting process its properties- mix proportioning-batching, mixing, transporting, placing, compaction, curing, form work- quality control-test for concrete- joints in concrete- concrete finishes

### Module-III

Concrete Construction-Introduction to framed structures  
Concrete in foundation- Shallow foundations – Deep foundations  
Concrete floors (PCC), walls & partitions. Concrete lintels, concrete beams and columns and slabs- one way and two way slab  
Drawings – RCC lintels and sunshades- Isolated footing, Combined footing, Raft Foundation, Pile Foundation, Well Foundation, foundation on sloping terrain,

### Module-IV

#### Concrete Staircases

Factors involving staircase design-types of staircases like straight flight, dog legged, quarter turn, bifurcated, spiral, helical, etc. – different support conditions like inclined slab, continuous, cantilever- foundations, finishes for staircase, detailing of handrails and balusters. Designing and detailing for physically handicapped.  
Drawings – Straight and Curved staircases.

**Course Outcome:**

Upon completion of the course, the student shall have acquired the concept of various components of buildings, materials used and methods of construction. The student have acquired knowledge in both conventional as well as vernacular building practices.

**References:**

1. Parker H., *Materials and Methods of Architectural Construction*, John Wiley & Sons, Canada, 1958.
2. McKay W. B., *Building Construction*, Orient Longman 21, London, 1938-44.
3. Barry R., *The Construction of Buildings* (Vol. I-II), 6/e, Affiliated East-West Press Pvt. Ltd., New Delhi, 1996.
4. Simmons H L., *Construction – Principles, Material & Methods*, 7/e, John Wiley & Sons Inc., New York, 2001.
5. Ching F. D. K., *Building Construction Illustrated*, Van Nostrand Reinhold Co. Inc., USA, 1985.
6. National Building Code
7. Harold R. J., *Construction Materials for Architecture*, Krieger Pub Co, 1992.
8. Varghese P.C., *Building Materials*, Prentice Hall of India Pvt Ltd, New Delhi, 2005.
9. Smith R. C. and T. L. Honkala, *Principles and Practices of Light Construction*, Prentice Hall, Englewood, 1986.
10. Alan Blanc, *Stairs, Steps and Ramps*, Butter worth Heinemann Ltd., 1996.

**Internal Continuous Assessment (Maximum Marks - 100) (Group 1 Subject)**

20% - Tests (minimum 2)

70% - Class work

10% - Regularity in the class

**University Examination Pattern:**

Examination duration: 4 hours Maximum Total Marks: 100

The question paper shall consist of 2 parts.

Part A:

Question 1. (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.

Question 2. (10 marks) – Questions for 10 marks from module I and II. Candidates have to answer any one out of the two.

Question 3. (10 marks) – Questions for 10 marks from module III and IV. Candidates have to answer any one out of the two.

Part B:

Question 4. (20 Marks) – Drawing: Candidates have to answer any one full question out of the two from module I & II.

Question 5. (20 Marks) – Drawing: Candidates have to answer any one full question out of the two from module III.

## AR 1303 HISTORY OF ARCHITECTURE II

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objective:

*The objective of the course is to develop an understanding of Dravidian and Islamic architecture and its influence in India's history of architecture, its changes in social processes and lifestyle.*

*Architecture is to be seen as an important and long lasting by-product of development of civilization by understanding the role of technology, construction techniques, climate and materials with inherent visual aspects like spatial organisation, scale, compositional organisation, architectural vocabulary and design grammar.*

### Module-I

Dravidian Architecture: Chola –Tanjore Style, Pandya- Madhura Style, Kailasanatha, Brihadeshwara, Srirangam, Vijayanagara (Example: Hampi).

Indo-Aryan Architecture: Orissan (Example: Lingaraja and Sun Temple Konark)

Khajuraho (Example: Kandariya Mahadeva Temple), Gujarath (Example: Sun Temple, Modhera).

### Module-II

Beginning of Islamic Architecture in India: : A brief introduction into origin & characteristics of Islamic architecture: building types, elements, structural systems, construction techniques.

Islamic Architecture in Delhi (Imperial Style)

Slave dynasty -Quwat-ul-Islam mosque, Qutb Minar, Mosque at Ajmer, Sultan Ghari, Tomb

of Iltumish, Tomb of Balban.

Khilji Dynasty -Alai Darwaza., Jamat Khana masjid

Tughlaq dynasty -Tomb of Ghias-Ud-din, City of Tughlaqabad, City of Firoz shah Kotla, Khirki Masjid.

Sayyid and dynasty-Tomb of Mubarak shah, Tomb of Mohamed Sayyid.

Tombs of Lodi Gardens.

### Module-III

Provincial Style

Jaunpur -Atala Masjid, Jami Masjid

Bengal -Dakhil Darwaza, Firoze Minar, and Adina Masjid.

Gujarat -Jami Masjid, Teen Darwaza, Well retreats of Ahmedabad.

