Department of Architecture and Planning				
SL.No	**Subjects Code**	**Subjects Title**	**Subject Area**	**Credit**
1.	MAN-001	Mathematics-1	BSC	4
2.	ARN-103	Introduction to Architecture	DCC	2
3.	ARN-105	Architectural Graphics-I	DCC	4
4.	ARN-107	Basic Design and Creative Workshop-I	DCC	4
5.	HS-001A	Communication Skills (Basic)	HSSC	2
6.	HS-001B	Communication Skills (Advance)	HSSC	2
7.	HSN-002	Ethics and General Awareness	HSSC	2
8.	CEN-105	Introduction to Environmental Science	GSC	3
9.	ARN-101	Introduction to Architecture	DCC	2
10.	ARN-102	Architectural Design-I	DCC	4
11.	ARN-104	Introduction to Building Materials Construction I	DCC	4
12.	ARN-106	Architectural Graphics -II	DCC	4
13.	ARN-108	Climatology in Architecture	DCC	4
14.	ARN-110	Visual Art and Creative Workshop - II	DCC	4
15.	ARN-112	Computer Systems and Programming	ESC	4
16.	ARN-201	Architectural Design-II	DCC	5
17.	ARN-202	Architectural Design-III	DCC	5
18.	ARN-203	Building Construction II	DCC	4
19.	ARN-204	Building Construction - III	DCC	4
20.	ARN-205	History of Architecture-I	DCC	4
21.	ARN-206	History of Architecture-II	DCC	3
22.	ARN-207	Quantity , Pricing and Specifications	DCC	3

23.	ARN-208	Building Codes and Regulations	DCC	2
24.	ARN-209	Structure and Architecture	DCC	3
25.	ARN-210	Modern World Architecture	DCC	3
26.	ARN-211	Principles of Architecture	DCC	3
27.	ARN-212	Landscape Design and Site Development	DCC	3
28.	ARN-213	Measured Drawing Camp	DCC	2
29.	ARN-301	Architectural Design-IV	DCC	5
30.	ARN-302	Architectural Design-V	DCC	5
31.	ARN-303	Building Construction IV	DCC	4
32.	ARN-305	Computer Applications in Architecture	DCC	2
33.	ARN-310	Building Technology- Mechanical and Electrica	ESC	4
34.	ARN-401	Architectural Design-VI	DCC	5
35.	ARN-402	Professional Training	DCC	10
36.	ARN-403	Urban Design	DCC	4
37.	ARN-405	Sustainable Architecture	DCC	4
38.	ARN-407	Working Drawing	DCC	2
39.	ARN-415	Live Project / Studio / Seminar- I	DCC	2
40.	ARN-501	Architectural Design-VII	DCC	5
41.	ARN-502	Professional Practice, Valuation and Arbitration	DCC	4
42.	ARN-503	Thesis Project-I	DCC	6
43.	ARN-504	Thesis Project – II	DCC	15
44.	ARN-505	Urban Planning	DCC	4
45.	ARN-507	Hill Architecture	DCC	3

46.	ARN-515	Live Project / Studio / Seminar – II	DCC	2
47.	CEN-192	Geomatics Techniques for Architects	ESC	3
48.	CEN-292	Theory of Structures	DCC	4
49.	CEN-391	Design of Reinforced Concrete Elements	ESC	4
50.	CEN-392	Design of Steel Elements	ESC	3
51.	CEN-394	BUILDING SERVICES	DCC	2
52.	HSN-351	Society, Culture and Built Environment	HSSMEC	3
53.	HSN-352	Building Economics	HSSMEC	3

Department Elective-I				
1	AR- 307	Interior Design	DEC	3
2.	AR -309	Applied Arts	DEC	3
3.	AR -311	Modern Indian Architecture	DEC	3
Department Elective-II				
1.	AR- 304	Acoustics and Lighting	DEC	3
2.	AR -306	Vernacular Architecture	DEC	3
3.	AR -308	High-rise Building	DEC	3
Department Elective-III				
1.	AR- 409	Digital Architecture	DEC	3
2.	AR -411	Ekistics	DEC	3
3.	AR -413	Construction Planning and Management	DEC	3
Department Elective-IV				
1.	AR- 509	Emerging Technologies in Architecture	DEC	3

2.	AR -511	Disaster Resistant Buildings	DEC	3
3.	AR -513	Vastushastra	DEC	3
Department Elective-V				
1.	AR- 506	Housing	DEC	3
2.	AR -508	Architectural Research and Journalism	DEC	3
3.	AR -510	Architectural and Urban Conservation	DEC	3

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE

NAME OF DEPARTMENT.: **Architecture and Planning**

1. Subject Code: **ARN-101** Course Title: **Introduction to Architecture**
2. Contact Hours: **L: 1** **T: 0** **P: 2**
3. Examination Duration (Hrs): **Theory :0** **Practical** :0
4. Relative Weightage: **CWS 100** **PRS 0** **MTE 0** **ETE 0** **PRE 0**
5. Credits : **2**
6. Semester: **Autumn** 7. Subject Area: **DCC** 8. Pre-requisite: **Nil**
9. Objective: to provide an comprehensive understanding of Architecture and help students to develop an active interest in the field of study.
10. Details of Course:

S. No.	Contents	Contact Hours
1.	**Understanding Architecture**: Definitions, interpretations and explanations; distinctive aspects of architecture, Architecture as a fine art, a technological field and as a profession; Language and medium of architecture.	**3**
2.	**The inter-linkages between Architecture, Nature and Culture**: The concepts of Nature and Environment as systems and Architecture and Culture as sub-systems; Architecture as manifestation of culture; Traditional and vernacular architecture; Design as a theme in nature and architecture.	**2**
3.	**Architectural Education** Curricular framework and content of architectural education; Similarities and differences between engineering disciplines and architecture. Specializations in architectural education and profession; Requirements and qualities of a student of architecture.	**3**
4.	**Architecture as a profession:** Unique aspects of architectural profession; Nature of job of an architect and the services provided by him; Role, responsibilities and essential qualities of an architect; Related professions. Distinctive institutions of education and profession in India and abroad; Architectural challenges within and outside India.	**3**
5.	**Well known architects and architectural work**; Indian and international examples of architectural works of famous architects. **Architectural contribution to current environmental and development contexts**. Innovations in architecture.	**3**

	Total	**14**

11. Suggested Books:

S. No.	Name of Authors/ Books/ Publishers	Year of Publication/ Reprint
1	Shephen Gardiner***, Introduction to Architecture***, Reed International Books Ltd.	**2004**
2	Hazel Conway & Rowan Roenisch, ***Understanding Architecture,*** Routledge, London	**1994**
3	Eugene Ruskin, A.I.A, ***Architecture and People***, Prentice Hall, inc	**1974**
4	J.M.Richards, ***The Professions: Architecture,*** Newton Abott Ltd., Great Britain	**1974**
5	***The Illustrated book of Architects and Architecture***, Edited by Mike Darton	**1990**
6	Christopher Benninger, ***Letters to A Young Architect***, CCBA Pvt. Ltd.	**2011**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-102** Course Title: **Architectural Design-I**

2. Contact Hours: **L: 1** **T: 0** **P: 6**

3. Examination Duration (Hrs): **Theory** : **0** **Practical** : 7

4. Relative Weightage: **CWS: 0** **PRS: 60** **MTE : 20** **ETE: 0** **PRE: 20**

5. Credits : **4** 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective: To introduce architectural design process with a focus on anthropometry, basic spatial understanding and simple form explorations.

10. Details of Course:

S.No.	Contents	Contact Hours
1.	Study of anthropometry and its association with built environment	**2**
2.	Understanding space and its volumetric sense through various configurations	**3**
3.	Exploring form alternatives with a sense of visual appeal	**3**
4.	Interrelationships of form and function	**3**
5.	Expressing design idea/s through presentation drawings	**3**
	Total	**14**

Design Exercises

1. Anthropometric studies
2. Spatial studies of diverse activities like living, dining, office seating , etc.
3. Form evolution for enclosed, semi open and open spaces
4. Design of simple form based structures

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", 3rd Ed., Blackwell Science.	2000
3.	Fawcett, A.P., "Architecture: Design Notebook", 2nd Edition, Architectural Press	2003
4.	Watson, D. (Editor), "Time-saver Standards for Architectural Design: Technical Data for Professional Practice", 8th Ed., McGraw-Hill.	2005
5.	Doorley, Scott, Witthoft, Scott, "Make Space – How to set the stage for creative collaboration", John Wiley & Sons.	2012

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-104** Course Title: **Introduction to Building Materials Construction I**

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

3. Examination Duration (Hrs): **Theory : 4** **Practical : 0**

4. Relative Weightage: **CWS: 0** **PRS: 40** **MTE: 20** **ETE: 40** **PRE: 0**

5. Credits: **3** 6. Semester : **Spring** 7. Subject Area : **DCC**

8. Pre-requisite: **Nil**

9. Objective: To introduce building construction materials, their properties, application, components and their construction technology.

10. Details of Course:

Sl.No.	Contents	Contact Hours
1.	**Introduction**: Basic building materials - masonry units, lime, cement, sand, timber; Application, properties, weaknesses, defects**;** Building components - wall, floor, roof and foundation; Construction terminologies	**3**
2.	**Masonry construction**: Mud, brick, stone; Constituents and properties of soil, brick and stone; Preparation, manufacturing and dressing of masonry units; Stabilization of mud; Application in wall and terracing; Defects	**3**
3.	**Timber:** Varieties of Indian timbers, characteristics and suitability for different uses, defects and decay, seasoning and preservation; Manufactured timber products and their applications as insulation materials and decorative materials	**2**
4.	**Lime an d cement**: Sources, classification, properties, hydration, method of manufacturing, testing, mixing and uses	**2**
5.	**Concrete**: Composition, properties and uses; Water cement ratio; Grade of concrete; PCC, RCC, light weight concrete, autoclaved aerated concrete, hollow concrete blocks; Admixtures	**2**
6.	**Masonry wall**: Wall construction in bricks and stone; Types and joints; Hollow concrete and glass block construction; Light weight panel walls, pre-cast and stone panel walls; Decorative brick work and jali work	**2**
	Total	**14**

Suggested Exercises:

- Construction details of different components of a building
- Construction techniques of masonry bonds
- Construction techniques of corners and junctions

Site visits to ongoing construction project/s and masonry structures

Visit to building materials' exhibitions

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Mckay, W.B., "Building Construction- Vol. I", Longman	2005
2.	Simmons H. L, "Olin's Construction Principles, Materials and Methods", John Wiley and Sons	2007
3.	Ching F.D.K., "Building Construction Illustrated", 3rd Ed., John Wiley and Sons	2001
4.	Goyal, M.M., "Handbook of Building Construction", Thomson Press	2004
5.	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: **ARN-106** Course Title: **Architectural Graphics -II**
2. Contact Hours: **L: 1** **T: 0** **P: 6**
3. Examination Duration (Hrs): **Theory: 0** **Practical :** 3
4. Relative Weight: **CWS: 0** **PRS: 60** **MTE : 20** **ETE : 0** **PRE: 20**
5. Credits: **4** 6. Semester: **Autumn** 7. Subject Area: **DCC**
8. Pre-requisite: Architectural Graphics I
9. Objective: To develop visualization and technical representation of design through perspective views and to develop drawing skills through software applications.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	**Introduction:** Basic terminology of perspective drawing - Vanishing Point, Horizon, Picture Plane, Point of View, Projection Plane, Reference Plane	**2**
2.	**Perspectives:** One Point Perspective, Two Point Perspective, Three Point Perspective	**3**
3.	**Sciography:** Study of shades and shadows cast by building surfaces or a combination of objects on each other in perspective	**2**
5.	**AutoCAD:** Creation of files, tools, commands, layers, blocks and symbols in AutoCAD; Creation of Orthographic Projections, Isometric Views and 2-D drawing of solids through AutoCAD	**5**
6.	**Google Sketch up:** Development of a set of architectural drawings through Google sketch up	**2**
	Total	**14**

Suggested Exercise:

1. One point perspective of simple objects like cubes, cylinders and other geometrical shapes.
2. One point perspective of simple buildings without ornamentation.
3. Two point perspective of simple buildings with projections and architectural features.
4. Three point perspective of simple objects.
5. Two point perspective of design already undertaken by students in design.
6. Two point perspective of major project with ornamentation details.

7. Drawing of simple objects and shapes in AutoCAD.
8. Conversion of orthographic projections done in Graphics I to computerized drawing in AutoCAD.
9. Drawing of simple building plans, sections and elevations in AutoCAD
10. Drawing of building details using Google Sketch up.

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", 48th Ed., Charotar Publishing House.	1996
2.	Griffin, A.W. and Brunicardi, V.A., "Introduction to Architectural Presentation Graphics", Prentice Hall.	1998
3.	Ching, F.D.K., "Architectural Graphics", 4th Ed., John Wiley.	2003
4.	Mike Tardos, "Google Sketch Up", Peachpit Press	2010
5.	Ellen Finkelstein, "AutoCAD 2012 and AutoCAD LT 2012 Bible", Wiley Publishing Inc.	2011

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-108** Course Title: **Climatology in Architecture**
2. Contact Hours: **L: 1** **T: 2** **P: 0**
3. Examination Duration (Hrs): **Theory : 2** **Practical** : **0**
4. Relative Weight: **CWS:25** **PRS: 0** **MTE: 25** **ETE: 50** **PRE : 0**
5. Credits: **3** 6. Semester: **Spring** 7.Subject Area: **DCC**
8. Pre-requisite: **Nil**
9. Objective: To impart knowledge of climatic elements, their influence on building design and passive design strategies
10. Details of Course:

S. No.	Contents	Contact Hours
1.	**Climatology**: Climatic zones, macro and micro climate, elements of climate and climatology data required for design of buildings	**2**
2.	**Human C omfort**: Human heat balance and comfort, heat stress, comfort index, Corrected Effective Temperature, Thermal Stress Index and Bioclimatic Analysis	**2**
3.	**Climatic Elements:** Air temperature and humidity, Sol-Air temperature, heat exchange through conduction, convection, radiation and evaporation; wind study -diurnal and seasonal variations, heating and cooling of land and sea, effect of topography; Precipitation- water vapour, condensation, rain, fog, snow and architectural responses; Graphical representation of climatic elements- wind rose; Tools for measurement	**8**
4.	**Sun a nd Solar Radiation:** Apparent movement of sun, solar radiation and intensity on surfaces and buildings in different latitude, sun path diagram, shading device and its design, heliodon and its use; Opaque building and heat transfer through its multi-layered envelope; Transparent surface and solar radiation on it, absorbance, reflectance, transmittance and emittance	**4**

5.	**Natural V entilation an d Air Movement:** Air movement in and around building, stack effect, Ventury effect, cross ventilation, influence of opening size and positions, wind eddies, effect of wind on location for industrial areas, airport and other land uses	**3**
6.	**Daylighting:** Fenestration, lighting level and glare, amount of light, sky as a source of light and daylight factor, effect of different types of fenestrations, their size, shape in different planes with and without obstructions	**3**
7.	**Site Climate:** Microclimate, site climate data, local factors, presence of water body and vegetation, topography, special characteristics, urban climate-cooling degree days and heating degree days	**2**
8.	**Passive Design Strategies:** Orientation-sitting of building with respect to sun, wind and view, use of evaporative cooling, ground cooling-earth air tunnel, thermal mass-cavity wall, natural ventilation of attic space, night time cooling, reflective surfaces and radiant barrier, cool roof and green roof, solar radiation and sun space	**4**
	Total	**28**

11**.** Suggested Books:

S.No.	**Name of Authors/ Books/ Publishers**	**Year of Publication / Reprint**
1.	Koenisberger, O.H., Ingersoll, T.G., Mayhew A., and Szokolay, S.V, "Manual of Tropical Housing and Building- Part I: Climatic Design", Orient Longman	2004
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.	Bansal, N.K., Hauser, G. and Minke G., "Passive Building Design: A Handbook of Natural Climate Control", Elsevier Science.	1994
5.	Drake, S., "The Third Sin: Architecture, Technology and Environment", UNSW Press	2007

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-110** Course Title: **Visual Art and Creative Workshop - II**

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

3. Examination Duration (Hrs): **Theory : 1** **Practical : 2**

4. Relative Weight: **CWS: 15** **PRS : 40** **MTE: 15** **ETE: 15** **PRE: 15**

5. Credits : **4** 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: Visual Art –I, Basic Design and Creative Workshop - I

9. Objective: To advance the insight into visual art and colour fundamentals, and to enhance creative skills in various materials and media

10. Details of the Course:

S.No	Particulars	Contact Hours
1.	**Colour Fundamentals:** Mixtures, Colour Systems, Organization and Application	**6**
2.	**Colour P sychology:** Psychological Factors Governing Colour Schemes and their Applications	**4**
3.	**National an d I nternational S tandards on C olours:** Various Standards on Colours	**2**
4.	**Visual A rt:** Advanced Drawing Techniques and 3-D Expressive Forms	**2**
	Total	**14**

Suggested Exercises of Visual Art - II

1.	Expression of an idea/concept through two dimensional forms of art, mural, collage, and paintings
2.	3-D Expressive Forms: Clay Pottery Designs, Clay Sculptures, Clay/POP Tiles Designs, Cement, Plaster, Plastic, Wood and Scrap Material
3.	Pictorial Views and Landscaping: Composition Exercises in Water, Oil, Poster, Crayon and Mixed Media
4.	Outdoor Sketching and Painting

