

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-201** Course Title: **Architectural Design-I**

2. Contact Hours: **L: 1 T: 2/2 P: 6**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To introduce architectural design to students through the study of space, form and functional interrelationships between the various spaces in a building. Physical attributes of the environment and their effects on building design will also be studied.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Study of anthropometrics and their relationship with the dimensions of objects of daily use.	2
2.	Determining space for activities such as living, dining, sleeping and conveniences.	2
3.	Measured drawing of a small building such as, a small house or office.	1
4.	Simple circulation/flow diagrams for small building projects	2
5.	Three dimensional organization of a variety of forms 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.	3
6.	Evolution of plan in relation to physical, climatic and site considerations, selection of materials and construction, study of architectural design vis-à-vis the concepts of privacy, security, comfort and maintenance.	4
	Total	14

Design Exercises:

Stage 1: Very small building structures, such as a compound wall, gate, milk booth, vendor stall, guard room, cycle stand, bus stop etc.

Stage 2: Study of simple repetitive type of spaces like small schools, hostels, shops and offices and their functional space relationships and circulation

Stage 3: Design of small residential components, such as a kitchen, bathroom, bedroom etc, design of small projects like a nursery school, a small club etc.

Rendering exercises of architectural plans, elevations, sections and perspective views from the design studio assignments.

Architectural Study Tour.

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Ching, F.D.K., "Design Drawing", Van Nostrand Reinhold.	1998
2.	Neufert, P., "Architects' Data", 3 rd Ed., Blackwell Science.	2000
3.	Agkathidis, A., Hudert, M. and Schillig, G., "Form Defining Strategies: Experimenting Architectural Design", Wasmuth.	2007

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-203** Course Title: **Introduction to Building Materials and Construction**

2. Contact Hours: **L: 1 T: 0 P: 4**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To introduce the students to building materials, their properties and application in building construction, alongwith the construction of some basic components of a building.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Mud: Stabilisation and use for walling and terracing.	1
2.	Bricks: Constituents and properties of brick earth, manufacturing of various types of bricks, decorative brick work and jail work Stone: Properties, varieties and their characteristics, stone masonry.	2
3.	Timber: Varieties of Indian timbers, their characteristics and suitability for different uses, defects and decay, seasoning and preservation; manufactured timber products and their applications as insulation materials and decorative materials etc.	2
4.	Surface Finishes: Various types of plaster and their application, guniting and its application; pointing, glazing and gluing.	2
5.	Lime and Cement: Sources, classification, properties and method of manufacturing, testing, mixing and uses.	1
6.	Concrete: Composition, properties and uses, light weight and no fines concrete and its uses.	1
7.	Various Construction Components of Buildings Foundations: Definition, safe bearing capacity of soils and methods of improving the depths and width of foundations, causes of failure and remedies, simple, steeped, combined and cantilevered footing, RCC footing and raft foundation.	5

	<p>Temporary work: Excavation and timbering of trenches with special references to loose soils and sub-soil water, shoring, underpinning and scaffolding.</p> <p>Basement: Damproofing, different types of damp proof materials, their compositions and application, Constructional details of walls, floors, foundations etc. with particular emphasis of their damp proofing and natural ventilation.</p> <p>Walls: Masonry walls in bricks and stone, hollow and panel walls, advantage over load bearing walls and the practical considerations during construction, light weight, hollow concrete and glass block construction, precast panel and stone panel walls.</p> <p>Arches: Different forms and centering.</p>	
	Total	14

Practicals: Brick walls – bonds, ends, corners and junctions; Stone masonry; Brick arches.

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Kumar, S.K., “Building Construction”, 19 th Ed., Standard Publishers Distributors.	2001
2.	Allen, E. and Iano, J., “Fundamentals of Building Construction: Materials and Methods”, Wiley.	2004
3.	Mehta, M., Scarborough, W. and Armpriest, Diane, “Building Construction: Principles, Materials and Systems”, Pearson Prentice Hall.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-205** Course Title: **Architectural Graphics**

2. Contact Hours: **L: 1 T: 0 P: 4**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: **CE-101**

9. Objective:

To teach students the fundamentals of architectural drawing through the study of architectural graphic symbols, orthographic projections, section of solids and sciography. Isometric and axonometric views and perspectives will also be covered.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Architectural Graphic Fundamentals: Lines, lettering and dimensioning, reduction and enlargement of drawings on different scales, representation of materials and architectural elements through architectural graphic symbols, introduction to architectural plans, elevations and sections.	3
2.	Orthographic Projections: Principles and projection methods of orthographic projection (third angle projection), straight lines, planes, solids and development of surfaces, section of solids	3
3.	Sciography: Study of shades and shadows cast by simple architectural forms on plain surfaces.	2
4.	Isometric and Axonometric Views: Solids, compositions and buildings	3
5.	Perspective Drawing: Definition of perspective technique (picture plane, stationary point etc) and their role in drawing perspectives, one point, two point and three point perspectives of geometrical shapes leading to perspectives of built forms, exercises in parallel, angular and bird's eye views, shades and shadows cast by simple forms on plain surfaces	3
	Total	14

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Bhatt, N.D. and Panchal, V.M., "Engineering Drawing – Plane and Solid Geometry", 48 th Ed., Charotar Publishing House.	1996
2.	Griffin, A.W. and Brunicardi, V.A., "Introduction to Architectural Presentation Graphics", Prentice Hall.	1998
3.	Ciriello, M., "Architectural Design Graphics", McGraw-Hill.	2002
4.	Ching, F.D.K., "Architectural Graphics", 4 th Ed., John Wiley.	2003
5.	Carpo, M., "Perspective, Projections and Design: Technologies of Architectural Representation", Routledge.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-207** Course Title: **Basic Design and Model Making**