Malwa -Hindola mahal , Hawa Mahal

Deccan - Charminar at Hyderabad.

Bijapur - Jami Masjid, Golgumbaz.

### Module-IV

Evolution of Mughal style and the different eras of rule:

Early period: Babar, Humayun, Shershah

Akbar: - Tomb of Humayun, Jahangir Mahal Agra, Fatehpur Sikri: - city planning & the various structures inside

Jahangir: - Akbar's tomb. Shah Jahan: - Red fort at Agra, Taj Mahal, City of Shahjahanabad (Delhi fort), and Jami Masjid at Delhi.  
Aurangzeb: - Tomb of Rabi Durrani at Aurangabad, Moti Masjid at Delhi fort.

**Course Outcome:**

*Knowledge about the history of a culture, its building art and construction techniques helps an architecture student to develop designs that are rooted in the country. Upon completion of the course, the student will be able to develop a keen appreciation of our heritage buildings leading to the understanding that architecture is the product of a particular culture, time and place.*

**References:**

1. Percy Brown, 'Indian Architecture: Buddhist and Hindu Periods', D. B. Taraporevala, 1965.
2. Satish Grover, 'The Architecture of India: Buddhist and Hindu', Vikas, 1980.
3. Brown P., *Indian Architecture (Islamic Period)*, D.B. Taraporevala Sons & Co. Private Ltd., Bombay, 1997.
4. Grover S., *Islamic Architecture in India*, CBS Pub., New Delhi, 2002.
5. Fletcher B. and D. Cruickshank [Ed.], *Sir Banister Fletcher's a History of Architecture*, Architectural Press, 1996.
6. Tadgell C., *The History of Architecture in India*, Phaidon Press, 1994.

**Internal Continuous Assessment (Maximum Marks - 50)**

*(Group 2 Subject)*

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.

20% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) - Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

## AR1304 BUILDING CLIMATOLOGY

Teaching Scheme: 2(L) - 0(T) - 0(P) Credits: 2

### Course Objective:

*To provide a broad awareness about the relation between climate and architecture  
To enable students to do a systematic study of the site climate in architectural projects  
To guide the students towards the design for thermal comfort in various climates*

#### Module-I

Introduction to Climate : Need to study climate – Weather and Climate – Tilt of earth axis – Solar radiation quantities – Sun path diagram – Earth's thermal balance and atmosphere – Global wind pattern – Thermal forces, trade winds, westerly and polar winds

#### Module-II

Elements of Climate: Quantification of elements, units, measurement, data, graphical representation. Sun path diagrams.

Classification of Climates: Different climates around the globe, tropical climates, climate of Kerala, monsoon. Macro and micro climate, site climate, urban climate.

#### Module-III

Thermal Comfort: Thermal balance of the human body, regulatory mechanisms, subjective variables. Thermal comfort indices, effective temperature, corrected effective temperature.

#### Module-IV

Climatic Design: Designing for different climates, active and passive systems. Shelters for tropical climates, Shelter for the climate of Kerala- vernacular buildings.

### Course Outcome:

*The course shall provide a broad awareness on the importance of climatology in architecture shall lay the foundation for subjects dealing with detailed and more specific aspects related with climate, comfort, sustainability and passive design which are incorporated in the following semesters.*

### References:

1. Koenigsberger O. H., T. G. Ingersoll, A. Mayhew and S. V. Szokolay, *Manual of Tropical Housing and Building: Climate Design*, University Press, 1975.
2. Givoni B., *Man, Climate and Architecture*, John Wiley & Sons, 1998.
3. Fry E. M. and J. Drew, *Tropical Architecture in the Dry and Humid Zones*, Reinhold Publishing, 1964.
4. Markus T. A. and E. N. Morris, *Building Climate and Energy*, Pitman Pub., 1980.

### Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as homework, quiz, seminar, term-project, etc.

20% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module:*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*



## AR1305 ARCHITECTURAL GRAPHICS -II

Teaching Scheme: 0(L) - 0(T) - 4(P)

Credits: 4

### Course Objective:

*To provide a comprehensive introduction to architectural representation, perspective drawings, sciography etc.*

*To give an introduction to graphic design, related softwares and photography.*

#### Module-I

Perspective drawing- Leonardo's window- perspective projection concepts, Vanishing points, station points, picture planes etc. Types of perspective-Single point perspective, Two point perspective. Perspective projection of simple objects, buildings, interior perspectives, human figures, landscapes etc. in perspective, Sciography.

#### Module-II

Introduction to vector drawing program- Adobe Illustrator, Freehand, Coral draw .properties of vector graphics and introduction to their various tools. Introduction of raster images – image resolution – RGB, CMYK, Index colour modes and their application – basic drawing in Photoshop – Using airbrush, pencil brush tools. Concept of layers in Photoshop – Transparency and blending modes- creative use of layers and blending modes. Preparation of images for print and web.