Suggested Exercises of Creative Workshop – II

1.	Hands-On Skill Development through exposure to varied craft skills
2.	Developing Prototypes related to space-making like partition walls, lighting fixtures, furniture out of different materials like terracotta, stone, wood with experts and facilitators
3.	Exploring and Developing Surface Finishes and Textures

11. Suggested Books:

S. No.	**Name of Authors/Books/Publishers**	**Year of Publication/ Reprint**
1.	Yanes, M.D. and Dominguez, E.R. "Freehand Drawing for Architects and Interior Designers", Norton	2005
2.	Trench, L., "Materials & Techniques in the Decorative Arts: An Illustrated Dictionary", University Of Chicago Press	2000
3.	Toy, M. (Ed.), "Colour in Architecture", Academy Ed.	1996
4.	Dunn, N., "Architectural Model Making", Lawrence King Publishing Ltd., London.	2010
5.	Farrelly, L., "Basics Architecture – Representation Techniques", AVA Publishing, SA Switzerland	2008
6.	Van Verkel, B., "Architectural Model lead to Design", DAMDI, Korea	2010

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-112** Course Title: **Computer Systems and Programming**
2. Contact Hours: **L: 3** **T: 0** **P: 2**
3. Examination Duration (Hrs): **Theory : 3** **Practical** : **0**
4. Relative Weightage: **CWS: 15** **PRS: 25** **MTE: 20** **ETE: 40** **PRE: 0**
5. Credits : **4** 6. Semester: **Spring** 7.Subject Area: **ESC**
8. Pre-requisite: **Nil**
9. Objective: To impart basic knowledge of Computer System and develop basic skills in Programming
10. Details of Course:

Sl.No.	Contents	Contact Hours
1.	**Basic Computer Fundamentals**: Introduction to computer systems; Binary, octal and Hexadecimal number systems, integer, signed integer, fixed and floating point representations; IEEE standards (single and double precision), Multiplication of integer using add and shift method.	**5 + 1 Home Assignment**
2.	**Basic Programming in C++:** Input/output; Constants, variables, expressions and operators; Naming conventions and styles; Conditions and selection statements; Looping and control structures (while, for, do-while, break and continue); File I/O, header files, string processing; Pre-processor directives such as #include, #define, #ifdef, #ifndef; Compiling and linking.	**10 + 5 Labs**
3.	**Programming through functional decomposition**: Functions (void and value returning), parameters, scope and lifetime of variables, passing by value, passing by reference. Design of functions and their interfaces (concept of functional decomposition), recursive functions; Function overloading and default arguments; Arrays and pointers; Dynamic data and pointers, dynamic arrays Basics of Structures.	**12+ 5 Labs**
4.	**Object Oriented Programming Concepts**: Data hiding, abstract data types, classes, access control; Class implementation-default constructor, constructors, copy constructor, destructor, operator overloading, friend functions; Object oriented design (an alternative to functional decomposition) inheritance and composition; Dynamic binding and virtual functions; Polymorphism; Dynamic data in classes. Introduction to data structures, Basics of linked list. Array Vs linked list. Singly linked list (creation, deletion and insertion of nodes in the list).	**15 + 4 Labs**
	Total	**42+ 14 Labs**

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	H.M. Deitel and P.J. Deitel, C++ How to Program. Prentice Hall, 5th edition.	2005
2.	I. Koren. Computer Arithmetic Algorithms. A.K. Peters Ltd., 2nd edition.	2001
3.	M. Shrikhande. Resources for EC--101A Computer Systems & Progr http//192.168.108.33/~manish/Courses/EC101A/index.htm.	
4.	W. Stallings. Computer Organisation and Architecture: Designing for Performance. Prentice-Hall, 7th edition.	2005
5.	B. Stroustrup. The C++ Programming Language. Addison-Wesley, 3rd edition.	1997

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE**:** **ARCHITECTURE AND PLANNING**

1. Subject Code: **ARN-201** Course Title: **Architectural Design-II**
2. Contact Hours: **L: 1** **T: 0** **P: 8**
3. Examination Duration (Hrs): **Theory :0** **Practical** : 7
4. Relative Weight: **CWS:0** **PRS:60** **MTE:20** **ETE:0** **PRE:20**
5. Credit: :5 6. Semester**: Autumn** 7. Subject Area: **DCC**
8. Pre-requisite: Exposure to **AR-102**
9. Objective: To develop the ability to design small buildings, synthesizing various influencing factors in given contexts.
10. Details of Course:

S. No.	Contents	Contact Hours
1.	Factors affecting design-function, site, climate, materials, aesthetics.	**2**
2.	Site study and analysis, case studies	**2**
3.	Documentation and analysis of case studies	**2**
4.	Space programming and functional interrelationships	**3**
5.	Evolution of Built Forms and Buildings elements in response to various criteria	**5**
	Total	**14**

Suggested Design Exercises

1. Analytical study of an existing small scale building
2. Site analysis
3. Small scale residential buildings
4. Nursing Home, clinic
5. Restaurant, cafeteria

** Architectural Study tour.

11. Suggested Books:

S.No.	Name of Authors/Book/Publisher	Year of Publication/Reprint
1.	Ching, F. D. K., "A Visual Dictionary of Architecture", John Wiley & Sons.	**1996**
2.	Neufert, P., "Architects' Data", 3rd Ed., Blackwell Science	**2000**
3.	Agkathidis, A., Hudert, M. and Schillig, G., "Form Defining Strategies: Experimental Architectural Design", Wasmuth.	**2007**
4.	Norberg-Schulz, C., "Principles of Modern Architecture", Andres Papadakis	**2000**
5.	Watson, D. (Editor), "Timer-saver Standards for Architectural Design: Technical Data for Professional Practice", 8th Ed., McGraw-Hill.	**2005**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPT./CENTRE**:** **Architecture and Planning Department**

1. Subject Code: **ARN-202** Course Title: **Architectural Design-III**

2. Contact Hours: **L: 1** **T: 0** **P: 8**

3. Examination Duration (Hrs) **Theory:0** **Practical:7**

4. Relative Weight: **CWS:0** **PRS:60** **MTE:20** **ETE:0** **PRE:20**

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

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

9. Objective: To develop design ability to evolve site responsive design solutions for multifunctional buildings on intermediate scale.

9. Details of Course:

S. No.	Contents	Contact Hours
1.	Relationship between site and sustainability of buildings	**2**
2.	Understanding building forms in relation to structure	**3**
3.	Design of multifunctional spaces and buildings, space standards, norms and case studies.	**6**
4.	Design issues concerning educational buildings	**3**
	Total	**14**

- **Suggested Design Exercises**

1. Site analysis and site planning
2. Evolution of building form and structure
3. Multifunctional community buildings and spaces for congregation
4. Educational buildings – Schools, Lecture theatre complex, Library, Gymnasium

- Architectural study tours for Site Visits, Case Studies

10. Suggested Books:

S. No.	Name of Books/Authors	Year
1.	Ching, F.D.K., "A Visual Dictionary of Architecture", John Wiley & Sons.	**1996**
2.	Neufert, P., "Architects' Data", 3rd 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", 8th Ed., McGraw-Hill.	**2005**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-203** Course Title: **Building Construction II**
2. Contact Hours: **L: 1** **T: 1** **P: 4**
3. Examination Duration (Hrs): **Theory :4** **Practical:0**
4. Relative Weight: **CWS:0** **PRS:40** **MTE:20** **ETE:40** **PRE:0**
5. Credits:**4** 6. Semester: **Autumn** 7. Subject Area: **DCC**
8. Pre-requisite: **AR 106**
9. Objective:

To impart knowledge on general construction materials and techniques for building envelope, floor, openings, roof, staircases and foundation.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	**Load b earing w all:** Construction details, Plinth and plinth protection, damp proof course - materials and application; Expansion and construction joints, seismic joints; Flooring types and materials; Surface finish- types of plaster and their application, lath, guniting, pointing, glazing and gluing	**4**
2.	**RCC construction**: Column, beam and slab, grade of concrete and steel; Shuttering, curing; Staircases, balconies and canopies; Shear walls and retaining walls	**2**
3.	**Openings**: Window and door types, wooden openings and their fixing details; Arch- types and forms and construction details	**2**
4.	**Roof**: Types; Method of construction of RCC/RB roofs including terracing details; Jack arch, lean to and coupled roofs; Construction of domes, vaults and shell roofs; Centering for arches, vaults and domes	**2**
5.	**Foundation**: Types- stepped, isolated, combined and cantilevered footing, RCC footing and raft, grillage, pile foundation; Selection foundation type; Safe bearing capacity of soils and methods of improvements; Depths and width of foundations; Causes of failure and remedies.	**2**
6.	**Temporary work**: Excavation and timbering of trenches with special references to loose soils and sub-soil water; Shoring, underpinning and scaffolding	**2**
	Total	**14**

Suggested Exercises:

- Construction details of load-bearing wall, flooring, openings, roof details, staircase, foundation
- Masonry walls
- Types of Arches and their details
- RC components including shuttering

- **Site visits** to construction project site, existing masonry and R C structures.

11. Suggested Books:

S. No.	Name of Books/Authors	Year of Publication
1.	Kumar, S.K., "Building Construction", 19th Ed., Standard Publishers Distributors	**2001**
2.	Allen, E. and Iano, J., "Fundamentals of Building Construction: Materials and Methods", Wiley	**2004**
3.	Goyal, M.M., "Handbook of Building Construction", Thomson Press	**2004**
4.	Mckay, W.B., "Building Construction- Vol. II", Longman	**2005**
5.	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**:** **Architecture and Planning**

1. Subject Code: **ARN-204** Course Title: **Building Construction - III**
2. Contact Hours: **L: 1** **T: 1** **P: 4**
3. Examination Duration (Hrs): **Theory :4** **Practical:0**
4. Relative Weight: **CWS:0** **PRS:40** **MTE:20** **ETE:40** **PRE:0**
5. Credits :**4** 6. Semester: **Spring** 7. Subject Area: **DCC**
8. Pre-requisite: **AR-203**
9. Objective:

To impart knowledge on advanced construction materials and techniques and industrialized building components.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	**Advanced con struction m aterials**: Steel, aluminium, glass; Properties and applications	**2**
2.	**Industrialized windows an d door s**: Types- sliding, revolving, collapsible, rolling shutters; Steel, aluminium and composite sections; system details and specifications	**2**
3.	**Walls**: curtain walls, partition walls, dry wall, composite wall; Gypsum wall and plaster	**2**
4.	**Suspended ceiling system**: Types of False Ceiling systems and their construction details	**2**
5.	**MS f rame s tructure**: Metal frame structural components, connections and joinery; Steel tubular space frame with joints	**2**
6.	**Trusses**: Types, materials; Timber and steel truss construction with connection detailing; Cover and drainage details; North light glazing	**2**
7.	**Staircase**: Principles of staircase construction and its elements; Details of staircase in wood, stone and steel	**2**
	Total	**14**

Suggested Exercises:

- Study of online catalogues of industrial products for building industry
- Construction details of window and door system details using Aluminum, PVC, Steel
- Construction details of
    - dry wall and partition wall
    - industrialized door and window systems
    - steel frame structure
    - steel truss using MS flats and tube sections
    - Joints of column to beam, beam to beam, column base, column splice
    - Joinery like welding, bolt, rivet and soldering

- **Site visits** to construction site, modern buildings

- Market survey of building materials and visit to building materials' industries

11. Suggested Books:

S. No.	Name of Books/Authors	Year of Publication
1.	Rangwala, S.C., "Building Construction", 19th Ed., Charotar Publishing House	**2001**
2.	National Building Code-2005, BIS	**2005**
3.	Mckay, W.B., "Building Construction- Vols. II & III", Longman	**2005**
4.	Mehta, M., Scarborough, W. and Armpriest, Diane, "Building Construction: Principles, Materials and Systems", Pearson Prentice Hall	**2008**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: ARCHITECTURE & PLANNING

1. Subject Code: ARN- 205 Course Title: History of Architecture-I

2. Contact Hours: L - 2, T-1, P - 0

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

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

5. Credits:3 6. Semester Autumn **7. Pre-requisite: Nil**

8. Subject Area: DCC

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

10. Details of Course:

S.No	Particulars	Contact Hours
1.	**Introduction:** Evolution of Architecture in Early Historical Periods	**2**
2.	**Primitive A rchitecture:** 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	**5**
3.	**Classical Architecture:** Greek – Columnar and Trabeated Architecture; Doric, Ionic and Corinthian Orders; Acropolis, Temple of Pantheon, Cultural and Sports Buildings, Roman Arcuated Architecture; Monumental Scale; Tuscan and Composite Orders; Pantheon, Forum, Basilicas, Thermae and Colosseum	**5**
4.	**Medieval A rchitecture:** Early Christian – Evolution of Church Architecture; Byzantine – Hagia Sophia; Romanesque; Pisa Cathedral Complex; Gothic – Pointed Arch Architecture; Notre Dame etc.	**5**
5.	**Renaissance A rchitecture:** Early and High Renaissance – Cathedral of St. Peter and St. Paul; Baroque and Rococo – Piazza of St. Peter Neo-Classiacal	**5**
6.	**Oriental Architecture**: Japanese Architecture, Chinese Architecture	**4**
	Total	**28**

11. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
1.	Watkin, D. "A History of Western Architecture", Thames and Hudson	**1986**
2.	Fletcher, B. "A History of Architecture", Butterworth Heinemann	**1996**
3.	Moffet, M., Fazio M. and Wodehouse, L. "A World History of Architecture", Mc. Graw Hill	**2008**
4.	Borngasser, B. "History of Architecture – From Classic to Contemporary", Parragon	**2008**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-206** Course Title: **History of Architecture-II**

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

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

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

5. Credits:**3** 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: - **Nil**

9. Objective:

To develop an insight into architecture and space theories and impart an understanding of various elements and principles in design compositions.

10. Details of Course:

S.No.	Contents	Contact Hours
1.	Architecture of Indus Valley civilization and the Vedic Aryans' timber built forms	**3**
2.	Buddhist architecture of the Hinayana and Mahayana periods; Early Hindu and golden age of Gupta architecture; Chalukyan architecture	**5**
3.	Dravidian architecture (South) : Pallava, Chola, Pandyas and Nayaks	**4**
4.	Indo Aryan architecture (North); Jain architecture, Bhuwaneshwar, Khajuraho styles	**5**
5.	Indo Islamic architecture in India, Imperial architecture of Delhi, including Slave dynasty, Tughlaq and Sayyed/Lodhi dynasties	**3**
6.	Provincial/Regional architecture of Bengal, Gujarat, Jaunpur, Deccan, Malwa and Bijapur	**4**
7.	Mughal Architecture of India	**4**
	Total	**28**

- **Suggested Exercises**
- Study tours for Case Studies, Photo essays

10. Suggested Books:

S. No.	Name of Books/Authors	Year of Publication
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 Publication.	**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", Mc Graw Hill.	**2008**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: **ARCHITECTURE & PLANNING**

1. Subject Code: **ARN- 207** Course Title: **Quantity , Pricing and Specifications**

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

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

4. Relative Weight: **CWS;25** **PRS:0** **MTE:25** **ETE:50**

5. Credits :**3** 6. Semester **Autumn** . 7. Subject Area: **DCC**

8. Pre-requisite: **Nil**

9. Objective of Course: To impart knowledge of cost estimation of building construction work and Specifications.

10. Details of Course:

S.No	Contents	Contact Hours
1.	**Introduction**: Cost estimation and definitions of terms related to estimates; Types of preliminary estimates and their preparation	**3**
2.	**Detailed Estimates:** Introduction and types of detailed estimates , details of measurement and their application, items of work, measurement of typical elements , viz., arches , steps and polygonal rooms, measurement of RCC work in slabs, beams, columns, stair cases etc.	**7**
3.	**Bill Of Quantities:** Preparation of abstract of estimated cost/BOQ, use of schedule of rates, analysis of rates and break up of material requirements	**5**
4.	Introduction to computer software for cost estimation	**2**
5.	**Specifications:** Use of standard specifications, methods of writing form and sequence of clauses, general and special clauses	**4**
6.	Specifications of common building materials and construction, as separate documents or annotated on the working drawings	**4**
7.	Specifications for special finishes, advanced materials and different construction elements	**3**
	Total	**28**

11. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
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," 24th Ed., UBS Publishers Distributers Ltd.	**1998**
3.	Punmia , B.C. and Khandelwal, K.K. "Project Planning and Control with PERT and CPM", Laxmi Publications Pvt. Ltd.	**2000**
4.	Construction Specifications For Govt. Contractors based on CPWD Specification Civil Works.	**2002**
5.	Ramaswamy, R., "Practical Handbook on Construction Management for Architects and Engineers," Nabhi Publications.	**2004**
6.	BIS, National Building Code.	**2005**
7.	CPWD Delhi Schedule of Rates Civil Works.	**2007**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: **ARCHITECTURE & PLANNING**

1. Subject Code: **ARN-208** Course Title: **Building Codes and Regulations**

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

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

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

5. Credits **2** 6. Semester **Spring** 7. Subject Area: **DCC**

7. Pre-requisite: **Nil**

9. Objective of Course: To familiarize the students with various kinds of building codes and regulations required to control and promote the ordered growth of a city /town.