2. Contact Hours: **L: 1 T: 0 P: 4**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To enable the students to develop an understanding of basic design elements and forms as a basis for subsequent architectural design. General principles of model making and carpentry will also be studied.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Relationship between basic design and architectural design, comprehensive understanding of space, form, order and design.	2
2.	Study of space, its scale, proportions and form, conception and space breaking through compositions and models in different media and materials.	2
3.	Study of elementary two dimensional shapes and three dimensional form.	2
4.	Ordering combination principles and their application in building through exercises in design of murals, screens and voids in walls.	2
5.	Block models, building details, construction models and interior models.	1
6.	Methods of presentation of various types of models, their degree of accuracy and refinement alongwith materials and tools used in model making.	1
7.	Cutting, fine joints and joinery in cardboard and wood/ plastic.	2
8.	Model making in paper, wood and plastics and demonstration in metal work.	2

	Total	14
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11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Parmar, V.S., "Design Fundamentals in Architecture", Somoiya Publications.	1973
2.	Morgan, C.L., "Jean Nouvel – The Elements of Architecture", Thames and Hudson.	1998
3.	Ching, F.D.K., "Architecture: Form, Space and Order", 3 rd Ed., John Wiley & Sons.	2007
4.	Kieran, S. and Timberlake, J., "Elements of a New Architecture", Princeton Architectural.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-209** Course Title: **Climatology in Architecture**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits

6. Semester: **Autumn**

7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To expose the students to climatic design principles, their influence on building design and energy conservation through passive techniques.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Climatology: Tropics, climatic zones, macro and micro climate, elements of climate and climatology data needed for planning of buildings.	4
2.	Human Comfort: Human heat balance and comfort, heat stress, effective temperature and bioclimatic analysis.	2
3.	Air Temperature: Factors that influence air temperature – latitude, altitude, seasons, water, trees, areas etc.; inversion of temperature, thermal diffusivity, thermal conductivity and heat transmission through building elements.	4
4.	Solar Radiation: Calculation of solar radiation on building surfaces, solar charts, design and application of shading devices, sun machines and their uses; opaque building elements and heat transfer through these surfaces/elements.	4
5.	Wind: Study of diurnal and seasonal variations, heating and cooling, effect of topography; effect of wind on location on industrial areas, airports and other land uses and road patterns; air movement in and around buildings, wind eddies, size and positions; effect of wind on design and siting of buildings.	4
6.	Precipitation: Water vapour, relative humidity, condensation, rain, fog, snow and architectural responses.	2

7.	Day Light: Glare, amount of light, sky as a source of light and day light factor; effect of size and shape openings in different planes with and without obstructions.	4
8.	Orientation and Application of Climatic Principles: Siting of buildings with respect of sun, wind and view; use of evaporative cooling, ground cooling, cavity walls, topography, landscape elements; ventilation of roof spaces and controlled ventilation.	4
	Total	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Bansal, N.K., Hauser, G. and Minke, G., "Passive Building Design: A Handbook of Natural Climatic Control", Elsevier Science.	1994
2.	Givoni, G., "Climatic Considerations in Building and Urban Design", Van Nostrand Reinhold.	1998
3.	Hausladen, G., "Climatic Design: Solutions for Buildings that can Do More with Less Technology", Birkhauser.	2005
4.	Drake, S., "The Third Skin: Architecture, Technology and Environment", UNSW Press.	2007

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **CE-291** Course Title: **Introduction to Geomatics Techniques**

2. Contact Hours: **L: 3 T: 0 P/D: 3**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits: 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To impart knowledge about the basic principles of geomatics engineering techniques for mapping and various other architectural applications.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Importance of geomatics engineering techniques to architecture, field surveying, photogrammetry, remote sensing, Geographic Information System and Global Positioning System.	2
2.	Type of maps, scales and uses, map sheet numbering, map projection, definition of surveying, principles, importance, classification, surveying equipment namely levels, compass, theodolites, tachometer, EDM, total Stations and other instruments.	4
3.	Measurement of distance, angles and directions; Determination of elevation through spirit leveling, trigonometrical leveling and tacheometric surveying, contouring.	13
4.	Method of control establishment namely traversing, triangulation, trielateration, coordinate computations, plane table surveying and mapping; Introduction to GPS surveys.	4
5.	GPS: Introduction to GPS surveys.	3
6.	Aerial and terrestrial photogrammetry, applications of photogrammetry, types of photographs, geometry of an aerial photograph, flying height and scale, relief (height) displacement, stereoscopy, measurement of parallax and height determination.	5

7.	Basics concepts of remote sensing, electromagnetic spectrum, platforms and sensors, remote sensing data products; Introduction to visual and digital image interpretation.	6
8.	Introduction to GIS, Digital Elevation Model (DEM).	3
9.	Applications of geomatics techniques to architecture and planning; Utility of high resolution remote sensing data, close range photogrammetry, visualization etc.	2
	Total	42

List of Practicals

Visit to Geomatics Engineering laboratory. Study of Maps and Map Numbering Systems, Map in the Making and Map Projection Systems, conventional symbol chart.
 Demonstration of various surveying equipment.
 Study of Dumpy and IOP levels, and Staff. Practice to take readings. Check levelling using Dumpy level.
 Profile levelling and Cross-sectioning using IOP level.
 Study of different parts of Vernier Theodolite. Practice for taking horizontal and vertical circle readings. Horizontal angle measurement using Method of Reiteration.
 Determination of constants of a Tacheometer. Determination of length and gradient of a line using Tacheometric surveying. Measure the included angle using method of repetition.
 Determination of height of an object using various trigonometric levelling methods.
 Plotting of control points. Three point problem and its solution using trial and error method.
 Preparation of a map of given area using plane table surveying.
 Determination of scale and flying height of an aerial photograph. Use of parallax scale.
 Base lining of a pair of stereo-photograph. Creation of 3-dimensional model. Practice of taking readings using parallax bar to find heights of at least 5 points.
 Demonstration of a GIS and Image Processing System.
 Demonstration of Total Station and Global Positioning System (GPS) equipment.