#### Module-III

Techniques of representation to acquire the necessary skill to represent visual images. Exercise on converting visual images into 2D representation. Corporate design – Design of corporate logo. Symbols and signage- graphic symbol design project. Poster design project- Design a poster for an event/cause/awareness campaign – Brochure design project- Student design a brochure for an event/cause/awareness campaign.

#### Module-IV

Colour photography- communicating ideas through photography. Study of photographic images, documentary and reportorial techniques, emphasis on experimental manipulation., materials and environment. Various trends in photography. Introduction to film theory and design for the dynamic media.

Sculpture making – Relief sculptures, round sculptures using clay. Moulding and casting using plaster-of- Paris and cements

(Module IV - Evaluation by internal assessment only)

### Course Outcome:

*At the end of the course, the students shall have gained an understanding of architectural representation graphically and through computer aided drafting software.*

### References:

1. Adobe Creative Team, *Adobe Illustrator CS6 Classroom in a Book*, Adobe Press, 2012.
2. Cohan L. S., *Adobe Photoshop CS Creative studio*, Adobe Press, 2003.
3. Drafahl J. and S. Drafahl, *Step-by-Step Digital Photography: A Guide for Beginners*, Amherst Media Inc., 2004.

4. Miotke J., *The Better Photo Guide to Digital Photography*, Amphoto Books, 2005.
5. Walton R., *The Big Book of Graphic Design*, Collins Design, 2007.
6. Meggs P. B., *A History of Graphic Design*, 3/e, John Wiley & Sons; 1998.

**Internal Continuous Assessment**(Maximum Marks - 100) (Group 1 Subject)

20% - Tests (minimum 2)

70% - Class work.

10% - Regularity in the class

**University Examination Pattern:**

Examination duration: 4 hours

Maximum Total Marks: 100

The question paper shall consist of 2 parts.

Part A (20 marks) - Four Short answer questions of 5 marks each. All questions are compulsory. There should be minimum one question from Modules I, II and III (not more than two questions from any of the modules, except IV).

Part B (80 Marks) – Drawing: Two questions of 40 marks each from Module I and III.

## AR1306 HUMANITIES

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Module I

Introduction to sociology.

Primary concepts- Society, family, Institutions, groups, association and Community. Relating these concepts to architecture. Relevance of study of sociology for architects.

### Module II

Man Environment and Society. Unity and diversity in India. Rural society, Village community, traditional patterns and trends of change. Society, architecture and settlement pattern of Kerala

### Module III

Social change, Social stratification, (Class and caste) Urbanism and urbanization. Modernization. Influences of these concepts in architecture, Urban safety and security, Urban crime and disasters.

### Module IV

Cultural anthropology, Culture and architecture. Concept of social structure. Relation between social structure and spatial structure. Social aspects of housing. Social problems of slums

### References:

1. Vidya Bhushan, 'An Introduction to Sociology'
2. K. Singh, 'Principles of Sociology'
3. Dr. Valsyayan, 'Urban Sociology'
4. James V. Mc Cannel, 'Understanding Human Behaviour'
5. Dr. K. Kumar, 'Rural Sociology'

### University Examination Pattern:

*Examination duration: 3 hours Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

## AR1307 COMPUTER APPLICATIONS IN ARCHITECTURE

Teaching Scheme: 0(L) - 0(T) - 2(P) Credits: 2

### Course Objectives:

*To provide a broad awareness about the use of software as an aid for architectural presentations.*

*To enable students to make visual images of their designs.*

### Module-I

Introduction to basics of Architectural softwares- Overview of current applications CAD concepts. - Computer as a drafting aid, scope and limitations of computer application in Architecture.

### Module-II

Computer Aided Drafting: Concept of Computer aided drafting – Conventional drafting and CAD. - Brief overview of related software. - Units of a CAD workstation, their operation and critical parameters. - Description of building geometry and topology and related general concepts.

### Module-III

Computer Graphics: Understanding 3D co-ordinate system – Using view ports. - 3D drawing & editing commands, solid modeling – advanced solid modeling commands – editing solids. - Introduction to rendering in 3D – Rendering process, animation and virtual reality. - Enhancing digital images from CAD applications using other packages.

### Module-IV

3d modeling, BIM, Internet and on-line resources, Introduction to GIS.

### Course outcome:

*At the end of the course the student shall be able to do two dimensional as well three dimensional drawings to present of a design idea legibly. He shall be able to explore the possibilities of a complete visualization of spaces he designs. Moreover he shall be equipped to extract all the information required at its execution stage*

### References :

1. Manuals & References of CAD, ACAD and other software.
2. Sanders D. H., *Computers Today*, McGraw Hill, 1988.
3. Mitchell W. J., *Computer Aided Architectural Design*, Van Nostrand, 1997.
4. Broadbent G., *Design in Architecture*, John Wiley, 1981.

### Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)

20% - Tests (minimum 2)

70% - Class work.

10% - Regularity in the class

No University Examination.