10. Details of Course:

S.No	Particulars	Contact Hours
1.	Historical background and need for codes and bye laws for buildings and land use development in urban context;	**2**
2.	National Building Code and provisions related to general building requirements, fire and life safety, lighting and ventilation, MEP, acoustics, vertical circulation, sustainability etc.; Energy Conservation Building Code.	**5**
3.	Overview of various development regulations, building bye laws, architectural controls; Study of Building Bye laws/regulations of selected cities with emphasis on zoning, architectural controls, frame controls etc.	**5**
4.	Requirements of statutory drawings- submission drawings, as built drawings, completion drawings	**2**
	Total	**14**

11. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
1.	National Building Code	**2005**
2.	ECBC	**2007**
3.	Building Byelaws of different cities of India	**-**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-209** Course Title: **Structure and Architecture**

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

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

4. RelativeWeight: CWS 25 PRS - MTE 25 ETE 50 PRE 0

5. Credits **3** 6. Semester: **Autumn** 7. SubjectArea: **DCC**

8. Pre-requisite: **Nil**

9. Objective:

To impart knowledge on integration of structural systems and Architecture

10. Details of Course:

S.No.	Contents	ContactHours
1.	**Introduction:** Role of structures in buildings; Interrelation between structural systems and architecture	**4**
2.	**History of Structures**: Advancement of building form and structure through history; Evolution of structural theory	**4**
3.	**Structural systems**: Structural elements- beam, column etc.; Gravity and lateral load; Classification of structural systems- vector active, bulk active, surface active, form active and vertical structure	**6**
4.	**Structure in Architecture:** Material, form, function and structural systems; Building typology and logic in building design; Causes of failures of structures	**8**
5.	**Case s tudies**: Contemporary examples of system choices in architectural applications	**6**
	Total	**28**

11.SuggestedBooks:

S.No.	NameofAuthors/Books/Publishers	Yearof Publication/ Reprint
1.	Nervi, PL1956, Structures,McGraw-Hill Inc.,US.	1956
2.	Salvadori, M and Heller,RA 1963, Structure in Architecture, 3rd ed., Prentice Hall.	1986
3.	Schodek, D &Bechthold, M, Structures,7th ed., Prentice Hall.	2013
4.	Lee, KM, Uang, CM & Gilbert, A, Fundamentals of Structural Analysis 7 th ed., McGraw-Hill Science/Engineering/Math.	2010
5.	Ching, FDK 1996, Architecture: Form Space and Order, 2nd ed., Van Nostrand Reinhold.	1996
6.	Levy, M & Salvadori, M 2002, Why Buildings Fall Down: Why Structures Fail?, reprint, W. W. Norton & Company.	2002

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-210** Course Title: **Modern World Architecture**

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

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

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

5. Credits: **3** 6. Semester: **Spring** 7. Subject Area: **DCC**

7. Pre-requisite: **Nil**

9. Objective:

To impart knowledge of the evolution and trends in modern architecture in the 20th and early 21st century.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Beginning of modern architecture - Neoclassicism in the 18th century; Industrial revolution - eclecticism and the architectural predicament in the 19th century; Art Nouveau- morphed forms, plastic treatment of plans; Chicago School- evolution of the high rise office building	**4**
2.	Works of the Masters: F.L. Wright and Organic Architecture; Le Corbusier- Domino System and Points of a new architecture; Mies Van der Rohe and Minimalism; Walter Gropius and Bauhaus	**5**
3.	Works of the early 20th century architects: Adolf Loos and Internationalism; G.T. Reitveld and De Stijl Architecture; Alvar Aalto and Scandinavian Regionalism; Louis Kahn, Richard Neutra, Eero Saarinen, Bruce Goff, P.L. Nervi, Philip Johnson and other architects	**4**
4.	Late and Post Modernism: The architectural philosophy and works of Richard Meier, Robert Venturi, Kenzo Tange, Arata Isozaki, Peter Eisenmann, Kisho Kurokawa, Michael Graves, Frank Gehry, Zaha Hadid; Hi-Tech architecture - Norman Foster, Richard Rogers, Renzo Piano, Michael Hopkins	**4**
5.	Evolution of Various Building Types: Houses, apartments, museums, mediatheques, galleries, educational buildings, offices, commercial complexes, transportation hubs	**6**
6.	Emerging concepts of modern architecture: Adaptive reuse, parametric design, biomimcry, mobius strip; New materials and their application, Seismic safety in the buildings and their integration with architectural problems; Energy efficient built environment with emphasis on energy simulation modeling,	**3**

	estimation of energy and carbon emissions; zero energy and energy plus buildings; Green building design with case studies	
	Total	**28**

11. Suggested Books:

S. No.	Name of Authors/Book/Publisher	Year of Publication
1.	The Phaidon Atlas of Contemporary Architecture, Phaidon Press	**2004**
2.	Gossel. P., "Architecture in the 20th Century", Vol.1 & 2, Taschen.	**2005**
3.	Ballard B. and Rank, V.P., "Materials for Architectural Design", Laurance King.	**2006**
4.	Vidiella, A.S., "The Sourcebook of Contemporary Architecture", Harper Collins.	**2007**
5.	Borngasser, Barbara, "History of Architecture – From Classic to Contemporary", Parragon	**2008**
6.	Tietz, J., "The Story of Modern Architecture", H.F. Ullmann	**2008**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-211** Course Title: **Principles of Architecture**

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

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

4. Relative Weight : **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:

To develop an insight into architecture and space theories and impart an understanding of various elements and principles in design compositions.

10. Details of Course:

S. No.	Contents	Time
1.	Theories of Architecture and Design– applications and connections; Architecture as a systems concept; Debates on Form function; Visual perception; Form and meaning; Gestalt law	**4**
2.	Concepts of space; Interpreting space and its qualities; Spatial configurations and interrelationships; Abstraction in space; Theory of Proxemics and aesthetics	**4**
3.	Elements of space design such as point, line, plane, volume; Role of light, color and texture in design; Surface articulation	**3**
4.	Types of forms (Platonic, Hybrid) and their visual properties; Volumetric compositions and their visual analysis	**3**
5.	Visual Principles of Design like unity, symmetry, balance, contrast, hierarchy, rhythm, order, datum, scale and proportion in architecture; Types of scale – Generic and Human Scale; Proportioning systems like Le Modulor, The Ken, Anthropomorphic proportions	**6**
6.	Concepts of Culture and space; Principles of social and environmental sustainability; Theory of Universal Design, Universal Design Principles, USA, Universal Design India Principles (UDIP)	**5**

7.	Tools for Ethnographic studies in design and Design methods	**3**
	Total	**28**

- **Suggested Exercises**

1. Study of forms in nature
2. Architectural Essays on titles like Physics of Forms, Geometry of space
3. Visual analysis of Architectural forms
4. Experiencing space through visual photo essays
5. Seminars on various principles of architecture

- Visual study tours for Case Studies, Photo essays

10. Suggested Books:

S. No.	Name of Books/Authors	Year of Publication
1.	Hall, Edward. T, "The Silent Language", Anchor Books, Doubleday	**1959**
2.	Grillo, Paul, J., "Form, Function and Design", Courier Dover Publications	**1975**
3.	Antoniades, Anthony C., "Poetics of Architecture: Theory of Design", Wiley	**1992**
4.	Ching, F D K, Form, Space and Order (Second Edition), John Wiley & Sons	**1996**
5.	Pandya, Yatin," Elements of Space Making", Mapin Publishing Pvt Ltd.	**2007**
6.	Ullmann, Franziska, "Basics: Architecture and Dynamics", Springer Vienna Architecture	**2011**
7.	Smith, K., "Introducing Architectural Theory: A debating discipline", Routledge	**2012**

DIAN INSTITUTE OF TECHNOLOGY ROORKEE

Name of Deptt. /Centre: Department of Architecture and Planning

1. Subject Code: **ARN-212** Course Title: **Landscape Design and Site Development**

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

3. Examination Duration (Hours)- **Theory: 3** **Practical:0**

4. Relative Weight: **CWS :15** **PRS:25** **MTE :20** **ETE:40** **PRE:0**

5. Credits:**3** 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-Requisite: Nil

9. Objective: To familiarize students with the linkage between architecture and nature through the planning and design of landscape elements.

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 design and site developments, 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	**Site Development**: Site Analysis process & methods; Topographical, climatological and environmental considerations. Site investigation process & checklist; Site property and its usability; Site development and its environmental impact; Site design: Ability to respond to site	**6**
4	**Horticulture**: Plant classification and nomenclature, plant identification, propagation and care of plants, planting preparation and methods. Characteristics and use of plants: Characteristics of various types of plants and their usability, plant selection criteria	**6**
5	**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, ecological and environmental aspects of landscape design; Hard and soft landscape; Water in landscape design, lighting design in landscape	**6**
6	Landscape construction and engineering details, preparation of landscape schemes	**2**
	Total	**28**

Suggested Design Exercises:

- Design of a small park, tot lot.
- Landscape of a Housing complex and private garden.
- Design of Landscape elements.
- Landscaping for conservation of monuments, ecologically sensitive areas.
- Study of plants and plant materials.

11. Suggested Books:

S.No.	Name of Authors/Book/Publisher	Year of Publication
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 & Sorvig K, “Sustainable Landscape Construction: A guide to Green”, Island Press.	2007
4	Haeris. C, Dines. N, “Time Saver Standard for Landscape Architecture”, McGraw-Hill.	1997
5	Simonds. J.O, Staike .B.W, “Landscape Architecture: A manual of land planning and design” McGraw-Hill.	2006

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
NAME OF DEPTT/ CENTRE: **Department of Architecture and Planning**

1. Subject Code: **ARN- 213** Course Title : **Measured Drawing Camp**
2. Contact Hours : L: 0 T:0 P:2
3. Examination Duration (Hrs): Theory : 0 Practical: 0
4. Relative Weight : **CWS** 0 **PRS** 100 **MTE** 0 **ETE** 0 **PRE** 0
5. Credits: 2 6. Semester : **Autumn** 7. Subject Area : **DCC**
6. 9. Pre-requisite : NIL
7. 10. Objective: To measure, survey, document and interpret building/s and their settings in socio-economic and environmental context.

11. Details of Course **Contents**

Measured drawings of selected heritage building / vernacular building/ settlement, utilising various tools techniques, will be done in camp for duration of 7-10 days during the semester
Socio- economic and cultural studies will be undertaken using-field notes and measurements; Walking tour; Transcripts of interviews; Boards interpreting field data, oral histories, and primary sources; Participative research approach; Photo Survey; Sketch Study

Suggested Books / journals

Sr. No	**Name of Authors / Books / publishers**	**Years of Publication /Reprint**
1	Rasmusson, S.E. , “Experience Architecture “, Chapman and Hall	1964
2	Burns J.A., ed., “Recording Historic Structures”, AIA Press	1989
3	Ching F.D.k., “Drawing : A Creative Process”, Van Nostrand Reinhold	1990
4	Henkin D, “City Reading”, Columbia University Press	1998
5	Ching F.D.K. , “ Design Drawing “, Van Nostrand Reinhold	1998

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPT./CENTRE**:** **Architecture and Planning Department**

1. Subject Code: **ARN-301** Course Title: **Architectural Design-IV**

2. Contact Hours: **L: 1** **T: 0** **P: 8**

3. Examination Duration (Hrs) **Theory:0** **Practical:7**

4. Relative Weight: **CWS:00** **PRS:60** **MTE:20** **ETE:00** **PRE:20**

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

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

9. Objective:

To enhance skills to evolve innovative design solutions incorporating challenging site and space constraints, FSI, bye laws & zoning regulations.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Built forms on challenging site contexts [contoured sites, regional urban contexts etc.]	**3**
2.	Building bye laws and zoning regulations	**2**
3.	Space optimization and efficiency / effective use	**3**
4.	Design development process incorporating the identified criteria	**3**
5.	Interior space innovations	**3**
	Total	**14**

Suggested Design Exercises

1. Multistoried Housing
2. Commercial /Mixed use buildings and complexes
3. Auditorium / Open air theatre/ Cineplex

- Architectural study tours for Site Visits, Case Studies

11. Suggested Books:

S. No.	Name of Books/Authors	Year of Publication
1.	Chiara, J.D., Panero, J., Zelnik, M., "Time Saver Standards for Housing and Residential Development", 2nd Ed., McGraw-Hill.	**1995**
2.	Neufert, P., "Architects' Data", 3rd Ed., Blackwell Science.	**2000**
3.	Watson, D.(Editor), "Time-saver Standards for Architectural Design: Technical Data for Professional Practice", McGraw-Hill.	**2005**
4.	Levitt. D, " Housing Design Book : A guide to good practice", Routledge Taylor & Francis Group.	**2010**
5.	Slotkis, J S, "Foundation of Interior Design", Fair Child Publication.	**2006**
6.	Edwards, C., " Interior Design: A Critical Introduction", Berg.	**2011**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPT./CENTRE**:** **Architecture and Planning Department**

1. Subject Code: **ARN-302** Course Title: **Architectural Design-V**

2. Contact Hours: **L: 1** **T: 0** **P: 8**

3. Examination Duration (Hrs): **Theory:0** **Practical:7**

4. Relative Weight: **CWS:0** **PRS:60** **MTE:20** **ETE:0** **PRE:20**

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

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

9. Objective:

To develop ability to design large scale built forms with complex program briefs integrating sustainability issues.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Design process of buildings with complex programs	3
2.	Sustainable design principles	3
3.	Integration of space and form of large scale buildings	3
4.	Structural systems for large scale buildings	3
5.	Introduction to building performance evaluation	2
	Total	**14**

- **Suggested Design Exercises**
  1. Hospitals
  2. Hotel Buildings
  3. Transportation Terminals
  4. Interior design of ongoing studio projects
- Architectural study tours for Site Visits, Case Studies

11. Suggested Books:

S. No.	Name of Books/Authors	Year of Publication
1.	Chiara, J.D., Panero, J., Zelnik, M., "Time Saver Standards for Housing and Residential Development", 2nd Ed., McGraw-Hill.	**1995**
2.	Neufert, P., "Architects' Data", 3rd 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**
5.	Onouys, B, Donglas, Z, Ching, F, " Building Structures Illustrated: Patterns, Systems and Design", John wiley	**2009**
6.	Kliment, S.A., " Retail and Mixed Use Facilities", John Wiley & sons	**2004**
7.	Kobus, R L, Skaggs, R L, " Building Type Basics for Health Care Building, John Wiley & sons	**2008**
8.	Fairweather V., Tumasetti R, Thromton, C, " Expressing Structure: the Technology of Large Scale Buildings", Birkhauser	**2004**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

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

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

3. Examination Duration (Hrs): **Theory:4** **Practical:0**

4. Relative Weight: **CWS:0** **PRS:40** **MTE:20** **ETE:40** **PRE:0**

5. Credits:**4** 6. Semester: **Autumn** 7. Subject Area: **DCC**

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

9. Objective:

To impart knowledge on advanced and innovative construction details, execution drawings; machines and equipments; and pre-fabrication and modular coordination.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Advanced construction methods and materials, innovative design detailing	**2**
2.	Introduction to prefabrication; Advantages and disadvantages of on-site and off-site prefabrication; prefabrication in Indian construction industry	**4**
3.	Modular coordination - types, components, assembly, tolerances, and application	**2**
4.	Modular kitchen and toilets detailing; Built-in furniture, shop fronts, display units, counters and other furniture items	**4**
5.	Machine and equipments for construction; Fire-proof construction	**2**
	Total	**14**

Suggested Exercises:

- Detailing of prefabricated components- wall, slab, structural components
- Innovative construction details of modular coordination system
- Coordination drawings integrating shop drawings of various building components
- Construction details of modular kitchen, toilet, shop-front

Site Visit to construction sites at different stages of construction to learn:

- site preparation, layout and management;

- building construction process and technology
- machines and equipment used for various stages
- application of pre-fabrication or system building construction

Visit to consultants' office handling system buildings and coordination drawings and to workshops manufacturing different prefabrication units

11. **Suggested Books:**

S. No.	Name of Books/Authors	Year of Publication
1.	Goyal, M.M., "Handbook of Building Construction", Thomson Press	**2004**
2.	Funkenbusch P.D., "Practical Guide to Designed Experiments: A Unified Modular Approach", CRC Press	**2004**
3.	National Building Code-2005, BIS	**2005**
4.	Ching, F.D.K., "Building Construction Illustrated", Wiley	**2008**
5.	Smith R.E., "Prefab Architecture: A Guide to Modular Design and Construction", John Wiley & Sons	**2010**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: **ARCHITECTURE & PLANNING**