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Schofield, W. and Breach, M., "Engineering Surveying", 6 th Ed., Butterworth-Heinemann.	2007
2.	Chandra, A. M., "Surveying", New Age Publishers.	2002
3.	Lillesand, T.L., and Kieffer, R. W., "Remote Sensing Image Interpretation", John Wiley and Sons.	2000
4.	Gopi, S., "Global Positioning System: Principles and Applications", Tata McGraw Hill Ltd.	2005
5.	Lo, C. P. and Young, A. K. W., "Concepts and Techniques of Geographical Information System", Prentice Hall.	2002
6.	Chandra, A.M and Ghosh S.K., "Remote Sensing and Geographical Information Systems", Alpha Science.	2005

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-202** Course Title: **Architectural Design-II**

2. Contact Hours: **L: 1 T: 2/2 P: 6**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits

6. Semester: **Spring**

7. Subject Area: **DCC**

8. Pre-requisite: **AR-201**

9. Objective:

To impart an understanding about the design of small buildings with respect to site, landscape and climate.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction to the design assignments, their aims and objectives, scope, special emphasis and limitation; Application of planning and design standards for the proposed design problems.	2
2.	Major design problems such as a house, clinic, elementary school and restaurant, with site orientation, prevailing wind direction and the use of local building materials.	7
3.	Minor design problems such as a small weekend cottage, monument, band stand in a park and way side restaurant.	5
	Total	14

- Study Tour Seminar on 'Visually Experiencing Architecture'
- Architectural Tour

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Neufert, P., "Architects' Data", 3 rd Ed., Blackwell Science.	2000
2.	Watson, D. (Editor), "Time-saver Standards for Architectural Design: Technical Data for Professional Practice", 8 th Ed., McGraw-Hill.	2005
3.	Agkathidis, A., Hudert, M. and Schillig, G., "Form Defining Strategies: Experimental Architectural Design", Wasmuth.	2007

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-204** Course Title: **Building Construction - I**

2. Contact Hours: **L: 1 T: 0 P: 4**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: **AR-203**

9. Objective:

To enable the students to learn detailing of roofs, stairs, partitions, metal windows and temporary work.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Roofs: Simple flat, jack arch, lean to and coupled roofs; Construction details of king-post trusses; Method of construction of RCC/RB roofs including terracing details; Hollow roof construction; Construction of domes, vaults and shell roofs; Expansion and Construction joints.	4
2.	Temporary Work: Centering for arches, vaults and domes.	2
3.	Openings: Metal windows (Z sections and L sections).	2
4.	Partitions: Various types of glazed and wooden partitions and paneling; Curtain walls; Sound proof and light weight partitions.	3
5.	Stairs: Principles of staircase construction and its elements; Details of various stair cases in wood, stone, steel and RCC.	3
	Total	14

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Kumar, S.K., "Building Construction", 19 th Ed., Standard Publishers Distributors.	2001
2.	Rangwala, S.C., "Building Construction", 19 th Ed., Charotar Publishing House.	2001
3.	Mckay, W.B., Building Construction, Vols. I, Longman.	2005
4.	Mckay, W.B., Building Construction, Vols. II, Longman.	2005
5.	Mckay, W.B., Building Construction, Vols. III, Longman.	2005

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-206** Course Title: **Principles of Architecture**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs) **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To teach the students the theory of architectural design and the principles pertaining to visual and aesthetic aspects of architecture.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Understanding of relevant terms – architecture, design art, fine art, visual art, architectural design and other types of design; comparisons of aesthetics in art and architecture.	3
2.	Principles of two dimensional design elements, such as, point, line, direction, shape, size, colour and texture; Three dimensional design profiles of geometric forms and their arrangements in different compositions.	3
3.	Harmony and contrast in 2-D and 3-D design; interplay of light and shade on building blocks and their effect.	5
4.	Scale and proportion in architecture; Le Modular and other concepts.	5
5.	Style, rhythm, balance, unity and order.	6
6.	Form and function in architecture; use of building materials, construction techniques and engineering services for different functions.	6
	Total	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Rasmusson, S.E., "Experiencing Architecture", Chapman and Hall Ltd.	1964
2.	Licklidan, H., "Architectural Scale", The Architectural Press.	1966
3.	Smith, P.F., "Architecture and the Human Dimensions", George Baldwin Ltd.	1979
4.	Ching. F.D.K., "A Visual Dictionary of Architecture", Van Nostrand Reinhold.	1997
5.	Ching. F.D.K., "Architecture Theoretician", Wiley.	2007
6.	Fisher, T., "Architectural Design and Ethics: Tools for Survival", Architectural Press.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-208** Course Title: **History of Architecture-I**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits

6. Semester: **Spring**

7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To expose the students to the evolution of different architectural solutions through historical periods within the restraints of prevalent social and religious customs, geography, climate, building materials and techniques, structural complexities and technology available at the time.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction: Brief about evolution of architecture.	2
2.	Primitive Architecture: Development of forms of shelters and megalithic structures.	2
3.	Architecture of Ancient Civilizations: Egyptian – mastabas, royal pyramids and great temples; West Asiatic (Mesopotamia and Persia) – ziggurats and palaces.	6
4.	Classical Architecture: Greek – columnar and trabeated architecture, Doric, Ionic and Corinthian orders, acropolis, temple at Parthenon, cultural and sports buildings; Roman – arcuated architecture, monumental scale, Tuscan and Composite orders, pantheon, forums, basilicas and thermae.	6
5.	Medieval Architecture: Early Christian – evolution of church architecture; Byzantine – Hagia Sophia; Romanesque – Pisa cathedral complex; Gothic – pointed arch architecture, Notre Dame.	6
6.	Renaissance Architecture: Early and High Renaissance – cathedral of St. Peter and St. Paul; Baroque and Rococo – Piazza of St. Peter Neo-classical	6
	Total	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Watkin, D., "A History of Western Architecture", Thames and Hudson.	1986
2.	Fletcher, B., "A History of Architecture", 20 th Ed., Butterworth Heinemann.	1996
3.	Moffet, M., Fazio, M. and Wodehouse, L., "A World History of Architecture", McGraw-Hill.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-210** Course Title: **Visual Art**

2. Contact Hours: **L: 1 T: 0 P: 2**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To teach the students about colour theory, colour coding systems and psychological factors governing the choice of colour schemes in architecture. They will also be taught basic drawing and painting skills in various media for architectural presentations.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Pencil drawings, tonal value, variation flight, shading and texture techniques.	3
2.	Freehand sketching, still life compositions, pictorial views and landscaping: Brush control exercises in water, oil, poster, crayon and mixed media.	5
3.	Psychology of colour, colour mixtures, colour systems, colour organization, application of colour schemes, national and international standards on colours.	6
	Total	14