## AR1308 STRUCTURAL ANALYSIS I

Credits: 3

Teaching Scheme: 2(L) - 1(T) - 0(P)

### Course Objective:

*An understanding of fundamentals of structural analysis including concepts of bending stresses and shear stresses*

*An understanding of concepts of deflection of beams and various methods of its computation.*

*An understanding of behavior of columns under axial loading.*

### Module-I

Theory of simple bending, section modulus, bending stresses in symmetrical beams, bending of composite beams.

### Module-II

Shear stresses in beams, concept of shear stresses in beams, distribution of shear stresses in simple cross sections. Torsion of shaft, torsion equation, torsional stresses in simple sections.

### Module-III

Slope and deflection of statically determinate beams, simple problems using double integration, Macaulay's Method, Moment area method and conjugate beam method.

### Module-IV

Columns, different types, discussion on radius of gyration, elastic stability of slender column – Euler's formula, Rankine's formula and IS code Formula.

### Course Outcome:

*The students after undergoing this course will be able to understand the behavior of various structural elements under the action of static loads.*

### References:

1. Junarkar S. B. and Shah S. J., *Mechanics of Structures (Vol. I)*, 30/e, Charotar Publishing House Pvt. Ltd., New Delhi, 2012.
2. Punmia B. C., A. K. Jain and A. K. Jain, *Strength of Materials & Theory of Structures (Vol. I)*, Laxmi Publications, New Delhi, 2013.
3. Vaidyanathan R. and P. Perumal, *Structural Analysis (Vol. I)*, Laxmi Publications, 2004.

### Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as homework, seminar, term-project, etc.

20% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

## AR1401 ARCHITECTURAL DESIGN – III

Teaching Scheme: 0(L) - 0(T) - 10(P)

Credits: 5

### Course Objective:

*To introduce the functional, symbolic, social-needs, and the link between the architectural space and human activities.*

*Design of multifunctional residential buildings involving vertical and horizontal linkages between spaces.*

*To equip the students to prepare municipal drawing.*

### Course Outline:

The students are required to do one major project and one minor project.

**Major Project** – Multi-Family Residential buildings, low rise apartments, Hotels

**Short Project**– Preparation of drawings for statutory approval.

*Note: Students are required to get exposed to the importance of climate responsive and environment friendly buildings that meet the needs of physically challenged. Importance should be given to regional and time factors in the built form. All design sheets should be manually drafted and explained through study models.*

### Course Outcome:

*The students shall be exposed to need based, functional designing of spaces.*

*They shall have acquired the knowledge to prepare municipal sanction drawings technically.*

### References:

1. Mills E. D., *Planning: Architect's Handbook*, 10/e, Butterworths, 1985.
2. De Chiara J. and J. H. Callender, *Time Saver Standards for Building Types*, McGraw Hill, 2001.
3. Neufert E., P. Neufert, and J. Kister, *Neufert Architects' Data*, Wiley- Blackwell, 2012.
4. Ramsey C. G., H. R. Sleeper, *Architectural Graphic Standards*, 11/e, Wiley, 2008.
5. BIS, Various Codes of Practice and National Building Code of India

**Internal Continuous Assessment**(Maximum Marks - 250) (Group 1 Subject)

20% - Tests (minimum 2)

70% - Class work

10% - Regularity in the class

### University Examination Pattern:

*Course work will be assessed by a panel of Jury as per approved manual of B.Arch. course.*

## AR1402 BUILDING MATERIALS AND CONSTRUCTION – III

Teaching Scheme: 1(L) - 0(T) - 3(P)

Credits: 4

### Course Objectives:

- To understand the progressive achievements from cast iron to steel, types of steel and its properties, application in construction industry and current developments
- To understand in detail through working drawings, the types of sections in steel, joints, application in foundations, columns, beams and trusses and concepts of space frame
- To understand how aluminium, its alloys, properties products, other Non-Ferrous metals like copper, bronze, tin and lead are used in the construction industry
- To understand in detail through working drawings, the various types of aluminium, doors, windows, ventilators, partitions and roofing systems as applied in construction industry

### Module-I

Ferrous Metals: Brief study on manufacture, properties and uses of cast iron, wrought iron, pig iron and steel-anti corrosive measures for steel, mechanical and heat treatment of steel-market forms of steel, structural steel, stainless steel, steel alloys, properties and uses, current developments

### Module-II

Steel constructions: Structural steel sections, types of connections in steel, steel in foundations, columns and beams, different types of steel roof trusses, including north light truss, space frames materials for roof covering.  
Steel staircases and hand rails, balusters, doors and windows, operable, sliding collapsible gates –rolling shutters  
Steel in furniture and other interior uses. Detailing and specification for physically handicapped.  
*Detailed drawings –Steel staircases, hand rails, Steel windows and doors*

### Module-III

Non Ferrous Metals: Aluminium and aluminium alloys, brief study on properties and uses, Aluminium products-extrusions, foils, castings, sheets, etc, brief study of other non-ferrous metals like copper, bronze, brass, tin and lead, properties and uses, current developments

### Module-IV

Construction using non-ferrous metals:  
Aluminium doors : Operable, sliding, pivoted  
Aluminium windows : Operable, sliding, fixed, pivoted  
Aluminium ventilators : top hung, bottom hung, pivoted, louvered and fixed  
Aluminium partitions, false ceilings, shop front handrails, curtain walling



Aluminium roofing- north light,glazing bar,aluminium roofing sheets.Use of other non-ferrous metals like copper,bronze,brass,etc in architectural construction.Detailing and specification for physically handicapped.