1. Subject Code: **ARN-304** Course Title: **Acoustics and Lighting**

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

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

4. Relative Weight: CWS:25 PRS:00 MTE:25 ETE:50

5. Credits: **3** 6. Semester: **Spring** 7. Pre-requisite: **Nil** 8. Subject Area: **DEC**

9. Objective of Course: To impart knowledge of acoustics and lighting in buildings.

10. Details of Course:

S.No.	Particulars	Contact Hours
1.	General principles of transmission and passage of sound, reverberation, absorption, reflection; Types of absorbents and reflectors; Study of acoustical design for various enclosures for speech, music and conference; acoustical considerations for site planning	**10**
2.	Noise and its control; Special problems related to structure borne noise; Basics of noise insulation; Insulation of A.C. ducts and plants from acoustical point of view	**6**
3.	Lighting in Buildings, light and its sources, lighting criteria, the visual field, daylight prediction methods.	**6**
4.	Artificial Lighting, lighting levels for various activities, calculation for lighting levels, practical examples/case studies; Advanced lighting design; Radiance	**6**
	Total	**28**

11. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
.	Egan M.D. , "Concepts in Architectural Acoustics", Mcgraw Hill Inc.	**1972 -1995**
2.	Philips, D., "Lighting Modern Buildings", Butterworth-Heinemann.	**2000**
3.	Steffy,G., "Architectural Lighting Design", 2nd Ed., Wiley	**2001**
	Vigran, T.E., "Building Acoustics", Taylor and Francis.	**2008**
	Cavanaugh, W.J., Gregory, C.T. and Wilkes, J.A. (Editors), "Architectural Acoustics : Principles and Practice", 2nd Ed., John Wiley.	**2010**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: **ARCHITECTURE & PLANNING**

1. Subject Code: **ARN-305** Course Title: **Computer Applications in Architecture**

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

3. Examination Duration (Hrs): **Theory 0** **Practical 4**

4. Relative Weight: **CWS:0** **PRS:60** **MTE:20** **ETE:0** **PRE:20**

5. Credits:**2** 6. Semester Autumn **8. Subject Area:** DCC

8. Pre-requisite: Nil

9. Objective of Course: To equip students with latest software applications in architecture.

10. Details of Course:

S.No	Particulars	Contact Hours
1.	**Building Information Modelling:** Introduction to BIM, Software dealing with BIM like AudoDesk Revit- Drawing and drafting, Material specification, quantity and pricing, and scheduling.	**5**
2.	**Graphic Design Software:** Coral Draw and Photoshop for advanced graphic design.	**3**
3.	**Whole Building Simulation:** Software like Energy Plus, Design Builder, Ecotect, Radiance etc.	**6**
	Total	**14**

11. Suggested Exercises:

1.	Development of an ongoing design exercise in Revit to add other dimension in BIM
2.	Scheduling of projects through BIM for already completd design exercise
3.	Graphic design on posters/presentations using coral draw suite
4.	Whole building simulation of existing buildings on campus

12. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
1.	ASHRAE 90.1	**2005**
2.	ASHRAE Book of Fundamentals	**2005**

3.	Eric Wing, Autodesk Revit Architecture 2013: No Experience Required	**2012**
4.	Adobe Creative Team, Adobe Photoshop CS6 Classroom in a Book	**2012**
5.	Gary David Bouton, CorelDRAW X6 The Official Guide	**2012**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-306** Course Title : **Vernacular Architecture**
2. Contact Hours L: **2** T:1 P:0
3. Examination Duration (Hrs): Theory : **2** Practical: **0**
4. Relative Weight : **CWS:25 PRS: 0 MTE :25 ETE:50 PRE:0**
5. Credits:**3** 6. Semester : **Spring** 7. Subject Area : **DEC**
6. Pre-requisite : **NIL**

9. Objective : To develop capacity to understand, appreciate and impart knowledge of vernacular architecture of India.

10. Details of Course

Sr. No	Contents	Contact Hours
1.	Introduction to Vernacular Architecture: Definition and characteristics of Vernacular Architecture; Differentiating Vernacular Architecture from traditional architecture; Purpose and scope of Vernacular Architecture; Evolution of development of shelter form and identity**;** Factors influencing Vernacular Architecture; Physiography, ecology , culture and Vernacular Architecture; Difference in rural and urban Vernacular Architecture	4
2.	Case studies covering settlement pattern, architectural forms and construction details of Northern India - Jammu Kashmir, Himachal Pradesh, Uttarakhand	4
3.	Case studies covering vernacular settlement pattern, architectural forms and construction details of Southern India - Karnataka, Kerala, Tamil Nadu, Andra Pradesh	4
4.	Case studies covering vernacular settlement pattern, architectural forms and construction details of Western India- Rajasthan and Gujarat	4
5	Case studies covering vernacular settlement pattern, architectural forms and construction details of Central India- Chhattisgarh and Madhya Pradesh, Odisha and Jharkhand	4
6	Case studies covering vernacular settlement pattern, architectural forms and construction details of Eastern India- Northern eastern states and West Bengal	4
7.	Contemporary case studies addressing social and cultural needs and utilizing local technology and materials.	4
	Total	**28**

11. Suggested Books / journals

Sr.No	Name of Authors / Books / publishers	Years of Publication /Reprint
1	Rudfoky , B., " Architecture without Architects" , University of New Mesvilo Press.	1964
2	Wells C. "Perspectives in Vernacular Architecture", I-XIII University of Missouri Press.	1982 /2007
3	Oliver P. " Encyclopaedia of Vernacular Architecture of the World", Cambridge University Press.	1997
4	Cooper , G. and Dawson, B." Traditional Building of India", Thames and Hudson.	1998
5	Glassie H.H., "Vernacular Architecture " Indiana University Press.	2000

NDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: **ARCHITECTURE & PLANNING**

1. Subject Code: **ARN- 307** Course Title: **Interior Design**

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

3. Examination Duration (Hrs): **Theory:1** **Practical:2**

4. Relative Weight: **CWS:00** **PRS:40** **MTE:20** **ETE:25** **PRE:15**

5. Credits : **3** 6. Semester **Autumn** 7. Pre-requisite: **Nil**

8. Subject Area: **DEC**

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

10. Details of Course:

S.No	Particulars	Contact Hours
1.	**Introduction:** Purpose, scope, objectives and history of Interior Design	**4**
2.	**Principles an d Elements o f In terior D esign:** Space making elements like wall, column, partition screen, floor, furniture, interior landscaping etc., their design value, colour theories and schemes, light	**4**
3.	**Interior-Design an d Space-Making C rafts:** Exposure to diverse traditional, folk and contemporary crafts and their role in creating and enhancing interior spaces	**4**
4.	**Interior D esign an d Space-Surface Crafts:** Surface treatments, materials , application techniques	**4**
5.	**Case Studies:** Examples of selected interiors	**4**
6.	**Interior Design Technology**: Innovative trends and technologies, materials and interior construction, visual merchandising, acoustics and lighting	**6**
7.	**Professional Practice:** Interior services, functional importance, bylaws, supervision and fees	**2**
	Total	**28**

11. Suggested Exercises:

1.	Designing a Manual of Space Making Elements for Interiors
2.	Documenting Space- Making Crafts and their role in designing Interior-Architecture
3.	Documenting Space -Surface Crafts and their role in designing Interior-Architecture
4.	Documenting and presenting case studies
5.	Studio Exercises: Designing Interior spaces, furniture, interior landscaping, graphics for visual merchandising and surfaces

12. Suggested Books:

S.N o.	**Name of Books/Authors**	**Year of Publication**
1.	Leydecker, S (ed.), "Designing Interior Architecture: Concept, Typology, Material, Construction", Birkhauser Verlag AG	**2013**
2.	Pandya, Yatin. "Elements of Space Making", Mapin Publishing Pvt.	**2007**
3.	Pandya, Yatin. "Concepts of Space in Traditional Indian Architecture", Mapin Publishing Pvt.	**2005**
4.	Chauhan, Muktirajsinhji (et.al.). "A History of Interior Design in India, Vol.1: Ahmedabad", SID, CEPT University	**2007**
5.	Brooker, Graeme. "Form + Structure: the organization of interior space", AVA Publishing SA, Switzerland	**2007**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: **ARCHITECTURE & PLANNING**

1. Subject Code: **ARN-308** Course Title: **High Rise Buildings**

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

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

4. Relative Weight: **CWS:25** **PRS:00** **MTE:25** **ETE:50** **PRE:00**

5. Credits:**3** 6. Semester **: Spring** 7. Subject Area: **DEC**

8. Pre-requisite: Nil

9. Objective of Course: To understand basic design concepts and emerging technologies of high rise architecture.

10. Details of Course:

S.No	Contents	Contact Hours
1.	Introduction: Various aspects of high rise building design in urban context	**2**
2.	Architectural design considerations like functional efficiency, privacy, safe access, aesthetic; Space planning and design standards, Building byelaws and codes	**3**
3.	Structural systems in RCC and steel for high rise building, composite structural systems, considerations for wind loads and earthquake loads	**5**
4.	Service core in high rise buildings; Parking, building services-vertical transportation, HVAC, electrical, firefighting and security, water supply and sanitation; Building Automation System; Codal provisions for building services	**8**
5.	Construction planning and management, equipments and construction techniques; Materials for construction and cladding; Prefabrication	**4**
6.	Sustainable resource management concept in high rise buildings, such as Bioclimatic design, Zero Energy Buildings	**4**
7.	National and International case studies of multi-storied buildings	**2**
	Total	**28**

11. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
1.	Armstrong P, CTUBH, "Architecture of Tall Building", Mc Graw Hill.	**1995**
2.	Reddy K.N., "Urban Redevelopment: A Study of High-Rise Building", Concept Publishing Company.	**1996**
3.	Lawrence, W.C.L. and Daniel, C.W.H., "Planning Buildings for a High Rise Environment", Hong Kong University Press	**2000**
4.	Lin Chew Fit," Construction Technology for Tall Buildings", Singapore University Press.	**2001**
5.	International Code Council, International Building Code 2009, USA	**2009**
6.	Craighead G., "High Rise Security and Fire Life Safety", Butterworth-Heinemann.	**2009**
7.	Jain V K, "Handbook of Designing and Installation of Services in Building Complex- High Rise Buildings", JBA Pub.	**2010**

Indian Institute of Technology Roorkee

Name of the Department **Department of Architecture & Planning**

1. Subject Code: **ARN-309** Course Title: **Applied Art**

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

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

4. Relative Weight: **CWS:00** **PRS:60** **MTE:20** **ETE:00** **PRE :20**

5. Credits**:3** 6. Semester: **Autumn** 7. Subject Area: **DEC**

8. Pre-requisite: **Nil**

9. Objective of Course: To provide requisite knowledge of various forms and techniques of Applied Art.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction : Application of art in architecture, purpose of Applied Art, principles and nature	1
2.	Paintings, Murals and Sculptures : Study of styles and changing trends in India from ancient times , their materials and techniques.	2
3.	Decorative elements: Jali design, Inlay work, Relief art work, study of changing trends in Dravidian, Gandhara, Gupta, Mughal, Rajput periods & their materials and techniques.	2
4.	Application of colors and textures in sculptures, murals, paintings, fountains etc., their psychological effects	2
5.	Art expression, appreciation and symbolism, two and three dimensional forms, aesthetic order and functional importance	2
6.	Interior and exterior space organization, graphic techniques of communication, form-space relation	1
7.	Modern trends in applied art, contribution of science and technology in terms of new materials	2
8.	Styles and techniques of modern masters	2
	Total	14

10. Suggested Exercises:

Practical implementation of exercises based on the lecture contents

11. Suggested Books:

Sl. No.	Name of Authors/ Books/ Publishers	Year of Publication/ Reprint
1.	Scott, R. G., “Design Fundamentals”, McGraw Hill	1951
2.	Pal, P, “Indian Sculpture”, University of California Press	1988
3.	Preble, D, Preble, S, Patrick F, “Artforms: An Introduction to the Visual Arts”, Longman	1999
4.	Barry A. Berkus AIA, “Architecture/ Art/ Parallels/ Connections”, The Image Publication Group Pvt. Ltd.	2000
5.	Liff, S. and Posey, P.A. “Seeing is Believing”; American Management Association, Broadway	2004
6.	Arnason, H. H., Elizabeth C., Mansfield H., “History of Modern Art: Painting, Sculpture, Architecture, Photography”, Prentice Hall	2009

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **ARCHITECTURE AND PLANNING DEPARTMENT**

1. Subject Code: **ARN-310*** Course Title: **Building Technology- Mechanical and Electrical**

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

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

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

5. Credits**:** 4 6. Semester**: Spring** 7. Subject Area**: ESC**

8. Pre-requisite**:** **Nil**

9. Objective: This course aims at exposing the architecture students to the areas of air conditioning, ventilation, general utilities and technology of electrical installation and illumination in Buildings.

10. Details of Course:

Part I

S. No.	Contents	Contact Hours
1.	**Introduction:** Thermodynamics. History of RAC	**2**
2.	**Psychrometrics:** Psychrometric properties, psychrometric chart, simple and computerized psychrometrics, psychrometric processes; Appreciation of indoor and outdoor conditions for a space in summer and winter. Evaporative cooling systems for dry and arid climates in India	**4**
3.	**Air C onditioning Processes:** Summer and winter air-conditioning processes; Sources of thermal load in summer and winter using Load Estimation Chart; Sensible Heat Factor (SHF)	**3**
4.	**Building C ooling L oad C alculations**: Internal heat gain; system heat gain; ventilation load; cooling and heating load estimate; psychrometric calculations for heating and cooling load	**7**
5.	**Transmission and Distribution of Air:** AHU; Room air distribution; friction loss in ducts; dynamic loss in ducts; air duct design; space air diffusion	**3**
6.	**Lifts and Elevators:** Traffic calculation, space and technical requirements	**2**
	Total	**21**

Part II

1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
	Total	**21**

11. Suggested Books:

S. No.	Name of Authors /Books /Publisher	Year of Publication
1.	Prasad, M., "Refrigeration and Air Conditioning", 2nd Ed., New Age International	**2002**
2.	Arora, C.P., "Refrigeration and Air Conditioning", Tata McGraw-Hill	**2000**
3.	Howell, R.H., Saucer, H.J., and Coad, W.J., "Principles of Heating, Ventilation and Air Conditioning", ASHRAE	**2005**
4.	ASHRAE Hand Book (Fundamentals), ASHRAE	**2005**
5.	Indian Standard (732) – Electrical Wiring Installation	**1963**
6.	Indian Standard (3646) – Interior Illumination Part I, II, III	**1966**
7.	Indian Standard (3043) – Earthing	**1966**
8.	Taylot E.O., "Utilization of Electric Energy", Orient Blackswan	**1971**
9.	Raina K.B., Bhattacharya S.K., "Electrical Design Estimation and Costing", New Age International (P) Ltd.	**2002**

*To be taught by faculty from Mechanical and Industrial Engineering Department and Electrical Engineering Department

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-311** Course Title: **Modern Indian Architecture**
2. Contact Hours: **L: 2** **T: 1** **P: 0**
3. Examination Duration (Hrs) Theory **2** Practical **0**
4. Relative Weight: **CWS** **25** **PRS** **0** **MTE** **25** **ETE** **50** **PRE** **0**
5. Credits: **3** 6. Semester: **Autumn** 7. Subject Area: **DEC**
8. Pre-requisite: **Nil**
9. Objective : To impart knowledge of the development of modern Indian architecture from post independence era to the present times.
10. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction to modern architecture in India; Brief overview of early post independence development of architecture	3
2.	Philosophy and contributions of Le Corbusier and Louis Kahn; Philosophy and early works of Charles Correa, A.P. Kanvinde, U.C. Jain, B.V. Doshi, J.A. Stein, Laurie Baker and other architects	5
3.	Modern trends in building materials and construction techniques	2
4.	Modern trends in regional vernacular styles and cultural identity; modern Indian regionalism	4
5.	Typical works of well known Indian architects	4
6.	Evolution of various building types - houses, apartments, museums, mediatheques, galleries, transportation hubs, educational buildings, skyscrapers etc.	6
8.	Critical review of on going modern trends and its future prospects in Indian architecture	4
	TOTAL	**28**

10. Suggested Books:

S. No.	Name of Authors/Book/Publisher	Year of Publication
1.	Bhatt and Scriver, P., "Contemporary Indian Architecture : After the Masters", Mapin	1990
2.	Lang, J., "A Concise History of Modern Architecture in India", Permanent Black	2002
3.	Gast, K-P, "Modern Traditions: Contemporary Architecture in India", Birkhäuser GmbH	2007
4	Shah, J., "Contemporary Indian Architecture", Roli Books	2008
5.	Desai, Madhavi, Desai, M. and Lang, J.,"The Bungalow in Twentieth-Century India: The Cultural Expression of Changing Ways of Life and Aspirations in the Domestic Architecture of Colonial and Post-colonial Society", Ashgate	2012

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-401** Course Title: **Architectural Design-VI**

2. Contact Hours: **L: 1** **T: 0** **P: 8**

3. Examination Duration (Hrs): **Theory:0** **Practical:**7

4. Relative Weight: **CWS:0** **PRS:60** **MTE:20** **ETE:0** **PRE:20**

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

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

9. Objective:

To develop futuristic design ideas incorporating technological advancements using digital design process.