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Gill, R.W., "Rendering with Pen and Ink", Thames and Hudson.	1985
2.	Kingsley, K., "Freehand Sketching in the Architectural Environment", Van Nostrand Reinhold.	1990
3.	Toy, Maggie (Editor), "Colour in Architecture", Academy Ed.	1996
4.	Yanes, M.D. and Dominguez, E.R., "Freehand Drawing for Architects and Interior Designers", Norton.	2005

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-212** Course Title: **Measured Drawing**

2. Contact Hours: **L: 0 T: 0 P: 4**

3. Examination Duration (Hrs) **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Spring.** 7. Subject Area: **DCC**

8. Pre-requisite: **CE-291**

9. Objective:

To train the students in conducting detailed building measurements including the application of surveying techniques.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Measurement of some historical or modern building using simple methods and plane table for plans and site plans.	14 X 4
2.	Measurement of elevations and sections by using instruments such as theodolites.	
3.	Village or neighbourhood study, preparing settlement plans, socio economic studies and conservation studies etc.	
Total		56

- Measured Drawing Camp

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Rasmusson, S.E., "Experience Architecture", Chapman and Hall Ltd.\	1964
2.	Frank, D.K. Ching, "Drawing: A Creative Process", Van Nostrand Reinhold.	1990
3.	Frank, D.K. Ching, "Design Drawing", Van Nostrand Reinhold.	1998

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **CE-292** Course Title: **Theory of Structures-I**

2. Contact Hours: **L: 3 T: 1 P: 0**

3. Examination Duration (Hrs) Theory Practical

4. Relative Weightage: CWS PRS MTE ETE PRE

5. Credits: 6. Semester: **Spring** 7. Subject Area: **DCC**

7. Pre-requisite: **Nil**

9. Objective:

The course covers mechanical properties of common engineering materials and introduces simple types of structural elements followed by determination of forces and stresses in the elements.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Types of engineering materials, their mechanical properties and the tests for determination of the same.	4
2.	Introduction to structural elements.	4
3.	Stress and Strains; Elastic constants and their mutual relationships; working stresses and factors of safety; Partial safety factors for load and stresses at limit state of collapse.	8
4.	Simple redundant problems of stresses and strains; Temperature stresses in composite sections.	4
5.	Analysis of trusses: method of joints and methods of sections	6
6.	Bending moment and shear force diagrams for determinate beams under simple types of loads; methods of super position.	8
7.	Theory of simple bending; bending and shear stresses in symmetrical sections; combined direct and bending stresses.	8
	Total	42

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Kumar, A., "Stability Theory of Structures", Tata McGraw Hill Co. Ltd.	1985
2.	Prakash Rao, D.S., "Structural Analysis", University Press.	2007
3.	Jain, A.K., "Strength of Materials and Structural Analysis", 2 nd Ed., Nem Chand & Bros.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-301** Course Title: **Architectural Design-III**

2. Contact Hours: **L: 1 T: 2/2 P: 6**

3. Examination Duration (Hrs) **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits: 6. Semester: **Autumn** 8. Subject Area: **DCC**

7. Pre-requisite: **AR-202**

9. Objective:

To expose the students to the designing of multifunctional community buildings on an intermediate scale with emphasis on building byelaws, impact of culture, traditions and building construction on the built form.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction to designing of multifunctional community building types on an intermediate scale.	2
2.	Importance of space programming, case studies and site analysis in architectural design.	2
3.	Importance of culture/traditions and building byelaws in shaping built forms.	2
4.	Design problems based on technical criteria of given programme and site, design of a library, a gymnasium, a community hall, low-rise apartments and offices cum shops.	8
	Total	14

- Seminar on the 'Work and Philosophy of Eminent Architects'.
- Architectural Study Tour.

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Ching, F.D.K., "A Visual Dictionary of Architecture", John Wiley & Sons.	1996
2.	Neufert, P., "Architects' Data", 3 rd Ed., Blackwell Science.	2000
3.	Norberg-Schulz, C., "Principles of Modern Architecture", Andreas Papadakis.	2000
4.	Watson, D. (Editor), "Time-saver Standards for Architectural Design: Technical Data for Professional Practice", 8 th Ed., McGraw-Hill.	2005

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-303** Course Title: **Building Construction - II**

2. Contact Hours: **L: 1 T: 0 P: 4**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: **AR-204**

9. Objective:

To enable the students to learn detailing of metal doors, fire proof structures, steel trusses and prefabrication.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Steel doors (sliding, revolving, collapsible and rolling shutters), aluminum doors, windows and glazing.	4
2.	M.S. frame structure components and connections.	2
3.	Tubular steel trusses, north light glazing and its covering and drainage details.	2
4.	Fire proof structures, classification of buildings and codal provisions, fire protection of building elements and fire protection devices.	3
5.	Advantages and disadvantages of on-site and off-site prefabrication in Indian conditions, simple details in prefabrication.	3
	Total	14

11. Suggested Books:

S. No.	Name of Authors/Books/Publishers	Year of Publication
1.	Kumar, S.K., "Building Construction", 19 th Ed., Standard Publishers Distributors.	2001
2.	Goyal, M.M., "Handbook of Building Construction", Thomson Press (I) Ltd.	2004
3.	Mckay, W.B., Building Construction, Vols. III, Longman.	2005
4.	Ching, F.D.K., "Building Construction Illustrated", Wiley.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-305** Course Title: **Quantity, Pricing and Accounts**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs) **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits: 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