*Detailed drawings –Aluminium windows and doors*

**Course outcome:**

*Upon completion of the course, the student of architecture shall have acquired knowledge in steel constructions and understood the applications of aluminium and its alloys*

**References**

1. S C Rangwala,Engineering Materils,Charetar Publishing House,India
2. McKay W. B., *Building Construction*, Orient Longman 21, London, 1981
3. B C Punmia, *Building Construction*,Laxmi Publication Private Limited,New Delhi,1993
4. Lyons A., *Materials for Architects and Builders*, Elsevier Butterworth- Heinemann, 2004.
5. Harold B Ohio .*Construction Principles,Materials and Methods*
6. Timesavers Standards for Architectural Design Data,Calender Jill,Mc Graw 1974
- Dea A Watson ,*Construction Materials and Processes*, Mc Graw Hill,1974

**Internal Continuous Assessment(Maximum Marks - 100) (Group 1 Subject)**

20% - Tests (minimum 2)

70% - Class work

10% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 4 hours Maximum Total Marks: 100*

*The question paper shall consist of 2 parts.*

Part A:

*Question 1. (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Question 2. (10 marks) – Questions for 10 marks from module I and II. Candidates have to answer any one out of the two.*

*Question 3. (10 marks) – Questions for 10 marks from module III and IV. Candidates have to answer any one out of the two.*

Part B:

*Question 4. (20 Marks) – Drawing: Candidates have to answer any one full question out of the two from module II.*

*Question 5. (20 Marks) – Drawing: Candidates have to answer any one full question out of the two from module III.*

## AR1403 HISTORY OF ARCHITECTURE III

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objective:

*To induce an appreciation to the importance of history of architecture and its relationship to the development of any place.*

*To develop awareness about the precious architectural past we had and how to build our future based on that tradition, wisdom and technical knowledge.*

### Module-I

Early Christian Architecture: Evolution of Church form (Example; Old St. Peters Rome)

Byzantine Architecture: Greek cross and Latin cross plans, Technique adopted to construct domes, Surface treatment and material of construction. (Example; Hagia Sophia)

Romanesque Architecture: Design evolution, Planning principles and Characteristics (Example; Pisa Cathedral)

### Module-II

Gothic Architecture: Evolution of structural systems in Gothic Architecture; Arches, vaults, flying buttress, pinnacles etc. (Example: York Minister Cathedral, England and Notre Dame, Paris).

Renaissance Architecture: Introduction, Evolution and Characteristics. (Example: Works of Michael Angelo, St. Peters, Rome. Works of Bramante, Florence)

Baroque Architecture: (Example: Works of Bernini)

Rococo Architecture: (Example: Basilica at Ottobeuren, Germany)

Palladian Architecture: (Example: The Rotunda, University of Virginia and Palladian Window).

### Module - III

Moorish Architecture- Characteristics and Planning Principles. Elements like Muqarnas and Horseshoe arch. (Example: Alhambra Complex, Granada and Great Mosque of Cordova).

Introduction to Mayan Architecture.

### Module - IV

Brief study of Architecture of the Pre-Colonial period in Asia-China-forbidden city & summer Palace, Beijing, Japan-Shinto Architecture, Torri, South -East Asia-Temple Of Angkor Wal, Cambodia,Burma.

### Course Outcome:

*Knowledge about the history of a culture, its building art and construction techniques helps an architecture student to develop designs that are rooted in the country. Upon completion of the course, the student will be able to develop a keen appreciation of our heritage buildings leading to the understanding that architecture is the product of a particular culture, time and place.*

### References:

1. Fletcher B. and D. Cruickshank [Ed.], *Sir Banister Fletcher's a History of Architecture*, Architectural Press, 1996.
2. Grodecki L., *Gothic Architecture*, Rizzoli, 1991.
3. *History of World Architecture (Series)*, Vols: *Ancient Architecture, Primitive Architecture, Greek Architecture, Roman Architecture and Byzantine Architecture*, Faber and Faber, London, 1988.
4. *Builders of Ancient World: Marvels of Engineering*, A National Geographic Society Publication, 1986.
5. Michael R., *Architecture of the Western World*, Popular Press, England, 1988.
6. *Global history of architecture*, Francis D.K Ching

### Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.

20% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) - Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

**AR1404 LANDSCAPE ARCHITECTURE**

Teaching Scheme: 1(L) - 0(T) - 3(P)

Credits: 4

**Course Objective:**

*To know the various approaches to Landscape Architecture from history.*

*Evolving understanding of the site and its context.*

*Creation and design of open space structure on the site and achieving aesthetic, functional and environmental goals.*

**Module - I**

Introduction to Landscape Architecture: Scope, Difference between Landscape Design and Building Design, Significance of Time in Landscape Design. Landscape Development in historical perspective: Gardens of Ancient World- Babylon, Egypt, Persia, Greece, Rome; Islamic tradition, Mughal in India. Renaissance, English; Industrialization, Parks movement in America; Indian, Japanese, and Chinese Landscapes and Contemporary movements.

**Module - II**

Elements of Landscape: Major and Minor Elements, Natural and Manmade elements, Tangible and Intangible elements; Landform, Water, Plants and Built Elements. Understanding Visual (color, form, texture) and Non visual (smell, touch, sound) characteristics. Principles of Landscape Design: Scale, Proportion, Unity, Rhythm, Harmony, Balance, Contrast. Angle of Vision and approach.

**Module - III**

Principles of Site Planning: Selection of site, Site analysis, Microclimate, Topography, Hydrology, Functional suitability of site, Movement of Pedestrian and Vehicles, Parking etc. Landscape Construction: Cutting and Filling, Grading, Retaining walls, fencing, steps, ramps, decks, gates, pergola, pools, ponds, fountains, sculptures etc. Landscape Services: Lighting, Garden lighting, Avenue lighting; Surface Water Drainage and Irrigation systems; Underwater construction, Issues in riverbank and Coastal Constructions; Terrace gardens, terrace pools, Rock gardens.

**Module - IV**

Study of Plant Materials: trees, shrubs, ground cover, climbers, physical characteristics and habit; Plant selection criteria - Functional, visual, ecological and microclimatic aspects. Horticulture: planting and transplanting, planting techniques, techniques of propagation, cutting, pruning, grafting etc. Lawns, preparation and maintenance; Hydroponics, Bonsai. Indoor landscaping: Functions and behaviour of indoor plants, light, air and water requirements, plant materials, Potting and Repotting, Raising of Indoor Plants.

**Course Outcome:**

*Students should be able to do site analysis and landscape design of building sites, campuses etc. considering environmental, functional and aesthetic aspects.*

**References:**

1. Appleton J., *The Experience of Landscape*, John Wiley & Sons, 1996.
2. Bose T. K. and K. Choudhary, *Tropical Garden Plants in Colour*, Horticulture and Allied Publishers, 1991.
3. Dee C., *Form and Fabric in Landscape Architecture: A visual introduction*, Taylor & Francis, 2001.
4. Eckbo G., *Urban Landscape Design*, McGraw Hill, 1964.
5. Gopalaswamiengar, K. S., *Complete Gardening in India*, 4/e, Gopalswamy Parthasarathy, 1991.
6. Jellicoe G., and S. Jellicoe, *The Landscape of Man*, Thames and Hudson, 1991.
7. Kanvinde A. and H. James Miller, *Campus Design in India: Experience of a Developing Nation*, Jostens/American Yearbook Co., 1969.
8. Kaplan R., R. L. Ryan and S. Kaplan, *With People in Mind - Design and Management of Everyday Nature*, Island Press, 1998.
9. Laurie M., *An Introduction to Landscape Architecture*, Elsevier, 1975.
10. Lyall S., *Designing the New Landscape*, Thames & Hudson, 1998.
11. Lynch, K. and G. Hack, *Site Planning*, 3/e, The MIT Press, 1984.
12. McHarg I., *Design with Nature*, John Wiley, 1978.
13. Motloch J. L., *Introduction to Landscape Design*, John Wiley and Sons, 2001.
14. Randhawa M.S., *Flowering Trees*, National Book Trust, 1998.
15. Rutledge, A. J., *Anatomy of a Park*, McGraw Hill, 1971.
16. Simonds J. O., *Landscape Architecture: The Shaping of Man's Natural Environment*, McGraw Hill, 1961.
17. Thompson I. H., *Ecology, Community and Delight: Sources of Values in Landscape Architecture*, E & FN Spon, 2000.
18. Williams S., *Outdoor Recreation and the Urban Environment*, Routledge, 1995.

**Internal Continuous Assessment (Maximum Marks - 100) (Group 1 Subject)**

20% - Tests (minimum 2)

70% - Class work

10% - Regularity in the class

**University Examination Pattern:**

Examination duration: 4 hours Maximum Total Marks: 100

The question paper shall consist of 3 parts.

Part A: Question 1. (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.

Part B: Questions 2 to 5. (40 marks)

Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 10 marks.

Part C: Question 6. (20 Marks) - Drawing: Two questions for 20 marks each on Landscape Design and detailing. Candidates have to answer any one full question out of the two.