Details of Course:

S. No.	Contents	Contact Hours
1.	Digital design process	**2**
2.	State of art building technologies and services	**3**
3.	Futuristic architecture	**3**
4.	Futuristic technology and forms	**3**
5.	Building performance systems	**3**
		14

- **Suggested Design Exercises**

1. Digital Form generation

2. Research stations / Laboratory buildings

3. Hi Tech buildings

4. Futuristic buildings -Museums, Stadiums

- Architectural study tours for Site Visits, Case Studies
-

10. Suggested Books:

S. No.	Name of Books/Authors	Year of Publication
1.	Kottas, D. “Contemporary Digital Architecture: Design and Technique”, Links International, Ceg	**2010**
2.	Spiller, N. “Digital Architecture Now: A Global Survey of Emerging Talent”, Thames & Hudson	**2008**
3.	Ali, A. and Brebbia, C. A (Ed.). “Digital Architecture and Construction”, Volume 90 of WIT transactions on the built environment, WIT Press,	**2006**
4.	Neil, L. “Designing for the Digital World”, John Wiley and Sons	**2002**
5.	William, M. “The Logic of Architecture: Design, Computation and Cognition”, MIT Press, Cambridge	**1995**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-402** Course Title: **Professional Training**

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

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

4. Relative Weight: **CWS:0** **PRS:100** **MTE:0** **ETE:0** **PRE:0**

5. Credits:**10** 6. Semester: **Spring** 7. Subject Area: **DCC**

7. Pre-requisite: Nil

8. Objective:

To undertake professional training in architectural design or research offices, organizations for gaining exposure to the world of architectural practice, innovation and research.

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT. /CENTRE: **ARCHITECTURE AND PLANNING**

1. Subject Code: **ARN-403** Course Title: **Urban Design**

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

3. Examination Duration (Hours)- **Theory:3** **Practical:0**

4. Relative Weight: **CWS:15** **PRS:15** **MTE:20** **ETE:50** **PRE:00**

5. Credits: **4** 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-Requisite: Nil

9. Objective: To introduce the basic elements, principles and techniques of urban design

10. Details of Course:

S.No.	Contents	Contact Hours
1	Understanding of Urban Design, Definitions, Scope of urban design and its relationship with architecture and planning: Various aspects and approaches to urban design.	**9**
2	Brief review of heritage of urban design in different periods, salient characteristics- urban forms, patterns, design quality of urban public spaces of towns during Ancient Greek, Roman, Medieval, Renaissance, Bastogne, periods and different periods in Indian history.	**12**
3	Basic elements of urban design; urban spaces and activities. Salient urban design principles and techniques.	**9**
4	Examples of salient urban design projects, building complexes, town centres, towns in India and other countries.	**12**
	Total	**42**

11. Suggested Books:

S.No.	Name of Authors/Book/Publisher	Year of Publication/Reprint
1	Broadbent G, “Emerging Concepts in urban Space Design”, Von Nostrand Reinhold	1995
2	Lynch K. “The image of the City”, MIT press, Cambridge	1960
3	Speriregen. Paul D, “Urban Design: The Architecture of Towns and Cities”, Krieger	1980
4	Chiara. J. D. and Kopplman. L, “Urban Planning and Design Criteria” Von Nostrand Reinhold	1975
5	Carmona M, “Public Places – urban Spaces: A guide to Urban Design” , Architectural Press	2003
6	Banerjee Tridib , Anastasia Loukaitou-Sideris, ‘Companion to Urban Design’, Routledge companions, Taylor & Francis	2011
7	Montgomery Charles, ‘Happy City: Transforming Our Lives Through Urban Design’ Farrar, Straus and Giroux	2013

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: ARCHITECTURE & PLANNING

1. Subject Code: **ARN- 405** Course Title: **Sustainable Architecture**

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

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

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

5. Credits :**4** 6. Semester **Autumn** 8. Subject Area: **DCC**

7. Pre-requisite: Nil

9. Objective of Course: To impart knowledge of sustainable architectural practices.

10. Details of Course:

S.No	Contents	Contact Hours
1.	**Introduction:** Sustainability and its various dimensions (economic, social and ecological); Sustainable development of built environment; Global Warming and Climate Change; Concepts in sustainable architecture- sustainable buildings, green buildings, climate responsive buildings, ecological buildings; Energy policy of India and world	**6**
2.	**Elements of Sustainable Architecture :** Earth/Soil , Materials – production and use, Site (Topography, Climatic Zone, surrounding), Water, Quality of indoor/outdoor environment; Energy; Infrastructure – transport, storm water management, waste management , underground water management etc.	**8**
3.	**Strategies and Technologies:** Assessment of existing resources ; Solar Passive Design; Recycling/Reuse strategies, optimization techniques, advances in HVAC, Electrical, Lighting and Plumbing technologies; Active energy systems- PV cells, micro wind towers, bio-mass energy etc.	**8**
4.	**Sustainability assessment rating systems:** Benchmarking; Study of rating systems across globe - BREEAM, CASBEE, LEED, IGBC, GRIHA, SBTool, SBC-ITACA, Green Globes and their credit system; Post occupancy evaluation; Life Cycle Assessment- Concept, terminologies, methodologies and tools	**8**
5.	Case studies: Examples of sustainable architecture- traditional and contemporary	**5**
6.	**Net Zero Energy and Energy Positive Buildings :** concept, and case studies	**3**
7.	**Whole B uilding Simulation:** Introduction to concept and basic software, requirements of certification and rating agencies	**4**
	Total	**42**

11. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
1.	Ian L Mcharg, Design with Nature, John Wiley and Sons Inc.	**1992**
2.	Ramchandra Guha, How much should we consume,	**1997**
3.	David Suzuki, The Sacred Balance: Rediscovering Our Place in Nature, Greystone Books, Doughlas and Mcintyre Publishing Group,	**2007**
4.	James Gustav Speth, The Bridge at the Edge of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability, Yale University Press	**2008**
5.	Jerry Yudison, The Green Building Revolution, Island Press	**2008**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-407** Course Title: **Working Drawing**

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

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

4. Relative Weight: **CWS:0** **PRS:60** **MTE:20** **ETE:00** **PRE:20**

5. Credits:**2** 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: Nil

9. Objective:

To impart knowledge and hands on training for preparation of working drawings for various architectural projects.

Suggested Exercises:

- Preparation of Site Working Drawings of any architectural design project
- Submission drawings for Municipalities or Development Authorities
- Basic Working drawings for essential areas like Toilets, Kitchen, etc.
- Coordination drawings for various building services and other design components like furniture, false ceiling
- Working Drawings for larger projects of building Interiors like Office interiors,Hotel interiors.
- Visits to Project and Construction Management sites to gain field experience on coordination between working drawings and on site work

9. Suggested Books:

S. No.	Name of Books/Authors	Year of Publication
1.	Stitt, F.A.,"Working Drawing Manual", Mc Graw Hill Professional 1st Edition	**1998**
2.	Leibing, R.W.,"Architectural Working Drawings",John Wiley & Sons	**1999**
3.	Wakita, O.A., Linde R.M., Bakhoum, A.R., "The Professional Practice of Architectural Working Drawings", Wiley Sons	**2011**
4.	Spiro, A., Ganzoni, D.,"The Working Drawing:The Architect's Tool", Park Books	**2014**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: ARCHITECTURE & PLANNING

1. Subject Code: ARN-409 Course Title: Digital Architecture

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

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

4. Relative Weight: CWS :00 PRS:50 MTE:20 ETE:15 PRE:15

5. Credits:3 6. Semester: Autumn

7. Pre-requisite: Nil 8. Subject Area: DEC

9. Objective of Course: To equip the students with latest technologies to create both virtual and physical built forms

10. Details of Course:

S.No	Particulars	Contact Hours
1.	**Introduction to Digital Architecture:** Definition, Purpose and Scope; Digital Theories; Historical background of past 25 years	**2**
2.	**Aspects of Digital Architecture:** Design and Computation, Difference(s) between Digital Design Process and Non-Digital Design Process, Architecture and Cyber Space, Qualities of new space, Automatism and its influence on Architectural Form and Space	**2**
3.	**Digital M edia an d T echnologies:** Computer modeling, programming, simulation, imaging, Parametric and Generative digital design processes, Biomimetics, Architectural visualization, advanced construction, Digital Production, Solid Modeling, Diagrammatic Reasoning, Digital Hybrid Design Protocols, Concept of Emergence	**6**
4.	**Examples, Case-Studies and Various Avenues:** Taking Cognizance of Works of varied experts on Digital Architecture, Varied Avenues like - Emergent architecture, film industry, Animation and simulation, App Development	**2**
	Total	**14**

11. Suggested Exercises:

1.	Developing the Façade of a building based on the parametric design approach
2.	To do case studies of Parametric Design, and Analyze in terms of the techniques
3.	Generate small scale models for digital architecture based on the existing examples and concepts

12. Suggested Books:

S.N o.	**Name of Books/Authors**	**Year of Publication**
1.	Kottas, D. "Contemporary Digital Architecture: Design and Technique", Links International, Ceg	**2010**
2.	Spiller, N. "Digital Architecture Now: A Global Survey of Emerging Talent", Thames & Hudson	**2008**
3.	Ali, A. and Brebbia, C. A (Ed.). "Digital Architecture and Construction", Volume 90 of WIT transactions on the built environment, WIT Press,	**2006**
4.	Neil, L. "Designing for the Digital World", John Wiley and Sons	**2002**
5.	William, M. "The Logic of Architecture: Design, Computation and Cognition", MIT Press, Cambridge	**1995**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE**:** **ARCHITECTURE AND PLANNING**

1. Subject Code: **ARN-411** Course Title: **Ekistics**

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

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

4. Relative Weight: **CWS:25** **PRS:0** **MTE:25** **ETE:50** **PRE:00**

5. Credits: **3** 6. Semester: **Autumn** 7. Subject Area**: DEC**

8. Pre-requisite**: Nil**

9. Objective : To expose students to the basics of historical development & contemporary practices in the art and science of human settlements.

10. Details of Course:

S.No	Contents	Contact Hours
1.	**Introduction:** Meaning and scope in relation to town planning and architecture, Ekistics Grid of Doxiadis.	**2**
2.	**Settlement th rough C ivilizations:** Evolution of human settlements through civilizations- Mesopotamian; Egyptian; Greek; Roman and Indus Valley, Settlement patterns in later periods of history, changing form and pattern of human settlements in ancient; medieval; colonial and modern India.	**4**
3.	**Early T own Planning M ovement:** Industrial Revolution and its impact on settlements, early developments in town planning, contributions of visionaries and social reformers, City Beautiful Movement by Daniel Burnham, Concepts of an ideal city by F L Wright, Le Corbusier and others, Clarence Perry's neighbourhood concept, contributions of Ebenezer Howard and other English & European personalities, Patrick Geddes contributions and works in India, development of new towns in post war England.	**4**
4.	**Urban Structure:** City plan patterns based on road systems, foreign and Indian examples, categories of urban structures and growth, functional components and dynamics of towns, categories of urban and rural settlement in terms of size and function, definition and explanation of the concepts of density, FAR, land use and zoning, case studies of land use of Indian cities.	**7**

5.	**City Planning and M anagement:** Emergence of the metropolitan phenomenon. A comparative study of cities and metropolises in the developed and developing countries, planning problems of cities and solutions, city management and governing institutions, planning and development agencies, development plan/master plan- its preparation and contents, case studies.	**6**
6.	**Rural an d r egional systems:** The rural-urban relationships, types of regions and their classification systems, physical and socio-economic structure and dynamics of rural settlements, rural planning.	**5**
	Total	**28**

11. Suggested Exercises:

1.	Seminars on visionaries, social reformers and theoreticians
2.	Term papers on topics lying under the broad area of 'Cities and People'
3.	Live case studies analyzing people's satisfaction based on Doxiadis's ideas

12. Suggested Books:

S.N o.	**Name of Author/Book/Publisher**	**Year of Publication/ Reprint**
1.	C.A.Doxiadis, "Anthropopolis: City for Human Development", W. W. Norton & Company	1975
2.	Constantinos A.Doxiadis, "EKISTICS: An Introduction to the Science of Human Settlements", First Edition, Oxford University Press	1968
3.	Whittick, A., "Encyclopedia of urban Planning", Kreiger Pub. Co.	1974
4.	Bacon, E., "Design of Cities", Penguin	1967
5.	Sir Abercombie, "Town and Country Planning", 3rd Edition, Oxford University Press	1959
6.	Brown, H.H., A J and Sherrad, "An Introduction to Town & Country Planning", American Elservier Pub., TBS	1951

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
NAME OF DEPARTMENT/CENTRE: ARCHITECTURE AND PLANNING

1. Subject Code: **ARN-413** Course Title: C**onstruction Planning and Management**

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

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

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

5. Credits:3 6. Semester: 7. Subject Area: DEC

8. Pre-requisite: Nil

9. Objective: To impart knowledge of construction planning practices, and management techniques.

10. Details of Course:

S. No.	Contents	Contact hours
1	**Construction Planning**: Planning for construction and site facilities using networks; Preparation of construction schedules for jobs, materials, equipment, labour and budgets using CPM	8
2	**Construction Equipments and Methods**: Equipment for earth construction and application; Concrete construction; Aggregate production concrete: production, handling and placement; Mixers, vibrations and temperature control	4
3	**Network Techniques**: Introduction to network techniques; Use of computer aided CPM and PERT for planning, scheduling and control of construction works; Computerised network scheduling and bar charts; Errors in networks; Types of nodes and node numbering systems	8
4	**Management of quality in Construction**: Construction, quality control and inspection; Significance of variability in estimation of risk; Construction cost control; Crashing of networks	4
5	**Project Planning & Management**: Learning through case studies	4
	TOTAL	28

11. Suggested Books:

S. No.	Name of Authors/Books/Publisher	Year of Publication/ Reprint
1	Srivastava, U. K., "Construction Planning & Management" 3 Edition, Galgotia Publications	2013
2	Krishnamurthy, K. G., Ravindra, S. V., "Construction and Project Management for Engineers Architects Planners & Builders", CBS Publisher	2010
3	Sharma, M. R., "Fundamentals of Construction Planning and Management", S. K. Kataria & Sons	2012
4	Sengupta, B. and Guha, H., "Construction Management and Planning", Tata McGraw-Hill	2002
5	Sidney M. Levy; "Construction Process Planning and Management"; Elsevier	2010

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-415** Course Title: **Live Project / Studio / Seminar- I**

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

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

4. Relative Weight: **CWS:0** **PRS:100** **MTE:0** **ETE:0** **PRE:0**

5. Credits: 2 6. Semester: **Autumn** 7. Subject Area: **DCC**

7. Pre-requisite: AR 302

8. Objective:

To provide exposure to live projects

- **Suggested Design Exercises**

  1. On site studio
  2. Design Studios on live projects by eminent professionals
  3. Design competitions
  4. Seminars

- Architectural study tours for Site Visits, Live studios

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-501** Course Title: **Architectural Design-VII**

2. Contact Hours: **L: 1** **T: 0** **P: 8**

3. Examination Duration (Hrs): **Theory :0** **Practical** :7

4. Relative Weight: **CWS:0** **PRS:60** **MTE:20** **ETE:0** **PRE:20**

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

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

8. Objective:

To develop students ability to evolve urban design solutions

9. Details of Course:

S. No.	Contents	Contact Hours
1.	Introduction to urban design projects	2
2.	Urban Design process	2
3.	Methods of urban design analysis	2
4.	Case Studies of varied urban design projects - Central Business District, Urban Regeneration/Renewal, Conservation, Water front development	8
	Total	**14**

Suggested Design Exercises

1. Central Business District, Town Centers
2. Water front development, Urban conservation, Urban renewal
3. Sustainable neighborhoods
4. Public domain, streetscapes

10. Suggested Books:

S. No.	Name of Books/Authors	Year of Publication

1.	Chiara, J.D., Panero, J., Zelnik, M., "Time Saver Standards for Housing and Residential Development", 2nd Ed., McGraw-Hill.	**1995**
2.	Neufert, P., "Architects' Data", 3rd Ed., Blackwell Science.	**2000**
3.	Watson, D.(Editor), "Time-saver Standards for Urban Design", McGraw-Hill.	**2005**
4.	Carmona,M., "Public Places Urban Spaces: The Dimensions Of Urban Design," Elsevier	**2010**
5.	Farrelly, L., "Drawing for Urban Design," Laurence King Publishing	**2011**
6.	Kasprisin, R., "Urban Design: The Composition of Complexity," Routledge	**2011**
7.	Massengale, J., Dover, V., "Street Design: The Secret to Great Cities and Towns"	**2013**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: ARCHITECTURE & PLANNING

1. Subject Code: **ARN-502** Course Title: **Professional Practice, Valuation and Arbitration**

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

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

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

5. Credits 4 6. Semester Spring

7. Pre-requisite: Nil 8. Subject Area: DCC

9. Objective of Course: To expose the students to the present trends of architectural practice, valuation and arbitration.