The objective of the course is to teach the students about cost estimation of building construction work. Use of management techniques for time scheduling of site work, computer software for costing estimation and an introduction to cost accountancy and book keeping also form a part of the course.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction to cost estimation and definitions of terms related to estimates.	2
2.	Types of preliminary estimates and their preparation.	3
3.	Introduction and types of detailed estimates, methods of details of measurement and their application, items of work, measurements of typical elements, viz., arches, steps and polygonal rooms, measurement of RCC work in slabs, beams, columns, stair cases etc.	10
4.	Preparation of abstract of estimated cost/bill of quantities, use of schedule of rates, analysis of rates and break up of material requirements.	4
5.	CPM and PERT management techniques.	3
6.	Introduction to computer software for cost estimation	3
7.	Introduction to cost accountancy and book keeping	3
	Total	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Singh, S.C. and Sofat, C.G., Ed., "Handbook on Building Economics and Productivity", Central Building Research Institute.	1988
2.	Dutta, B.N., "Estimating and Costing in Civil Engineering", 24 th Ed., UBS Publishers Distributors Ltd.	1998
3.	Punmia, B.C. and Khandelwal, K. K., "Project Planning and Control with PERT and CPM", Laxmi Publications Pvt. Ltd.	2000
4.	Ramaswamy, R., "Practical Handbook on Construction Management for Architects and Engineers", Nabhi Publications.	2004
5.	Birdie, G.S., "Text Book of Estimating and Costing (Civil Engineering)", Dhanpat Rai Publishing Company (P) Ltd.	2005

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-307** Course Title: **History of Architecture -II**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits: 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To expose the students to the evolution of architecture through various historical periods pertaining to India within the restraints imposed by prevalent social and religious customs, geography and climate, building material and techniques, structural complexities and limited technology available at the time.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Architecture of the Hindu Period, the Indus Valley civilization and the Vedic Aryans.	4
2.	Buddhist architecture of the Hinayana and Mahayana Periods, early Hindu and golden Age of Gupta Architecture, Chalukyan Architecture	6
3.	Architecture of the Dravidians, Pallavas, Pandavas, Cholas and Nayaks	5
4.	Indo-Aryan architecture (North), Jain Architecture, architecture of the Islamic Period, Mughal Architecture.	5
5.	Indo-Islamic Architecture in India, Imperial Architecture Delhi – Slave, Kalaji, Tugalaq and Sayyed/Lodhi etc.	4
6.	Provincial/Regional Architecture of Bengal, Gujarat, Jaunpur, Deccan, Malwa and Bijapur.	4
	Total	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Brown, P., "Indian Architecture", D.B. Taraporevala.	1965
2.	Grover, S., "The Architecture of India: Buddhist and Hindu", Vikas Publishing House.	1980
3.	Grover, S., "The Architecture of India: Islamic", Vikas Publishing House.	1981
4.	Hardy, A., "Indian Temple Architecture: Form and Transformation", Abhinav Publications.	1995
5.	Parihar, S., "Some Aspects of Indo-Islamic Architecture", Abhinav Publishers.	1999
6.	Moffet, M., Fazio, M. and Wodehouse, L., "A World History of Architecture", McGraw-Hill.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **CE-391** Course Title: **Theory of Structures-II**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs) Theory Practical

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits:

6. Semester: **Autumn**

7. Subject Area: **DCC**

7. Pre-requisite: **CE-292**

9. Objective:

To evaluate elastic deformations in beams and frames and to find forces and deflection in redundant structures.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Slopes and deflections of beams and frames (simple cases only), moment-area method.	4
2.	Conjugate beam method.	4
3.	Virtual work (unit load) method, principles of virtual work and theorem of reciprocal deflections.	4
4.	Redundant structures, introduction to force and displacement approaches, method of consistent deformation.	6
5.	Slope deflection method.	6
6.	Moment distribution method (simple cases only)	4
	Total	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Tung, Au. And Christano, P., “Structural Analysis”, Prentice Hall International.	1987
2.	Jain, A.K., “Advanced Structural Analysis”, Nem Chand & Bros.	2007
3.	Prakash Rao, D.S., “Structural Analysis”, University Press (India) Ltd.	2007
4.	Jain, A.K., “Strength of Materials and Structural Analysis”, 2 nd Ed., Nem Chand & Bros.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **CE-393** Course Title: **Introduction to Foundation Engineering**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs) Theory Practical

4. Relative Weightage: CWS PRS MTE ETE PRE

5. Credits:

6. Semester: **Autumn**

7. Subject Area: **DCC**

7. Pre-requisite: **Nil**

9. Objective:

To give adequate exposure of soil mechanics and foundation engineering to students of architecture so as to enable them to appreciate design of foundation structures.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Soil formation and resulting soil deposits, nomenclature of different soil types, basic physical properties and their inter-relationships, Indian Standard System of Classification.	4
2.	Total effective and neutral stresses, stresses due to building loads, concept of shear strength, Mohr's strength theory, unconfined compression test.	4
3.	Concept of consolidation of clays, compressive index using liquid limit, computation of consolidation settlement.	3
4.	Soil exploration methods, standard penetration test, dynamic cone penetration test, concept of borelog for soil description, ground water table.	3
5.	Use, types and tentative proportioning of retaining walls.	3
6.	Footing foundations – types, guidelines for depth for footing, dimensioning of footings on basis of given values of bearing capacity/allowable pressure and soil borelog, codal provisions, use of plate load test data, effect of variation of ground water table.	4

7.	Rafts – situations where adopted, raft with basement, water proofing of basements below ground water table.	3
8.	Pile foundations – situations where adopted, types of piles, methods of construction, pile capacity from pile loading tests, under reamed piles.	4
	Total	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Ghulati, S.K. and Datta, M., “Geotechnical Engineering”, Tata McGraw Hill.	2005
2.	Varghese, P.C., “Foundation Engineering”, Prentice-Hall of India.	2005
3.	Ranjan, G. and Rao, A.S.R., “Basic and Applied Soil Mechanics”, New Age International (P) Ltd.	2007
4.	Murthy, V.N.S., “Soil Mechanics and Foundation Engineering”, CBS.	2007

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-302** Course Title: **Architectural Design-IV**

2. Contact Hours: **L: 1 T: 2/2 P: 6**

3. Examination Duration (Hrs) **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits: 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: **AR-301**