**AR1405 ARCHITECTURAL ACOUSTICS**

Teaching Scheme: 2(L) - 1(T) - 0(P) Credits: 3

**Course Objectives:**

To familiarize the students with nature and propagation of sound.

To understand the impact of sound on human beings in built as well as un-built spaces and methods to control them.

To understand prevailing standards, materials and methods related to the above and their application.

#### **Module - I**

Nature and propagation of sound: The nature of sound. Propagation of sound. Properties of sound - velocity, frequency, wavelength of sound, sound pressure, sound intensity and loudness. Units for measuring sound. The human ear and hearing characteristics. Audibility. Noise and human behavior.

#### **Module - II**

Behaviour of Sound: Room acoustics. Behavior of sound in enclosures - sound reflection, diffusion and Diffraction. Sound absorption and sound absorption coefficient. Reverberation and reverberation time. Calculation of reverberation time. Sabine's formula. Acoustical defects in the enclosed spaces.

#### **Module - III**

Study of Noise, Sources of noise. Air borne and structure borne sound transmission. Noise criteria. Transmission loss. Permissible noise levels for different types of building. Noise control in specific buildings like Auditoriums and lecture halls.

#### **Module - IV**

Acoustical treatment of spaces: Sound absorptive materials and construction - porous material, membrane absorbers, cavity resonators, space absorbers, variable absorbers - their absorptive characteristics. Mounting and distribution of absorptive materials. Acoustical design of different types of rooms such as auditoriums, recording studios and lecture halls - acoustical corrections

#### **Course Outcome:**

*At the end of the course the student shall be able to understand how the planning and designing of spaces with good acoustics can be done.*

#### **References:**

1. Kinsler L. E. and A. R. Frey, *Fundamental of Acoustics*, 4/e, John Wiley & Sons, 2000.
2. Knudsen V. O. and C. M. Harris, *Acoustical Designing in Architecture*, Wiley, 1963.
3. Templeton D., *Acoustics in the Built Environment*, 2/e, Architectural Press, 1997.
4. Acentech and J. P. Cowan, *Architectural Acoustics Design Guide*, McGraw Hill, 2000.
5. Cavanaugh W. J., G. C. Tocci and J. A. Wilkes, *Architectural Acoustics: Principles and Practice*, John Wiley & Sons, 2000.

#### **Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)**

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.

20% - Regularity in the class

#### **University Examination Pattern:**

*Examination duration: 3 hours Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) - Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

## AR1406 ESTIMATION AND SPECIFICATION

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objective:

*To introduce the study of building materials and methods for working out their quantity.  
To understand the factors like transportation and labour, and their relationship with cost.  
To familiarize the students with market rates of building materials & understand prevailing BIS specifications.*

### Module - I

Specifications-Importance, objectives, types.  
Principles of specification writing- BIS, PWD, CPWD formats.  
Specifications for materials - Coarse aggregates, bricks, cement and sand.

### Module - II

Specifications for clearing, dismantling and demolition, excavation and earthwork, mortars, concrete work, masonry work, stonework, wood work, iron and steel work, flooring, roofing and finishing work.

### Module - III

Estimating - Units of measurement of various items of work - Mode of measurement.  
Methods of estimating.  
Exercise to write down the detailed estimate to find out the quantity of various items of work of different types of structures-tiled roof, load bearing and framed structures.

### Module - IV

Schedule of rates for labour and materials, rate analysis, standard data for items, bills of quantities and estimated cost. Introduction to computer applications in estimation.

### References:-

1. *CPWD Specifications*, Vol. I&II, Director General of Works, CPWD, Government of India, 2009.
2. *Latest Standard Data Book and Schedule of Rates*, Kerala PWD, Govt of Kerala.
3. *IS 1200: Methods of Measurement of Building and Civil Engineering works (Part 1 to 28)*, BIS, New Delhi.
4. Dutta B. N., *Estimating and Costing in Civil Engineering*, USB publishers and Distributers Ltd., New Delhi, 2008.
5. Chakraborti M, *Estimating Costing Specification and Valuation in Civil Engineering*, 24/e, Chakraborti, 2012.

### Course Outcome:

*Upon completion of the course, the student of architecture shall have acquired enough knowledge about the cost of constructing a building.*

Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as homework, quiz, seminar, term-project, etc.

20% - Regularity in the class

### University Examination Pattern:

Examination duration: 3 hours Maximum Total Marks: 100

The question paper shall consist of Two Parts

Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.

Part B (60 Marks) - Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.

## AR1407 BUILDING SERVICES - I (WATER SUPPLY AND SANITATION)

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objective :

*Identify the different sources of water supply, its preservation and conservation.*

*List and identify water distribution components and networks.*

*List and identify sanitation systems in India and their functioning process.*

*To understand the design of Plumbing systems with specifications for buildings.*

### Module - I

Water Supply: Sources of water supply, standards of purity and treatment of water, qualities of potable water. Domestic water demand, capacity of over head tanks and calculation of water consumption.