10. Details of Course:

S.No	Particulars	Contact Hours
1.	Role of Professional bodies such as the Indian Institutes of Architects, Council of Architecture- its working byelaws, categories of membership, election procedure and code of conduct.	**6**
2.	Professional responsibilities of the architect, copyrights, scale of charges, mode of payment, termination of services, specialized building services.	**4**
3.	Techniques of valuation, elements of valuation, and factors affecting valuation; Methods, valuation of landed and building property, comparable cost of scale, purchase and mortgage.	**8**
4.	Valuation for compensation on acquisition, compensation under central and state legislation, relevance of the Town Planning Act; Valuation for renewal or lease/extension of lease, standard rent, easement rights, dilapidation, insurance, estate development and advice on investment policy.	**8**
5.	Arbitration, arbitrators, umpire and nature of arbitration; Appointment, conduct, powers and duties of arbitrators and umpires; Procedure for arbitration, preparation and publication of awards and impeachment.	**8**
6.	Fire insurance and arbitration of insurable value, claims and damages with specific relevance to insurance regulatory authority; Easement and its definition, features of easements, interim, permanent and mandatory injunctions.	**8**
	Total	**42**

11. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
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**
4.	James R. Franklin, "Architect's Professional Practice Manual", Mcgraw Hill	**2000**
5.	Council Of Architects, :Handbook of Professional Documents 2011", COA	**2011**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-503** Course Title: **Thesis Project - I**

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

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

4. Relative Weight : **CWS:100** **PRS:0** **MTE:0** **ETE:0** **PRE:0**

5. Credits: 3 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: - Nil

9. Objective:

To understand different aspects and trends of the selected thesis project through literature review and case studies

10. Details of Course:

Contents	**Time**
Thesis project selection	**2 weeks**
Literature review covering diverse aspects, trends, climatic analysis and other relevant dimensions of the project	**4 weeks**
Selection, documentation and analysis of Case Studies (minimum three)	**6 weeks**
Submission of project report followed by Jury evaluation	**2 weeks**
Total	**14 weeks**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-504** Course Title: **Thesis Project - II**

2. Contact Hours: **L: 0** **T: 0** **P: 20**

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

4. Relative Weight : **CWS** 0 **PRS** 0 **MTE** 0 **ETE** 0 **PRE** 100

5. Credits: 15 6. Semester: **Spring** 7. Subject Area: **DCC**

8. Pre-requisite: - **AR 503 Thesis Project - I**

9. Objective:

To carry out architectural design of the selected thesis project

10. Details of Course:

The thesis project shall comprise of three stages of deliverables by each student followed by external Jury evaluations of each stage. The details and weightage of each stage is indicated below:

Contents	**Weightage**
Stage 1 : Site Analysis, Spatial requirements, Case Studies and Conceptual Design	**25**
Stage 2: Preliminary design with site plan, buildings design (Plan, Elevations, Sections)built form characterizations, block models and 3D sketch views	**25**
Stage 3: Final design with rendered architectural presentation and working drawings, detailed physical models, 3D views, structural design, estimation, energy simulation, advanced objectives (Landscape design, Interior design, HVAC, Acoustics, Lighting design) final thesis report submission	**50**
Total	**100**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Name of Deptt. /Centre: Department of Architecture and Planning

1. Subject Code: **ARN-505** Course Title: **Urban Planning**

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

3. Examination Duration (Hours)- **Theory:** 3 **Practical:** 0

4. Relative Weight: **CWS** 15 **PRS** 25 **MTE** 20 **ETE** 40 **PRE** 0

5. Credits 4 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-Requisite: Nil

9. Objective: To familiarize the students with urban planning frameworks, process, techniques and standards.

10. Details of Course:

S.No.	Contents	Contact Hours
1	**Introduction:** Need and objectives of planning; evolution of town planning; Urban Settlements as planning units; Characteristics of settlements and surveys; Types of plans, planning process,	**6**
2	**Problems and Issues of Urban Areas:** Identification of planning problems of land use distribution and change, communication system, overcrowding, slums, sporadic growth and conurbation.	**8**
3	**Planning Framework and Process for various Development Plans:** Planning process, components and techniques; Concept of master plan, its elements, preparation and implementation; Perspective plans, structure plans, advocacy plans, zonal plans; Participatory and inclusive planning	**12**
4	**Planning Standards:** Development controls; Formulation of planning standards for land use, density, road, and various community facilities at the local and town level; Development Control Rules and Regulations and its relation to Architecture	**10**
5	**Planning Legislation:** Legislation as tools of plan implementation and development, Review of planning legislation in India, complaints and redressal mechanism	**6**
	Total	**42**

11. Suggested Books:

S.No.	Name of Authors/Book/Publisher	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
5	"UDPFI Guidelines: Volumes I & II" Institute of Town Planners of India	1996
6	Latest Master Plans of Delhi, Mumbai and other important cities	-
7	City development plans prepared for JNNURM (Jawaharlal Nehru National Urban Renewal Mission)	-

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Name of Deptt. /Centre: Department of Architecture and Planning

1. Subject Code: **ARN-506** Course Title: **Housing**

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

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

4. Relative Weight: **CWS:25** **PRS:00** **MTE:25** **ETE: 50** **PRE:0**

5. Credits: 3 6. Semester: **Spring** 7. Subject Area: **DEC**

8. Pre-Requisite: Nil

9. Objective: To impart knowledge on various aspects, issues and considerations for housing planning, design and implementation.

10. Details of Course:

S.No.	Contents	Contact Hours
1	**Introduction:** Understanding housing: its process, systems and classifications; Problems and issues; Relationship with city planning; Role of architect in housing; Housing policy, finance, legal and management aspects	4
2	**Housing Infrastructure and facilities:** Physical and Social infrastructure; Road and access, water supply, drainage, sewerage, electricity, solid waste management, playground, community halls, health and educational facilities, commercial and other recreational facilities	2
3	**Housing Planning and Design:** Criteria for site selection; Design principles, norms and standards for infrastructure, land subdivision, housing layout and buildings; Built form, socio-psychological and aesthetic implications of various types of housing	8
4	**Construction Materials & Technologies:** Energy efficient, Cost effective Materials and construction technology; innovative and emerging new materials; Prefabricated housing; Materials and techniques for rural housing	4
5	**Affordable, Low Income & Informal housing:** Concept, criteria and determinants of affordable, low income and informal housing; design, planning and strategy issues for affordable housing; Characteristics and Types of low income and informal housing; Improvement models for planning and development of informal housing;	6
6	**Special housing:** Planning and design considerations for housing in hill areas, disaster prone areas, single/aged persons housing, working women's hostel, rehabilitation housing, night shelters, emergency shelters, mobile and kinetic housing solutions, service apartments; Emerging trends in housing types	4
	Total	**28**

11. Suggested Books:

S.No.	Name of Authors/Book/Publisher	Year of Publication
1	Greater London Council "An Introduction to Housing Layout", Architectural Press	1983
2	Macsai. J. "Housing", John Wiley & Sons	1982
3	Chiara. J. D., Panero. J, Zelnik. M "Time Saver Standards for Housing and Residential Development", 2nd Ed., McGraw Hill	1995
4	Schmitz. A, "Residential Development Handbook", 3rd Edition, Urban Land Institute	2004
5	Crolland. A, "Housing Development: Theory, Process & Practice", Routledge	2003
6	David. L, "Housing Design Book: A guide to good practice, Routledge Taylor & Francis Group.	2010

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-507** Course Title : **Hill Architecture**
2. Contact Hours: L: **2** T:**1** P:0
3. Examination Duration (Hrs): Theory :2 Practical:0
4. Relative Weight : **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 : To impart knowledge on different aspects of hill architecture.

10. Details of Course

Sr. No	Contents	Contact Hours
1.	Hills: Definition, Generic characteristics of hills and their influence on architecture	**4**
2	Unique factors influencing planning and designing in hill context such as topography, hydrology, vegetation, climate, hazards, culture, economy and environment; Suitability analysis of varying hill sites for different activities and purposes	**6**
3.	Vernacular hill settlements- examples of vernacular Communities, settlements, building types, techniques and materials across hills of India	**6**
4.	An overview of hill architecture of Uttarakhand in rural and urban context; Environmental and ecological concerns and safeguards required in Uttarakhand; Building Types, techniques and materials of Uttarakhand; Design and planning considerations for hills of Uttarakhand	**3**
5.	Modern building and building complex examples on hills in India and other countries, examples from Structural aspects of modern buildings and necessary safeguards	**6**
6.	Planning and design considerations for building on hills	**3**
	Total	**28**

11. Suggested Books

Sr. No	Name of Authors / Books / publishers	Years of Publication /Reprint
1	Abbott D., Pollit K. "Hill Housing: a comparative study " , Granada	1980
2	Taylor K., "Prehistoric Hill Settlement Museum"	1986
3	Bhatt H.P. "Environmental dimensions of rural settlements in hill areas" Ashish Pub House	1993
4	Aamir A. "Environmental protection of the Himalaya A Mountaineers' View"	1994
5	Thakur "The Architectural Heritage of Himachal Pradesh"	1996
6	Bahuguna, Lal S., Singh, Tej V., Sharma, M.L "The Survival of the Himalaya, Eco-systems- A scenario of Unsustainability '	1998

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE**: ARCHITECTURE AND PLANNING**

1. Subject Code: **ARN-508** Course Title: **Architectural Research and Journalism**

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

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

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

5. Credits **3** 6. Semester: **Spring** 7. Subject Area**: DEC**

8. Pre-requisite**: Nil**

9. Objective

To impart knowledge on basic principles of any research task related to the discipline and its application to the profession, and the role of architectural criticism and journalism in the production of architecture.

10. Details of Course:

S.No	Contents	Contact Hours
1.	**Introduction to Architectural Research Techniques:** The nature and function of research, scientific research, meaning of research in the field of architecture.	**2**
2.	**Vocabulary of Research Techniques:** Exposure to different terms, resources and standards like – MLA, APA, CHICAGO STYLE etc.	**2**
3.	**Modes of Enquiry and Methods of Research** : Research methodology, various techniques of data collection in general, specific techniques in architectural research, methods of analysis stage, communication of research reporting, the structure of a report, the necessity for the development of writing skills	**4**
4.	**Formal Writing**:Technical data about formal writing the use of visuals, the qualities of research, the use of primary and secondary references, bibliography, notation, cross reference etc	**4**
5.	**Fields of Research in the discipline**: Research in the fields of environment, community structure, architectural history and theory, urban structure, building type studies	**2**

6.	**Overview of journalism:** Reporting in the field of architecture and planning	**2**
7.	**Analysis**: Recent historical and contemporary examples of written and journalistic criticism of architecture, works of Indian and International writers and critics.	**4**
8.	**Discursive techniques**: Analysis of major critical themes, thematic categories in architectural writing	**2**
9.	**Structure**: Architectural journals, analytical reports, editing and book reviews	**2**
10.	**Types and Forms**: Contemporary Architectural journalism, photo journalism and digital journalism	**4**
	Total	**28**

11. Suggested Exercises:

1.	Preparing and presenting mock research proposals
2.	Historiography Compilations
3.	Seminars on Indian architectural writers, journalists and critics
4.	Production of a journal by the students themselves and other contributors.

12. Suggested Books:

S.No.	**Name of Author/Book/Publisher**	**Year of Publication/ Reprint**
1.	Harrigan, John E., "Human Factors Research: Methods and Applications for Architects and Interior Designers" Amsterdam: Elsevier	1987
2.	Kliment, SA, "Writing for Design Professionals", W W Norton & Co Inc	1998
3.	Borden, Iain and Katerina Ruedi., "The Dissertation: An Architecture Student's Handbook" Oxford, Boston: Architectural Press	2000
4.	Groat, L. and Wang, D., " Architectural Research Methods ", John Wiley & Sons	2002
5.	De Jong, T.M. and D.J.M. Van Der Voordt., "Ways to Study and Research Urban, Architectural and Technical Design" Delft, Netherlands: DUP Science	2002

6.	Gray, Carole and Julian Malins., “Visualizing Research: A Guide to the Research Process in Art and Design” Aldershot, Hants, England: Ashgate Publishing Limited	2004
7.	Asad, MA, Musa, M, “Architectural Criticism and Journalism: Global Perspectives”, Umberto Allemandi	2007

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: **ARCHITECTURE & PLANNING**

1. Subject Code: **ARN-509** Course Title: **Emerging Technologies in Architecture**

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

5. Credits 3 6. Semester Autumn

7. Pre-requisite: Nil 8. Subject Area**:** DEC

9. Objective of Course: To expose students to emerging tools and technologies in architecture, construction and planning

10. Details of Course:

S.No	Particulars	Contact Hours
1.	**Virtual D esign an d C onstruction :** Introduction to virtual design and construction; tools and techniques; Engineering modeling and Analysis methods; Product, organization, process and process risks, Visualization methods, Predicted and measured performance in relationship to projected project performance objectives.	**6**
2.	**4D and 5D modelling :** 4D-BIM Overview, Spatial Program Validation, Operations Formulating, Recent 4D Technologies , Gantt Chart, Critical Path Method, Introduction to Software like Synchro 4D/5D BIM Software, Autodesk Navisworks Manage Cost parameters and Estimating, 5d Cost planning strategies, Construction services for cost planning and preconstruction estimating. Economic impact assessment.	**6**
3.	**Lean Construction Planning :** Introduction, terminologies used , preparation of workflow charts, advantages and uses.	**4**
4.	**The i nstruments o f analysis an d d esign i n E mergent T echnologies:** Computational Processes, interdisciplinary effects of emergence, biomimetics and the evolutionary computation of design and production technologies	**6**
5.	**Material Systems and Fabrication:** Material behaviour and fabrication processes, associative modelling in Grasshopper/Rhino, workshops on scripting in VB and in Grasshopper, sessions on geometry and iterative processes, and L-Systems to model and control growth processes.	**6**
	Total	**28**

12. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
1.	Menges, A. **"Material Computation: Higher Integration in Morphogenetic Design Architectural Design "**, Architectural Design Series, Book 216, Wiley	**2012**
2.	Hensel, M., Menges, A. and Weinstock, M. **"Emergent Technologies and Design: Towards a Biological Paradigm for Architecture"**, Routledge	**2010**
3.	Oxman, R. **"The New Structuralism: Design, Engineering and Architectural Technologies (Architectural Design) "**, Architectural Design Series, Book 80, Wiley, Edition 1	**2010**
4.	Iwamoto, L. **"Digital Fabrications: Architectural and Material Techniques"**, Princeton Architectural Press	**2009**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: **ARCHITECTURE & PLANNING**

1. Subject Code: ARN-510 **Course Title: Architectural and Urban Conservation**

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

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

4. Relative Weight: **CWS** 15 **PRS** 25 **MTE** 20 **ETE** 40

5. Credits 3 **6. Semester:** Spring

7. Pre-requisite: Nil **8. Subject Area: DEC**

9. Objective of Course: To sensitize students towards role of conservation in human habitats

10. Details of Course:

S.No	Particulars	Contact Hours
1.	**Introduction to Conservation and related topics:** Meaning/definition, purpose of studying, theory of conservation – origin and history, role of conservation in the Social, Economic and Environmental Sustainability of the human habitats, urban and cultural landscapes, conservation practice	**6**
2.	**Conservation and its relation to History of Architecture and History of Culture:** Introduction to Archeology; Architectural symbolism; Buildings of historic traditions as Record of Program and Purpose; Architectural Design principles with reference to the relevant theories, Comparative cultures; City forms and traditional Planning; Tools for cultural studies	**6**
3.	**Building Elements, Forms and Documentation:** Elements of buildings; Building forms; Building precincts; Documentation: Sketching, measure drawing, photography, models, study of crafts traditions, sensitive repairs; Inventories, mapping methods, study of evolution, people and memories, understanding change	**6**
4.	**Material Science, Condition Survey and Environmental Studies:** Processes of extraction/production, behavior of the material, damages and repair; Structural defects and repairs, quantities and estimation, specifications; Impacts of change on the ecological and well as human habitat	**5**
5.	**Construction, Structure and Infrastructure:** Behavior of basic structural elements and structural systems adopted in old structures of historic, archeological and architectural importance; Defects and deterioration; Repairs and rehabilitation; Infrastructural up gradations in historic areas, sustainable mobility, innovations in development	**5**
	Total	**28**

11. Suggested Exercises:

1.	Reviews
2.	Case Studies
3.	Documentation and Survey
4.	Drawings
5.	Reports/Seminars

12. Suggested Books:

S.N o.	**Name of Books/Authors**	**Year of Publication**
1.	Stubbs J., "Time Honored: A Global View of Architectural Conservation", Wiley, Edition 01	**2009**
2.	Orbasli, A., "Architectural Conservation: Principles and Practice", Wiley Blackwell, Edition 1	**2007**
3.	Jokilehto, J., "History of Architectural Conservation (CONSERVATION AND MUSEOLOGY) ", Routledge, edition 01	**2002**
4.	Cohen, N., "Urban Conservation", MIT Press	**1999**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT/CENTRE: ARCHITECTURE AND PLANNING

1. Subject Code: **ARN-511** Course Title: **Disaster Resistant Buildings**

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

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

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

5. Credits:**3** 6. Semester: **Autumn** 7. Subject Area: **DEC**

8. Pre-requisite: Nil

9. Objective: To develop understanding on disaster and planning/ design measures for safer buildings

10. Details of Course:

S. No.	Contents	Contact hours
1	Introduction to hazard, risk, vulnerability and disaster; Types of disaster- natural and man-made; Disaster profile of India; Lessons learnt from past experiences	**4**
2	Geological disaster- Earthquake, Landslides, Snow Avalanches; Causes for Landslides and Avalanches, their impact on built environment, measures with respect to architectural, structural and planning considerations	**4**
3	Elementary Seismology; Architectural, structural and site planning consideration for earthquake resistance design; contemporary approaches; Non-structural elements' safety; Vulnerability assessment and retrofitting.	**8**
4	Wind and water related disaster- Floods, Cyclones, Tsunami; Causes and effects of flood, cyclone and tsunami; architectural and planning considerations	**4**
5	Manmade disaster- Fire, Blast, Vandalism and neglect; Types of damage and their respective design considerations	**4**
6	Disaster Management Cycle; Preparedness andPost disaster relief and logistics management; Cost aspect, Role and responsibilities of different agencies, government and community participation; role of building bye-laws	**4**