9. Objective:

To expose the students to multifunctional design problems of an intermediate scale with emphasis on the impact of culture, traditional building construction methods, building services and building by-laws on built forms and interior spaces.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction to design of buildings with plinth area and height restrictions, site limitations, material restrictions and optimum space requirements.	2
2.	Importance of building services, working drawing and detailing in architectural design.	3
3.	Role of interior designing and decoration in creating desirable spaces and built environment.	2
4.	Design assignments of buildings with challenging practical problems, such as plot, plinth area, height, materials and climatic restrictions to achieve optimum space programme of domestic buildings, commercial and cultural complexes, multipurpose halls, cinema halls and auditoriums; Design of mid-rise apartments.	4
5.	Interior design of running design assignments or separate topics such as entrance halls or lounges of a library, restaurants etc.	1
6.	Working drawings and detailing of the running design problems.	2
	Total	14

- Architectural Design Tour

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Chiara, J.D., Panero, J., Zelnik, M., "Time Saver Standards for Housing and Residential Development", 2 nd Ed., McGraw-Hill.	1995
2.	Neufert, P., "Architects' Data", 3 rd Ed., Blackwell Science.	2000
3.	Watson, D.(Editor), "Time-saver Standards for Architectural Design: Technical Data for Professional Practice", McGraw-Hill	2005
4.	Ballard Bell, Victoria and Rand, P., "Materials for Architectural Design", Laurence King.	2006

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-304** Course Title: **Building Construction - III**

2. Contact Hours: **L: 1 T: 0 P: 4**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: **AR-303**

9. Objective:

To enable the students to learn about operational work studies, modular coordination and advanced construction detailing.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Operational work study methods, application of statistical methods, costing, labour, tools and plants and overhead charges.	3
2.	Modular coordination.	2
3.	Detailing of built-in furniture, display units, counters and other furniture items.	3
4.	Balconies, canopies, shop fronts, false and suspended ceilings, free standing stair cases, pergolas and covered walkways.	6
	Total	14

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Singh, S.C. and Sofat, C.G., Ed., "Handbook on Building Economics and Productivity", Central Building Research Institute.	1988
2.	Goyal, M.M., "Handbook of Building Construction", Thomson Press (I) Ltd.	2004
3.	Deplazes, A. (Editor), "Constructing Architecture: Materials, Processes, Structures: A Handbook", Birkhäuser.	2005
4.	Ching, F.D.K., "Building Construction Illustrated", Wiley.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **CE-392** Course Title: **Structural Design - I**

2. Contact Hours: **L: 3 T: 1 P: 0**

3. Examination Duration (Hrs): Theory Practical

4. Relative Weightage: CWS PRS MTE ETE PRE

5. Credits: 6. Semester: **Spring** 7. Subject Area: **DCC**

7. Pre-requisite: **Nil**

9. Objective:

To impart knowledge of simple steel structures and masonry elements.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Properties of Structural Materials: Steel, masonry and B.I.S. specifications, design loads as per B.I.S. codes.	4
2.	Riveted and Welded Connections: Simple connections and connections subjected to moments (simple cases only).	6
3.	Members Subjected to Axial Compressions: Steel struts and columns including built-up columns.	6
4.	Beams: Steel beams and built-up sections.	6
5.	Introduction to Steel Trusses and Industrial Buildings.	5
6.	Bases and Footings: Types, design of slabs and gusseted bases.	5
7.	Masonry: Walls, columns and footings.	10
	Total	42

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Dayaratnam, P., "Brick and Reinforced Brick Structures", Oxford & IBH Publishing Co.	1997
2.	Arya, A.S., "Masonry and Timber Structures Including Earthquake Resistant Design", Nem Chand Bros.	2001
3.	Arya, A.S. and Ajmani, J.L., "Design of Steel Structures", Nem Chand Bros.	2004
4.	Chandra, R., "Design of Steel Structures", Standard Book House.	2006
5.	Duggal, S.K., "Design of Steel Structures", 2 nd Ed., Tata McGraw Hill.	2007
6.	Kazmi, S.M.A. and Jindal, S.K., "Design of Steel Structures", Prentice Hall.	2007

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **CE-394** Course Title: **Building Services**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs) Theory Practical

4. Relative Weightage: CWS PRS MTE ETE PRE

5. Credits:

6. Semester: **Spring**

7. Subject Area: **DCC**

7. Pre-requisite: **Nil**

9. Objective:

To cover various aspects of water supply, drainage and solid waste disposal from buildings.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Basic principles of plumbing, terminology.	2
2.	Systems of water supply of buildings – upfeed and downfeed systems and critical fixtures.	4
3.	Units, most probable simultaneous demand and design.	3
4.	Hot water supply systems – tank, cylinder and combinations.	2
5.	Fire water supply, wet and dry standpipes, automatic fire sprinkler systems.	4
6.	Drainage systems – two pipes, one pipe, single stack and MOP systems.	3
7.	Septic tank disposal and soakage pit design.	4
8.	Solid waste disposal from high rise buildings.	2
9.	Water supply to high rise buildings, problems encountered and systems adopted.	4
	Total	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Bureau of Indian Standards.	1995
2.	Pachauri, A.K., "Water Supply and Sanitary Installations, Design, Construction and Maintenance", New Age International Ltd.	1999
3.	Manas Handbook of Plumbing, Manas Publishers.	2000

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-401** Course Title: **Architectural Design-V**

2. Contact Hours: **L: 1 T: 2/2 P: 6**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits:

6. Semester: **Autumn**

8. Subject Area: **DCC**

7. Pre-requisite: **AR-302**

9. Objective:

To enable the students to design large scale housing and building projects in an urban environment with emphasis on advanced building services and systems, urban development regulations, building by-laws and architectural controls.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Planning and designing of large scale housing and building projects in an urban environment, advance building services, energy conservation and systems for large scale design projects, importance of urban development regulations, building by-laws and architectural controls.	8
2.	Design assignments of institutional, industrial, recreational, transportation and hospital buildings and housing design.	6
	Total	14

- Seminar on 'Building Services and Technologies'
- Architectural Study Tours

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Chiara, J.D., Panero, J., Zelnik, M., “Time Saver Standards for Housing and Residential Development”, 2 nd Ed., McGraw-Hill.	1995
2.	Neufert, P., “Architects’ Data”, 3 rd Ed., Blackwell Science.	2000
3.	Watson, D.(Editor), “Time-saver Standards for Urban Design”, McGraw-Hill.	2003
4.	Watson, D.(Editor), “Time-saver Standards for Architectural Design: Technical Data for Professional Practice”, McGraw-Hill.	2005