Domestic water piping systems: Water distribution networks. Cold and hot water distribution within the building. Specifications and sketches of various plumbing fittings for buildings. Uses of valves, taps, and their different types. Definitions and related terms, plumbing systems (one pipe, two pipe; etc). House/service connection. Layout of water supply lines in a domestic house.

### Module - II

Sanitation: Basic principles of sanitation and disposal of waste matter from building. Brief description of various systems of sewage disposal and their principles. Details of a Septic tank and capacity calculation.

Sewer System: Quantity of sewage and storm water, infiltration, runoff calculation, Manning's formulae, partial flow diagram. Design of Sewers, shapes of sewers, factors affecting, design of sewers. Materials, bend, pipe joints used in sewer systems.

### Module - III

Sewer appurtenances: Manholes, Sub drains, culverts, ditches and gutters, drop inlets and catch basins roads and pavements, storm overflow/regulators. Intercepting chambers, inspection chambers and their proper location and ventilation of sewers. Laying and testing of sewer. Gradient used in laying of drains and sewers, and respective sizes.

Sewage treatment: The process of self purification and disposal of sewage from isolated building (septic tank, imhoff tank, soak pit etc.), sewage breakdown.

*Discussion: Waste water recycling-an effective system for water conservation*

### Module - IV

Plumbing House drainage system and sanitary appliances and traps.

Design considerations on drainage scheme: Preparation of plan, Planning of bathrooms, lavatory blocks and kitchen in domestic and multi-storeyed buildings. Indian standards for sanitary convenience. Mandatory requirements regarding water supply, sanitationrainwater harvesting, fire protection of buildings.

*Discussion: Plumbing, sanitation and hygiene.*

*Exercise: Preparation of sample layout of toilets, kitchen etc. Site visits to understand the basic concepts.*

### Course Outcome:

*Upon completion of the course, the student of architecture shall have acquired enough knowledge about the plumbing and sanitation of a building.*

### References:-

1. Punmia B. C., A. K. Jain and A. K. Jain, *Waste Water Engineering*, Laxmi Publications Pvt. Ltd., 1998.
2. Husain S. K., *Water Supply and Sanitary Engineering*, Oxford and IBH Publications, 1981.
3. Rangwala S. C., *Water Supply and Sanitary Engineering*, Charotar Publishing House, 1989.

4. Shah C.S., *Water Supply and Sanitation*, Galgotia Publishing Co., 1998.
5. *Manual on Water Supply and Treatment*, 3/e, Central Public Health and Environmental Engineering Organization, Ministry of Urban Development, New Delhi, 1999.
6. *National Building Code of India (SP 7:2005)*, BIS, New Delhi, 2005.
7. *Kerala Municipal Building Rules*, LSGD, Govt. of Kerala, 2013.
8. Garg S. K., *Water Supply Sanitary Engineering*, Khanna Publishers, 2010.
9. Duggal K. N., *Elements of Public Health Engineering*, S Chand, 1983.

**Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)**

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as homework, quiz, seminar, term-project, etc.

20% - Regularity in the class

**University Examination Pattern:**

Examination duration: 3 hours Maximum Total Marks: 100

The question paper shall consist of Two Parts

Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.

Part B (60 Marks) - Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.

**AR1408 STRUCTURAL ANALYSIS II**

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

**Course Objective :**

To bring about awareness of the importance of structural analysis and behaviour of structural elements in buildings.

To familiarize the student with the techniques of analysing structures.

**Module - I**

Analysis of statically indeterminate beams (propped cantilever and fixed beams) - consistent deformation method. Shear force and bending moment diagram.

**Module - II**

Analysis of continuous beam by theorem of three moments and slope deflection methods. Shear force and bending moment diagram.

**Module - III**

Analysis of continuous beam by moment distribution method. Shear Force and bending moment diagram.

**Module - IV**

Analysis of simple portal frames with or without sway by moment distribution method, Shear force diagram, bending moment diagram, Kani's method (beams and simple frames)

**Course Outcome:**

Upon completion of the course, the student shall have developed a basic awareness of the structural behaviour in context of Architecture and Planning, and shall have developed the necessary knowledge and skills required to evaluate the forces developed in the structural elements from external loads.



**References:-**

1. Junnarkar S. B. and H. J. Shah, Mechanics of Structures, Vol - II, 23/e, Charotar Publishing House, 2013.

2. Punmia B. C., A. K. Jain and A. K. Jain, Theory of Structures (SMTS- II), Laxmi Publications Pvt. Ltd., 2004.

3. Ramamrutham S. And R. Narayan, Theory of Structures, Dhanpat Rai Publishing Co., 2012.

**Internal Continuous Assessment**(Maximum Marks - 50) (Group 2 Subject)

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as homework, quiz, seminar, term-project, etc.

20% - Regularity in the class

**University Examination Pattern:**

Examination duration: 3 hours Maximum Total Marks: 100

The question paper shall consist of Two Parts

Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.

Part B (60 Marks) - Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.