11. Suggested Books:

S. No.	Name of Authors/Books/Publisher	Year of Publication/ Reprint
1	Abhas K. Jha, Safer Homes, "Stronger Communities: A Handbook For Reconstructing After Natural Disasters", World Bank Publications	2010
2	GoI-UNDP, "Guidelines For Design And Construction of Cyclone/Tsunami Shelters", GoI-UNDP	2006
3	"Guidelines Improving Earthquake Resistance of Housing", BMTPC	2010
4	"Guidelines Improving Flood Resistance of Housing", BMTPC	2010
5	Vulnerability Atlas of India, BMTPC	2006

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT: ARCHITECTURE & PLANNING

1. Subject Code: **ARN-513** Course Title: **Vastushastra**

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

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

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

5. Credits 3 6. Semester Autumn

7. Pre-requisite: Nil 8. Subject Area: DEC

9. Objective of Course: To impart knowledge to the student on Vastushastra and its applicability in modern times.

10. Details of Course:

S.No	Contents	Contact Hours
1.	**Introduction to Vastushastra:** Historical Origins; Purpose, nature and scope; Classification of various texts available across India; Outline of contents and chapters; relevance of astrological calculations in Vaastu; Mandalas- types and application, Vastupurusha mandala	**6**
2.	**Principles and science of Vastushstra:** Principles of Vastushastra and their effect; Application to Modern architecture; Engineering principles overlapped on traditional principles of design; understanding of religious language and the context behind	**5**
3.	**Measurements:** System of measurements as per Vaastu and Vedas, its correlation to Geometry; Ancient system of determining directions	**2**
4.	**Site Selection and Building Design:** Site selection, orientation and shapes, recommendations of site layout; location; landscaping inside and outside; Layout of interior spaces, window and doors- shapes and sizes; architectural element details- plinth, overhang, walls; materials for construction- brick (dimensions)	**8**
5.	**City P lanning i n Vastushastra:** layout and planning of roads; cluster planning; design of wells, ponds and other public spaces	**3**
6.	**Modern Vastushastra:** Current practices of Vastushastra in architecture; their relevance and analysis; Case studies of traditional and modern Vaastushastra	**4**
	Total	**28**

11. Suggested Books:

S.N o.	Name of Books/Authors	Year of Publication
1.	Jonathan D., "An introduction to Vastu", D&S Books	**2002**
2.	Mayamuni, Daegens B., " Mayamata: An Indian Treatise on Housing, Architecture and Iconography", Sitaram Bhartiya Institute of Scientific Research	**1985**
3.	Pandey, S., "Vasturaj Vallabhmandanam", Chaukhamba Subharti Prakashan	**2001**
4.	Shukla, A. K., "Vastusaukhyam", Sampoornanand Sanskrit Vishvidyalaya, Varanasi	**1999**
5.	Jha, Pt. Achyutanand ,"Bruhatsamhita", Chaukhamba Vidyabhawan	**2003**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **ARN-515** Course Title: **Live Project / Studio / Seminar - II**

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

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

4. Relative Weight : **CWS** 0 **PRS** 100 **MTE** 0 **ETE** 0 **PRE** 0

5. Credits: 2 6. Semester: **Autumn** 7. Subject Area: **DCC**

8. Pre-requisite: -

9. Objective:

To provide exposure to live projects

- **Suggested Design Exercises**
  1. On site studio
  2. Design Studios on live projects by eminent professionals
  3. Design competitions
  4. Seminars
- Architectural study tours for Site Visits, Live studios

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **CEN-192** Course Title**: Geomatics Techniques for Architects**

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

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

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

5. Credits**: 3** 6. Semester**: Spring** 7. Subject Area**: ESC**

8. Pre-requisite**: Nil**

9. Objective: To impart knowledge about the basic principles of geomatics engineering techniques for data collection and mapping for planning infrastructural facilities, including various architectural applications.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Importance of geomatics engineering techniques to architecture and planning, Data collection techniques - Field surveying, Photogrammetry, Remote Sensing, Geographic Information System and Global Positioning System.	**2**
2.	Definition of surveying, Basic principles, Types of maps, their scales and uses, Map sheet numbering, map datum and projections and their importance, Classification of Survey, Surveying equipment namely Levels, Compass, Theodolites, EDM, Total Stations and Laser based equipment.	**3**
3.	Measurement of distance, angles, directions and heights; Principles and components of Theodolites, Magnetic Compass, IOP Levels, Auto Levels, and Total stations; Tacheometric surveying; contouring.	**5**
4.	Plane table surveying and mapping;	**3**
5.	GPS: Introduction to GPS surveys, GPS data collection for mapping.	**3**
6.	Aerial and terrestrial photogrammetry, types of photographs, geometry of an aerial photograph, flying height and scale, relief (height) displacement, stereoscopy, height determination.	**3**
7.	Basics concepts of remote sensing, electromagnetic spectrum, platforms and sensors, remote sensing data products; Introduction to visual and digital image interpretation techniques.	**4**

8.	Introduction to GIS, Database (Spatial and non-spatial), Digital Elevation Model (DEM).	**3**
9.	Applications of geomatics engineering techniques to architecture and planning; Utility of high resolution remote sensing data for infrastructural planning, 3D visualization etc.	**2**
	Total	**28**

List of Practicals

1. Study of various Maps and Indian Map Numbering Systems, Map Projection Systems, Conventional symbol chart.
2. Use of IOP level for determining the elevations of given points.
3. Profile levelling and Cross-sectioning using Auto level.
4. Use of Vernier Theodolite for taking horizontal and vertical circle readings.
5. Use of Total Station for measuring angles
6. (i) Determination of length and gradient of a line using Tacheometric surveying.
   (ii) Determination of magnetic bearing of a closed traverse.
7. Use of Total stations for determining the distances, elevations and coordinates.
8. Preparation of a map of given area using plane table surveying.
9. Use of GPS for taking field measurements.
10. Determination of scale and flying height of an aerial photograph.
11. Creation of 3-dimensional model and use of parallax scale to find height of points.
12. Use of remote sensing images for Landuse and landcover classification.
13. Practice on Image Processing System to use remote sensing images.
14. Practice on GIS for layers creation.

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-Heinemam.	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: **CEN-292** Course Title: **Theory of Structures**
2. Contact Hours: **L: 3** **T: 1** **P: 0**
3. Examination Duration (Hrs) Theory **3** Practical **0**
4. Relative Weight: **CWS 25 PRS 0 MTE 25 ETE 50 PRE 0**
5. Credits: **4** 6. Semester: **Spring** 7. Subject Area: **DCC**
8. Pre-requisite: **NIL**
9. Objective: To impart knowledge on mechanical properties of common engineering materials, simple types of structural elements and determination of forces and stresses in the elements

10. Details of Course:

S. No.	Contents	Contact Hours
1	Types of Engineering Materials, Introduction to Structural Elements, Types of supports, Stresses and Strains: Elastic Constants and their Mutual Relationships	4
2	Analysis of Trusses: Method of Joints and Method of Sections	6
3	Bending Moment and Shear Force Diagrams for Determinate Beams under Simple Types of Loads, Method of Super Position	6
4	Theory of Simple Bending, Bending and Shear stresses in Symmetrical Sections	6
5	Slopes and Deflections of Beams and Frames, Moment-Area Method, Conjugate Beam Method	8
6	Unit Load Method for Determination of Slopes and Deflections in Beams & Frames and Deflection of Trusses	4
7	Redundant Structures: Static and Kinematic Indeterminacy	2
8	Moment Distribution Method for Analysis of Continuous Beams, Portal Frames and Multistoried Structures	6
	Total	**42**

11. Suggested Books:

S. No.	Name of Authors/Books/Publisher	Year of Publication
1	Kumar, A., “Stability Theory of Structures”, Tata McGraw Hill	1985
2	Tung, A. And Christano, P., “Structural Analysis”, Prentice Hall International	1987
3	Prakash Rao, D.S., “Structural Analysis”, University Press	2007
4	Jain, A.K., “Advanced Structural Analysis”, Neam Chand & Bros.	2007
5	Punmia, B.C., Jain, A.K. and Jain, A.K., “Mechanics of Materials”, Laxmi Publications (P) Ltd.	2007
6	Jain, A.K., “Strength of Materials and Structural Analysis”, Nem Chand & Bros.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

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

1. Subject Code: **CEN-391** Course Title: **Design of Reinforced Concrete Elements**
2. Contact Hours: L: **3** T: **1** P: **2/2**
3. Examination Duration (Hrs) Theory: **3** Practical: **0**
4. Relative Weight: **CWS 20 PRS 20 MTE 20 ETE 40 PRE 0**
5. Credits: **4** 6. Semester: **Autumn** 7. Subject Area: **ESC**
8. Pre-requisite: **NIL**
9. Objective: To impart knowledge in the area of the design of simple reinforced concrete structural elements.
10. Details of Course:

S. No.	Contents	Contact Hours
1	Properties of Concrete and Reinforcing Steels	**3**
2	Design Approaches	**3**
3	Limit State Design of Reinforced Concrete Sections for Bending and Shear; Bond Strength and Development Length; Serviceability; Limit States of Deflection and Cracking	**6**
4	Design of Rectangular, L and T Beams	**9**
5	Design of One-way and Two-way Slabs, Staircases	**9**
6	Design of Columns and Footing for Isolated Columns	**9**
7	Introduction to Framed Buildings and Prestressed Concrete	**3**
	Total	**42**

11. Suggested Books:

S. No.	Name of Authors/Books/Publisher	Year of Publication
1	Dayaraatnam, 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: CEN-**392** Course Title: **Design of Steel Elements**
2. Contact Hours: L: **2** T: **1** P: **0**
3. Examination Duration (Hrs) Theory **2** Practical **0**
4. Relative Weight: **CWS 25 PRS 0 MTE 25 ETE 50 PRE 0**
5. Credits: **3** 6. Semester: **Spring** 7. Subject Area: **ESC**
8. Pre-requisite: **NIL**
9. Objective: To impart knowledge in the area of the design of simple steel elements
10. Details of Course:

S. No.	Contents	Contact Hours
1	Properties of Structural Steel and B.I.S. Specifications, Design Loads	2
2	Design of Members Subjected to Axial Tension	6
3	Riveted/Bolted and Welded Connections	8
4	Design of Members Subjected to Axial Compression: Steel Struts and Columns Including Built-up Columns.	6
5	Design of Beams: Rolled and Built-up Sections.	6
	Total	**28**

11. Suggested Books:

S. No.	Name of Authors/Books/Publisher	Year of Publication
1	Area, A,S., Ajmani, J.L., “Design of Steel Structures”, Nem Chand Bros.	2004
2	Chandra, R., “Design of Steel Structures”, Standard Book House.	2006
3	Duggal, S.K., “Design of Steel Structures”, 2nd Ed., Tata McGraw Hill.	2007
4	Kazmi, S.M.A., Jindal, S.K., “Design of Steel Structures”, Prentice Hall.	2007
5	Subramanian, N., “Design of Steel Structures”, Oxford University Press	2009
6	Bhavikatti, S.S., “Design of Steel Structures”, I.K. Int. Pub. House (P) Ltd.	2012

INDIAN INSTITUTE OF TECHNOLOGY, ROORKEE

NAME OF DEPARTMENT/CENTRE: ARCHITECTURE AND PLANNING

1. Subject Code: **CEN-394** Course Title: **BUILDING SERVICES**

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

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

4. Relative Weight: **CWS** | **25** | **PRS** | **0** | **MTE** | **25** | **ETE** | **50** | **PRE** | **00** |

5. Credits | 0 | 2 | 6. Semester | | **Autumn** | √ | **Spring** | | **Both** |

7. Pre-requisite: **NIL**

8. Subject Area: **DCC**

9. Objective of the Course: To cover various aspects of water supply, drainage and solid waste disposal from buildings.

10. Details of the Course:

S.No.	Particulars	Contact Hours
1.	Basic principles of plumbing; Terminology	1
2.	Systems of Water Supply of Buildings – Upfeed and downfeed systems and critical fixtures, high altitude plumbing	2
3.	Units, Most Probable Simultaneous Demand and Design	1
4.	Hot Water Supply Systems – tank, cylinder and combinations	2
5.	Fire Water Supply, Wet and Dry Standpipes, Automatic Fire Sprinkler Systems	2
6.	Drainage Systems – two pipes, one pipe, single stack and MOP systems	2
7.	Septic Tank Disposal and Soakage Pit Design	1
8.	Solid Waste Disposal from High Rise Buildings	1
9.	Water Supply to High Rise Buildings, Problems encountered and systems adopted	2
	Total	**14**

11. Suggested Books:

S.No.	Authors/Title/Edition/Publisher	Year of Publication
1.	NBC-2005, National Building Code of India - 2005, Bureau of Indian Standards, New Delhi	2005
2.	Panchdhari, Water Supply and Sanitary Installations, New Age International Ltd., New Delhi	2000
3.	Hall and Greeno, Building Services Handbook, Butterworth Heinemann, Oxford, UK	2001
4.	2011 Uniform Plumbing Code of India, IAPMO/IPA, New Delhi	2011
5.	2012 International Plumbing Code, IAPMO, CA, USA	2012
6.	Tchobanoglous, Integrated Solid Waste Management, McGraw Hill, NY	2001
7.	Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi.	1997
8.	Manual of Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi.	1993

List of Studio Exercises for Practical Component of the Syllabus:

Design and Drawings of the following, preferably using Microstation:

1. Cold water supply system for a low rise building - Two Turns
2. Hot water supply system for a low rise building - Two Turns
3. House drainage system for a low rise building - Two Turns
4. Water supply system for a high rise building - Two Turns
5. House Drainage system for a high rise building - Two Turns
6. Fire water supply system for a high rise building - Two Turns
7. Solid waste collection system for a high rise building - Two Turns

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT**: ARCHITECTURE AND PLANNING**

1. Subject Code: **HSN-351** Course Title: **Society, Culture and Built Environment**

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

3. Examination Duration (Hrs): **Theory** 02 **Practical** 0

4. Relative Weight: **CWS** 25 **PRS** -- **MTE** 25 **ETE** 50 **PRE** --

2

5. Credits 3 6. Semester: **Autumn** 7. Subject Area: **HSSMEC**

8. Pre-requisite: **Nil**

9. Objective:

To develop appreciation for varied cultural expressions through history of culture, and understand their impact on the society and built environment

10. Details of the Course

S. No.	Contents	Contact Hours
1.		
2.		
3.		
4.		
	Total	**28**

11. Suggested Books:

S. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
1.		
2.		
3.		
4.		
5.		

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT**: ARCHITECTURE AND PLANNING**

1. Subject Code: **HSN-352** Course Title: **Building Economics and Real Estate**

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

3. Examination Duration (Hrs): **Theory** 02 **Practical** 0

4. Relative Weight: **CWS** 25 **PRS** -- **MTE** 25 **ETE** 50 **PRE** --

2

5. Credits 3 6. Semester: **Autumn** 7. Subject Area: **HSSMEC**

8. Pre-requisite: **Nil**

9. Objective:

To understand basic principles of economics, various methods, applied in building and real estate management.

10. Details of the Course

S. No.	**Contents**	**Contact Hours**
1.		
2.		
3		
4		
5		
6		
7		
	Total	**28**

11. Suggested Books:

S. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
1.		
2.		
3.		
4.		
5.		