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **CE-401** Course Title: **Construction Planning and Management**

2. Contact Hours: **L: 3 T: 1 P: 0**

3. Examination Duration (Hrs) Theory Practical

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits:

6. Semester: **Autumn**

7. Subject Area: **DCC**

7. Pre-requisite: **Nil**

9. Objective:

To impart knowledge of network techniques, construction planning practices, construction equipments and methods alongwith quality control in construction.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Network Techniques: Introduction to network techniques; Use of computer aided CPM and PERT for planning, scheduling and control of construction work, bar charts; Error in networks, Types of nodes and node numbering systems.	12
2.	Construction Planning: Planning for construction and site facilities using networks; Preparation of construction schedules for jobs, materials, equipment, labour and budgets using CPM.	10
3.	Construction Equipments and Methods: Equipment for earthworks; Concrete construction; Aggregate production; Concrete production, handling and placement; Mixers, vibrations and temperature control.	12
4.	Control of Construction: Construction quality control and inspection; Significance of variability and estimation of risks; Construction cost control; Crashing of networks.	8
	Total	42

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Ahuja, H.N., "Construction Performance Control by Networks", Wiley Interscience Publications.	1976
2.	Peurifoy, R.L., "Construction Planning, Equipments and Methods", McGraw Hill Book Co. Inc.	1996
3.	Srivastva, U.K., "Construction, Planning Management", Galgotia Publisher.	1999

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **CE-491** Course Title: **Structural Design - II**

2. Contact Hours: **L: 3 T: 1 P: 0**

3. Examination Duration (Hrs) Theory Practical

4. Relative Weightage: CWS PRS MTE ETE PRE

5. Credits:

6. Semester: **Autumn**

7. Subject Area: **DCC**

7. Pre-requisite: **CE-392**

9. Objective:

To impart knowledge in the area of the design of simple concrete structural elements and structures as well as the behavior of advanced concrete structures.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Properties of concrete and reinforcing steels.	3
2.	Design approaches.	4
3.	Limit State Design of reinforced concrete sections for bending and shear; Bond strength and development length; Serviceability; Limit states of deflection and cracking.	14
4.	Design of beams, one-way slabs, L and T beams, two-way slabs, columns and footing for isolated columns; Detailing of reinforcement.	10
5.	Introduction of framed buildings and prestressed concrete.	8
6.	Structural behavior of domes, grids, waffle slabs, shells and folded plates.	3
	Total	42

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Dayaratnam, P., "Reinforced Concrete Structures", Oxford & IBH Publishing Co.	2002
2.	Jain, A.K., "Reinforced Concrete – Limit State Design", Nem Chand Bros.	2006
3.	Sinha, S.N., "Reinforced Concrete Design", Tata McGraw Hill.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **EE-441** Course Title: **Building Technology - I**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs): **Theory 2 Practical 0**

4. Relative Weightage: **CWS 25 PRS 0 MTE 25 ETE 50 PRE 0**

5. Credits: **3**

6. Semester: **Autumn**

7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

The course aims at exposing the students of architecture to the areas of electrical installations and illumination in buildings.

10. Details of Course:

S. No.	Contents	Contact Hours
	ELECTRICAL WIRING	
1.	Domestic Electrical Appliances: Brief description, principles of action of the appliances commonly used in domestic installations - electric water heaters, radiators and air conditioners etc.	4
2.	Electrical Wiring Systems: Wiring in domestic and commercial buildings, control panels.	5
3.	Lightning Conductors and Earthing: Purpose, materials and fixing arrangements.	2
	ILLUMINATION	
4.	General Principles: Nature of light, definition, units of light, definitions of flux, solid angles, luminous intensity and brightness.	4
5.	Production of Light: Brief description, characteristics, incandescent lamp, sodium vapour lamp, mercury vapour lamp, fluorescent lamp, neon lamp, characteristics of reflectors.	6
6.	Laws: Laws of illumination, inverse square law, Lamber's Cosine law, application of laws in lighting calculations using point by point method.	2

7.	Light Flux Method: Calculation of number of lamps required for achieving a particular level of illumination.	3
8.	Reference to Indian Standards and Energy Auditing	4
	Total	42

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Indian Standard (732)– Electrical Wiring Installation	1963
2.	Indian Standard (3646)– Interior Illumination Part I, II, III	1966
3.	Indian Standard (3043)– Earthing	1966
4.	Taylor E. O., “Utilisation of Electric Energy (in SI units)”, Orient Longman, Revised in S.I. units by Rao, V.V.L	1971

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-402** Course Title: **Architectural Design-VI**

2. Contact Hours: **L: 1 T: 2/2 P: 6**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits: 6. Semester: **Spring** 7. Subject Area: **DCC**

7. Pre-requisite: **AR-401**

9. Objective:

To promote team work amongst students for designing large scale urban design projects.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction to urban design projects: planning and design considerations.	2
2.	Planning and design or urban regeneration, renewal, conservation and redevelopment schemes.	3
3.	Infrastructure and systems organization and its impact on urban projects.	2
4.	Design of high rise/tall buildings, viz., apartments and commercial mixed use complexes, five star hotel, multiple complex, layout and design of large scale exhibitions.	3
5.	Group design assignments for urban development schemes such as civic centres, district/town commercial centres, neighbourhood, community centres, residential, recreational and commercial mixed use development; urban renewal; conservation and re-development projects.	4
	Total	14

- Architectural Study Tours.