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT/CENTRE: **DEPARTMENT OF CIVIL ENGINEERING**

1. Subject code: **CEN-105** Course Title: **Introduction to Environmental Studies**
2. Contact Hours: **L: 3 T: 0 P: 0**
3. Examination Duration (Hrs): **Theory:** 3 **Practical:** 0
4. Relative Weightage: **CWS:** 15 **PRS:** 0 **MTE:** 35 **ETE:** 50 **PRE:** 00
5. Credits: **3** 6. Semester: **Autumn** 7. Subject Area: **GSC**
8. Pre-requisite: **Nil**
9. Objective: To introduce fundamentals of environmental pollution and its control.
10. Details of Course:

S. No.	Contents	Contact Hours
1.	Overview: Environment and Natural Processes; Development (Resource Utilization & Waste Generation); Environmental issues; Concept of Sustainable Development; Issues affecting future development (population, urbanization, health, water scarcity, energy, climate change, toxic chemicals, finite resources etc.); Environmental units	6
2.	Air –Water interaction: (Liquid phase-gas phase equilibrium) Henry's Law Constant with units, Dimensionless Henry's Law Constant	3
3.	Water –Soil Interaction: Carbonate System (Alkalinity and buffering capacity); Major ions in water; Natural Organic Matter (NOMs); Water quality parameters; Physical processes (Mass Balance): Spatio-temporal variation in quality of river water, lake water, ground water; Water quality standards	9
4.	Wetlands, water treatment and wastewater treatment .	6
5.	Air resources: Atmosphere; Air pollutants; Emissions and control of air pollutants; Atmospheric meteorology and dispersion; Transport of air (global, regional, local); Air/ atmospheric stability; Plume shape; Gaussian modeling; Air quality standards	9
6.	Land pollution and solid waste management	3
7.	Ecosystem: Structure and function; Energy flow in ecosystem; Material flow in ecosystem; Biodiversity and ecosystem health; Bio-amplification and bio-magnification	3
8.	Hazardous Waste: Definition; Classification; Storage and management; Site remediation; Environmental Risk: assessment, and management	3
Total		**42**

11. Suggested Books:

S. No.	Name of Books / Authors/ Publishers	Year of Publication/ Reprint
1.	Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e	2008
2.	Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e	2007
3.	Peavy H. S., Rowe D.R. and Tchobanoglous G., "Environmental Engineering", McGraw Hill, New York	1986
4.	Mines R. O. and Lackey L. W. ""Introduction to Environmental Engineering", Prentice Hall, New Yark	2009
5.	Miheicic J. R. and Zimmerman J. B. " Environmental Engineering: Fundamentals, Sustainability, Design" John Wiley and Sons, Inc.	2010

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Humanities & Social Sciences**

1. Subject Code: **HS-001A** Course Title: **Communication Skills (Basic)**

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

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

4. Relative Weight**:** **CWS** 25 **PRS** 00 **MTE** 25 **ETE** 50 **PRE** 0

5. Credits**:** 2 6. Semester**: Autumn/Spring** 7. Subject Area**: HSS**

8. Pre-requisite**: NIL**

9. Objective:
The course intends to build the required communication skills of the students having limited communicative abilities, so that they may communicate effectively in real-life situations

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Understanding the Basics of Communication Skills: Listening, Speaking, Reading & Writing, Scope and Importance	**01**
2.	Grammar & Composition: Time and Tense, Agreement, Active-Passive, Narration, Use of Determiners, Prepositions & Phrasal Verbs	**05**
3.	Vocabulary Building & Writing: Word-formation, Synonyms, Antonyms, Homonyms, One-word Substitutes, Idioms and Phrases, Collocations, Abbreviations of Scientific and Technical Words	**02**
4.	Introduction to Sounds (Vowels & Consonants) Organs of Speech, Place and Manner of Articulation, Stress & Intonation, Listening Comprehension (Practical Sessions in Language Laboratory)	**02**

5.	Speaking, Countering Stage-fright and Related Barriers to Communication.	**02**
6.	Reading and Comprehension: Two lessons to be identified by the department.	**02**
	Total	**14**

List of Practicals:

1. Ice-breaking Exercises
2. Assignments on Time and Tense, Agreement, Active-Passive
3. Laboratory Session on Narration, Use of Determiners, Prepositions & Phrasal Verbs, Revisionary Exercises & Quiz
4. Laboratory Session on Synonyms, Antonyms, Homonyms
5. Assignments and Practice Sheets on One-word Substitutes, Idioms and Phrases, Collocations, Abbreviations of Scientific and Technical Words
6. Laboratory Session on Practice of sounds, Intonation and Stress, Listening Comprehension
7. Individual presentation, debates, Extempore & Turncoats
8. Exercises in Composition and Comprehension

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Murphy, Raymond. *Intermediate English Grammar*, New Delhi, Cambridge University Press.	**2009**
2.	Quirk, Randolph & Sidney Greenbaum. *A University Grammar of English*, New Delhi, Pearson.	**2009**
3.	McCarthy, Michael & Felicity O' Dell. *English Vocabulary in Use*, New Delhi, Cambridge University Press	**2010**
4.	Jones, Daniel. *The Pronunciation of English*, New Delhi, Universal Book Stall.	**2010**
5.	Birchfield, Susan M. *Fowler's Modern English Usage*, New Delhi, OUP.	**2004**
6.	Llyod, Susan M. *Roget's Thesaurus of English Words and Phrases*. New Delhi: Penguin.	**2010**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Humanities & Social Sciences**

1. Subject Code: **HS-001B** Course Title: **Communication Skills (Advanced)**

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

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

4. Relative Weight**:** **CWS** 25 **PRS** 00 **MTE** 25 **ETE** 50 **PRE** 0

5. Credits**:** 2 6. Semester**: Autumn/Spring** 7. Subject Area**: HSS**

8. Pre-requisite**: NIL**

9. Objective: The course intends to train the learners in using both verbal and non-verbal communication effectively.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	Advanced Communication Skills: Scope, Relevance, & Importance	**01**
2.	Soft Skills: Interpersonal Communication; Verbal & Non-verbal, Persuasion, Negotiation, Neuro-Linguistic Programming	**03**
3.	Communication and Media (Social and Popular), The Social and Political Context of Communication, Recent Developments and Current Debates in Media	**04**
4.	Cross-cultural and Global Issues in Communication: Race, Ethnicity, Gender & Diaspora	**03**
5.	Rhetoric and Public Communication, Audience Awareness, Emotionality	**03**
	Total	**14**

List of Experiments:

1. Discussion on the Process of Communication in Personal and Professional Life
2. Group Discussion, Case Studies and Role-Play
3. Assignments on E-mail Etiquette, Social Networking, Blog Writing, Discussions on Current Issues
4. Non-Verbal Communication in Cross-Cultural Situations, Case Studies, Group Discussions and Readings on Topics Related to Race, Ethnicity , Gender and Diaspora
5. Individual Presentations (Audience Awareness, Delivery and Content of Presentation)

11. Suggested Books:

S. No.	Name of Authors / Books / Publishers	Year of Publication/ Reprint
1.	Rentz, Kathryn, Marie E. Flatley & Paula Lentz. *Lesikar's Business Communication CONNECTING IH A DIGITAL WORLD*, McGraw-Hill, Irwin	**2012**
2.	Bovee, Courtland L & John V. Thill. *Business Communication Today*. New Delhi, Pearson Education	**2010**
3.	McMurrey, David A. & Joanne Buckley. *Handbook for Technical Writing*, New Delhi, Cengage Learning.	**2009**
4.	Jones, Daniel. *The Pronunciation of English*, New Delhi, Universal Book Stall.	**2010**
5.	Allan & Barbara Pease. *The Definitive Book of Body Language*, New York, Bantam	**2004**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Department of Humanities and Social Sciences**

1. Subject Code: **HSN-002** Course Title: **Ethics and Self-awareness**

2. Contact Hours: **L: 01** **T: 0 1** **P: 0**

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

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

5. Credit **02** 6. Semester**: Autumn** 7. Subject Area**: HSSC**

8. Pre-requisite**: NIL**

9. Objective: To introduce the concepts pertaining to ethical and moral reasoning and action and to develop self - awareness.

10. Details of Course:

S. No.	Contents	Contact Hours
1	**Introduction**: Definition of Ethics; Approaches to Ethics: Psychological, Philosophical, Social.	**1**
2	**Psycho-social theories of moral development**: View of Kohlberg; Morality and Ideology, Culture and Morality, Morality in everyday context.	**3**
3	**Ethical Concerns**: Work Ethics and Work Values, Business Ethics, Human values in organizations.	**3**
4	**Self-Awareness**: Self Concept: Johari Window, Self and Culture, Self Knowledge, Self-Esteem; Perceived Self-control, Self-serving bias, Self-presentation, Self-growth: Transactional Analysis and Life Scripts.	**4**
5.	**Self Development**: Character strengths and virtues, Emotional intelligence, Social intelligence, Positive cognitive states and processes (Self-efficacy, Empathy, Gratitude, Compassion, and Forgiveness).	**3**
	Total	**14**

11. Suggested Books:

S.No.	Name of Authors / Books / Publishers	Year of Publication
1.	Hall, Calvin S., Lindzey, Dardner., & Cambell, John B.,"Theories of Personality",Hamilton Printing Company.	1998
2.	Car Alan, "Positive Psychology: The Science of Happiness and Human Strengths", Brunner-Routledge.	2004
3.	Leary M.R., "The Curse of Self: Self-awareness, Egotism and the Quality of Human Life", Oxford University Press.	2004
4.	Louis P. P., "The Moral Life: An Introductory Reader in Ethics and Literature", Oxford University Press.	2007
5.	Corey, G., Schneider Corey, M., & Callanan, P., "Issues and Ethics in the Helping Professions", Brooks/Cole.	2011
6.	Snyder, C.R., Lopez, Shane, J., & Pedrotti, J.T., "Positive Psychology" Sage, 2nd edition.	2011

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: **Mathematics Department**

1. Subject Code: **MAN-001** Course Title: **Mathematics I**

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

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

4. Relative Weightage**:** **CWS** 25 **PRS** 00 25 50 0

5. Credits**:** 4 6. Semester**: Autumn** 7. Subject Area**: BSC**

8. Pre-requisite**:** **None**

9. Objective: **To provide essential knowledge of basic tools of Differential Calculus, Integral Calculus , Vector Calculus and Matrix Algebra for degree students.**

10. Details of Course:

S. No.	Contents	Contact Hours
1.	**Matrix Algebra:** Elementary operations and their use in getting the Rank, Inverse of a matrix and solution of linear simultaneous equations. Orthogonal, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, Normal & Unitary matrices and their elementary properties. Eigen-values and Eigenvectors of a matrix, Cayley-Hamilton theorem, Diagonalization of a matrix.	**8**
2.	**Differential Calculus:** Limit, Continuity and differentiability of functions of two variables, Euler's theorem for homogeneous equations, Tangent plane and normal. Change of variables, chain rule, Jacobians, Taylor's Theorem for two variables, Error approximations. Extrema of functions of two or more variables, Lagrange's method of undetermined multipliers	**12**
3.	**Integral Calculus:** Review of curve tracing and quadric surfaces, Double and Triple integrals, Change of order of integration. Change of variables. Gamma and Beta functions. Dirichlet's integral. Applications of Multiple integrals such as surface area, volumes, centre of gravity and moment of inertia..	**12**
4.	**Vector Calculus:** Differentiation of vectors, gradient, divergence, curl and their physical meaning. Identities involving gradient, divergence and curl. Line and surface integrals. Green's, Gauss and Stroke's theorem and their applications.	**10**
	Total	**42**

11. Suggested Books:

S. No.	Name of Authors/ Books/Publishers	Year of Publication/Reprint
1.	E. Kreyszig, Advanced Engineering Mathematics, 9th edition, John Wiley and Sons, Inc., U.K.	2011
2.	R.K. Jain and S.R.K. Iyenger, Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House.	2005
3.	M.D. Weir, J. Hass, F.R. Giordano, Thomas' Calculus, 11th Edition, Pearson Education.	2008

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE

NAME OF DEPARTMENT.: **Architecture and Planning**

1. Subject Code: **ARN-103** Course Title: **Visual Art - I**

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

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

4. Relative Weightage: CWS:**0** PRS:**60** MTE:**20** ETE:**0** PRE:**20**

5. Credits:**2** 6. Semester **Autumn** .

7. Pre-requisite: **Nil** 8. Subject Area: **DCC**

9. Objective of Course: To develop an insight into visual art and aesthetic appreciation, and develop skills for sketching and drawing.

10. Details of Course:

S.No	Particulars	Contact Hours
	Visual Art	
1.	**Introduction:** Visual art and its role in architecture	**2**
2.	**Principles and elements of Visual Art**	**4**
3.	**Elements of drawing techniques:** tonal value, variation flight, shading and texture, sketching, drawings	**4**
4.	**Two-dimensional expressive forms:** objects, nature, spaces, surfaces, patterns and human anatomy	**4**
	Art Appreciation	
5.	**Art Movements through History** : From Classical to Contemporary, such as Renaissance, Cubism, Art deco; Eminent artists' works	**7**
6.	**Indian Art through History** : Sacred to Regional Art forms of different periods, such as Hindu temple art, Buddhist, Islamic; Eminent artists' works	**7**
	Total	**28**

11. Suggested Exercises:

1.	Sketching, shading and texture/tonal effects using different media
2.	Still Life drawings
3.	Landscape drawings
4.	Spatial drawings and line sketching of built environment
5.	Human figure drawings
6.	Paintings in mixed media

12. Suggested Books:

S.N o.	**Name of Books/Authors**	**Year of Publication**
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**
5	Honour, Hugh and Fleming, John F. "The Visual Arts: A History", Pearson Prentice Hall	**2009**
6.	G. M. Rege . “The World of Visual Communication”, Himalayan Art Book	**2009**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE

NAME OF DEPARTMENT.: **Architecture and Planning**

1. Subject Code: **ARN-105** Course Title: **Architectural Graphics –I**

2. Contact Hours: **L: 1** **T: 0** **P: 6**

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

4. Relative Weightage**: CWS:0** **PRS:60** **MTE:20** **ETE:0** **PRE:20**

5. Credits:**4** 6. Semester **Autumn** 7. Pre-requisite: **Nil**

8. Subject Area: **DCC**

9. Objective:
To impart fundamental knowledge and develop skills of architectural drawing and graphics.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	**Architectural Graphic Fundamentals:** Lines, lettering and dimensioning, representation of materials and architectural elements through architectural graphic symbols,	**2**
2.	**Orthographic Projections**: Principles and projection methods of orthographic projection (third angle projection), straight lines, planes, solids and development of surfaces; section of solids	**4**
3.	**Architectural Plans, Elevations and Sections**	**2**
4.	**Sciography**: Study of shades and shadows cast by simple architectural forms on plain surfaces.	**2**
5.	**Isometric and Axonometric Views**: Solids, compositions and buildings	**4**
	Total	**14**

10. 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", 48th Ed., Charotar Publishing House.	**1996**
2.	Griffin, A.W. and Brunicardi, V.A., "Introduction to Architectural Presentation Graphics", Prentice Hall.	**1998**
3.	Ching, F.D.K., "Architectural Graphics", 4th Ed., John Wiley.	**2003**

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE

NAME OF DEPARTMENT.: **Architecture and Planning**

1. Subject Code: **ARN-107** Course Title: **Basic Design & Creative Workshop - I**

2. Contact Hours: **L: 1** **T: 0** **P: 6**

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

4. Relative Weightage: CWS:**0** PRS:**60** MTE:**20** ETE:**0** PRE:**20**

5. Credits:**4** 6. Semester **Autumn** 7. Pre-requisite: **Nil**

8. Subject Area: **DCC**

9. Objective of Course: To develop comprehensive understanding of space, form, order and design as a basis for architectural design and to develop creative skills and practical know-how of model making through different techniques of working with various materials.

10. Details of Course:

S. No.	Contents	Contact Hours
1.	**Introduction**: Introduction to basic design in architecture	**2**
2.	**Visual Perception through simple design elements:** line, plane, solids, and their inter-relationship	**2**
3.	**Space Comprehension:** Study of space, scale, proportion, light, colour, texture	**4**
4.	**Spatial Organization:** Perception of spaces through design elements and their organization, study of elementary two dimensional shapes and three dimensional forms, their interactions, abstraction, conception and space breaking through compositions and models in different media and materials.	**6**
	Total	**14**

11. Suggested Exercises:

a.) Basic Design

S.No.	Basic Design Exercises
1.	Two-dimensional compositions with lines, planes, Grids, shapes, solids, voids, colours, textures and expressions
2.	Compositions with Interpenetration of Solids
3.	Space: composition, conception in free flowing forms, angular forms , geometric/organic shapes etc, Breaking of spaces with horizontal and vertical planes, Form and design
4.	Three-dimensional compositions
5.	Compositions using surface texture and sciography
6.	Design of Murals, Screens and Voids in Walls

b.) Creative Workshop

Cutting, Joining, Shaping with various materials like ivory sheets, mount boards, acrylic sheets, plaster of Paris, clay, terracotta, etc.

S.No.	Creative Workshop Exercises
1.	**Space representation**: through Planar forms
2.	**Development of Solids and Voids** - Surface Development, Additive Forms, Subtractive Forms, Interpenetrating Forms Developing Surfaces and Creating Forms like Cube, Prisms, Cylinders
3.	**Complex Surface Developments**: with polyhedral forms like Icosahedron, Dodecahedron,etc.
4.	**Creating different forms:** Sculptural forms, product forms using alternative materials
5.	**Architectural Models** - Boundary walls, Kiosk, Architectural Elements, Skyscraper built forms, Space making crafts, landscape elements like shrubs trees, lights, street furniture.

12. Suggested Books:

S. No.	Name of Authors/Books/Publishers	Year of Publication/ Reprint
a.	**Basic Design**	
1.	Ching, F.D.K., "Architecture: Form, Space and Order", 3rd Ed., John Wiley & Sons.	**2007**
2.	Kieran, S. and Timberlake, J., "Elements of a New Architecture", Princeton Architectural.	**2008**
3.	Parmar, V.S., "Design Fundamentals in Architecture", Somoiya Publications.	**1973**
4.	Morgan, C.L., "Jean Nouvel – The Elements of Architecture", Thames and Hudson.	**1998**
b.	**Creative Workshop**	
1.	Dunn, Nick, Architectural Model Making, Lawrence King Publishing Ltd., London.	**2010**
2.	Farrelly, Lorraine, Basics Architecture – Representation Techniques, AVA Publishing, SA Switzerland	**2008**
3.	Van Verkel, Ben, Architectural Model lead to Design, DAMDI, Korea	**2010**