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Chiara, J.D., Panero, J., Zelnik, M., "Time Saver Standards for Housing and Residential Development", 2 nd Ed., McGraw-Hill.	1995
2.	Neufert, P., "Architects' Data", 3 rd Ed., Blackwell Science.	2000
3.	Watson, D.(Editor), "Time-saver Standards for Architectural Design: Technical Data for Professional Practice", McGraw-Hill.	2005

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-404** Course Title: **Finishes, Materials and Specifications**

2. Contact Hours: **L: 2 T: 1 P: 0**

3. Examination Duration (Hrs) **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits: 6. Semester: **Spring** 7. Subject Area: **DCC**

7. Pre-requisite: **Nil**

9. Objective:

To expose the students to the various types of building finishes, materials and their specifications.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Special finishes like aluminium, anti-corrosive and water bound paints.	3
2.	Distempers, snowcem, lacquers, polishes and staining varnishes, water proofing compounds and proprietary materials.	3
3.	Aluminium, plastic, glass and different alloys and their applications in the building industry.	3
4.	Recent developments in timber and concrete building materials.	3
5.	Different paving and facing materials.	3
6.	Acoustical and fibre boards.	4
7.	Influence of the above materials and their methods of construction on modern architectural design.	2
8.	Specifications of common building materials and simple construction as separate documents or annotated on the working drawings.	3
9.	Specifications for special finishes, advanced materials and different construction elements.	4
	Total	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Singh, S.C. and Sofat, C.G., Ed., "Handbook on Building Economics and Productivity", Central Building Research Institute.	1988
2.	BMTPC, "Standards & Specifications for Cost Effective Innovative Building Materials and Techniques".	1996
3.	Dutta, B.N., "Estimating and Costing in Civil Engineering", 24 th Ed., UBS Publishers Distributors Ltd.	1998

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-406** Course Title: **Landscape Architecture**

2. Contact Hours: **L: 2 T: 0 P: 2**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To familiarize the students with the linkage between architecture and nature through the planning and design of land using elements like plants and water.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction: Definition, scope, objectives, design process and profession of landscape architecture in relation to architecture, elements of landscape architecture, linkages with nature and built environment; Graphics in landscape architecture.	4
2.	Historical Review: History of the art of garden design of India, China, Persia, Japan, Italy, France and England; Garden design of the modern world.	4
3.	Horticulture: Plant classification and nomenclature, plant identification, propagation and care of plants, planting preparation and methods.	4
4.	Characteristics and Use of Plants: Characteristics of various types of plants and their suitability of landscaping, plant selection criteria, landscape design elements and principles.	6
5.	Landscape Design: Landscape design for various building types, landscaping parks and roads, rock gardens, interior and terrace gardens, formal and informal design, use of water and man-made elements in landscape, garden furniture and embellishments, landscape construction, preparation of landscape schemes, ecological and environmental aspects of landscape design.	10

	Total	28
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11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Bose, T.K. and Chowdhury, B., "Tropical Garden Plants in Colour", Allied Publishers.	1991
2.	Black & Decker, "Landscape Design & Construction", Creative Publishing International.	1993
3.	Thompson, W. and Sorvig, K., "Sustainable Landscape Construction: A Guide to Green", Island Press.	2007

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1. Subject Code: **AR-503** Course Title: **Town Planning Design**

2. Contact Hours: **L: 2 T: 0 P: 2**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits: 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

The objective of the course is to familiarize the students with the socio-economic and demographic characteristics of villages, towns and cities, their present growth trends and future needs.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Planning Problems: Identification of planning problems of land use distribution and change, communication system, overcrowding, slums, sporadic growth and conurbation.	4
2.	Planning Standards: Formulation of planning standards for land use, density, road and various community facilities at the local and town level.	4
3.	Development Plan: Planning process, concept of master plan, its elements, preparation and implementation.	6
4.	Regional Planning: Concept of regional planning, types of regions, locational factors of settlements etc.	5
5.	Planning Legislation: Review of the development of planning legislation in India and UK.	5
6.	Housing Acts.	4
	TOTAL	28

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Gupta, V., "Energy and Habitat: Town Planning and Building Design for Energy Conservation", Wiley Eastern.	1984
2.	Rangwala, S.C., "Town Planning", Charotar Publishing House.	1989
3.	Eleanor, S.M., "British Town Planning and Urban Design: Principles and Policies", Longman.	1997
4.	Randall, A., "Crossroads, Hamlet, Village, Town: Design Characteristics of Traditional Neighbourhoods, Old and New", American Planning Association.	2004

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Architecture and Planning**

1 Subject Code: **AR-505** Course Title: **Professional Practice, Valuation and Arbitration**

2. Contact Hours: **L: 3 T: 1 P: 0**

3. Examination Duration (Hrs): **Theory** **Practical**

4. Relative Weightage: **CWS** **PRS** **MTE** **ETE** **PRE**

5. Credits: 6. Semester: **Autumn** 7. Subject Area: **DCC**

7. Pre-requisite: **Nil**

9. Objective:

The objective of the course is to expose the students to the present trends of architectural practice, valuation and arbitration.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Role of professional bodies such as The Indian Institute of Architects, working, byelaws, categories of membership, election procedure and code of conduct; The Architects' Act of 1972 and the Council of Architecture.	6
2.	Professional responsibilities of the architect, copyrights, scale of charges, variation of charges, mode of payment, termination of services, specialized building services.	3
3.	Techniques of valuation, elements of valuation and factors affecting valuation.	4
4.	Methods, valuation of landed and building property, comparable cost of sale, purchase and mortgage.	4
5.	Valuation for compensation on acquisition, compensation under central and state legislation, relevance of the Town Planning Act.	4
6.	Valuation for renewal or lease/extension of lease, standard rent, easement rights, dilapidation, insurance, estate development and advice on investment policy.	4

7.	Arbitration, arbitrators, umpire and nature of arbitration.	4
8.	Appointment, conduct, powers and duties of arbitrators and umpires.	4
9.	Procedure for arbitration, preparation and publication of awards and impeachment.	4
11.	Fire insurance and arbitration of insurable value, claims and damages with specific relevance to insurance regulatory authority.	2
12.	Easement and its definition, features of easements, interim, permanent and mandatory injunctions.	3
	TOTAL	42

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Rangwala, S C , “Valuation of Real Properties”, Charotar Book Stall.	1974
2.	Piotrowski, A. and Williams, Julia, “The Discipline of Architecture”, University of Minnesota Press.	2001
3.	Eldred, G.W., “The Beginner’s Guide to Real Estate Investing”, John Wiley & Sons.	2004