

SCHOOL OF ARCHITECTURE

GITAM University

REGULATIONS

B.Arch. (Bachelor of Architecture)

(w.e.f. Academic Year 2015-16)

1.0 ADMISSIONS

- 1.1 Admissions into 5 year B.Arch. (Bachelor of Architecture) programme of GITAM University are governed by GITAM University admission regulations and as per norms of Council of Architecture (CoA), New Delhi.

2.0 ELIGIBILITY CRITERIA

- 2.1 A pass in National Aptitude Test in Architecture (NATA) conducted by Council of Architecture (CoA), New Delhi **(or)** a pass in Joint Entrance Examination (JEE) Main –Paper II (B.Arch.) conducted by the Central Board of Secondary Education (CBSE).

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- 2.2 A pass with a minimum of 50% marks in aggregate at the end of new 10+2 scheme of Senior School Certificate Examination or Equivalent, with Mathematics as subject of examination at the 10+2 level from a recognized Central/State Board. Admissions into B. Arch. will be based on 50% weightage of marks in the qualifying examination and 50% weightage in National Aptitude Test in Architecture (NATA) / Joint Entrance Examination (JEE) Main –Paper II (B.Arch.)

3.0 STRUCTURE OF THE PROGRAMME

- 3.1 The Programme of instruction consists of:

- (i) A general core programme comprising Basics of Architecture, Building Materials, Building Construction, Architectural Design, Climatology in Architecture, etc.
- (ii) Structural design program fundamentals related to Surveying, Theory of Structures, Design of Steel and RCC, etc.
- (iii) An elective enabling the students to take a group of specialization courses of interest to him/her.
- (iv) Carryout design thesis approved by the faculty of architecture and submits a portfolio.
- (v) Undergo Practical Training (PT) in which the student is exposed to practical design problems.

- 3.2 Each academic year consists of two semesters for first four years (1st to 8th semesters), 9th and 10th semesters are offered together as final year. The curriculum and course content (syllabi) for the B.Arch. course is recommended by the Board of Studies in Architecture and approved by Academic Council.

4.0 CREDIT BASED SYSTEM

- 4.1 Each course is assigned certain number of credits which will depend upon the number of contact hours (lectures/tutorials) per week.
- 4.2 The curriculum of B.Arch. programme is designed to have a total of 289 credits for the award of B.Arch. degree.

5.0 MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English.

6.0 REGISTRATION

Every student has to register himself/herself for each semester individually at the time specified by the School / University.

7.0 ATTENDANCE REQUIREMENTS

7.1 A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend the end - semester examination and he/she will not be allowed to register for subsequent semester of study. He/She have to repeat the semester along with his/her juniors.

7.2 However, the Vice Chancellor on the recommendation of the Principal/Director of the Institute/School may condone the shortage of attendance of the students whose attendance is between 66% and 74% on genuine grounds and on payment of prescribed fee.

8.0 EVALUATION

8.1 The assessment of the student's performance in each course (theory and design courses) will be based on two components: Continuous Evaluation and Semester-end Examination.

8.2 A student has to secure an aggregate of 40% in the two components of the course put together to be declared to have passed the course, subject to the condition that the student must have secured a minimum of 40% in the Semester-end Examination component of the respective course.

8.3 Practical courses, Design Thesis and Practical Training are completely assessed under Continuous Evaluation. A student has to secure a minimum of 40% marks in each course to be declared to have passed the course. Details of assessment procedure are furnished below in Table 1.

Table 1: Assessment Procedure

S.No.	Component of assessment	Marks allotted	Type of Assessment	Scheme of Examination
1	Theory Course / Architectural Drawing & Graphics (I & II Semesters)/ Building Construction (I to V Semesters)	50	Continuous Evaluation	(i) Two mid semester examinations shall be conducted for fifteen (15) marks each. (ii) Fifteen (15) marks are allotted for assignments. (iii) Five (5) marks are allotted for attendance.
		50	Semester-end Examination	Fifty (50) marks are allotted for the semester-end examination.
	Total	100		

2	Basic Design (I & II Semesters)	200	Continuous Evaluation	(i) One Hundred and Ninety Five (195) marks are allotted for course work. (ii) Five (5) marks are allotted for attendance.
		200	Semester-end Examination	Two Hundred (200) marks are allotted for the semester-end examination.
	Total	400		
3	Architectural Design (III to VII Semester)	200	Continuous Evaluation	(i) One Hundred and Fifteen (115) marks are allotted for course work. (ii) Eighty (80) marks are allotted for the external viva-voce. (iii) Five (5) marks are allotted for attendance
		200	Semester-end Examination	Two Hundred (200) marks are allotted for the semester-end examination.
	Total	400		
4	Practical Course (without viva-voce)	100	Continuous Evaluation	(i) Ninety Five (95) marks are allotted for course work. (ii) Five (5) marks are allotted for attendance.
5	Practical Course (with viva-voce)	100	Continuous Evaluation	(i) Fifty Five (55) marks are allotted for course work. (ii) Forty (40) marks are allotted for the external viva-voce. (iii) Five (5) marks are allotted for attendance
6	Design Thesis (VIII Semester)	600	Continuous Evaluation	(i) Three Hundred and Sixty (360) marks are allotted for continuous evaluation of the project by the internal guide. (ii) Two Hundred and Forty (240) marks are allotted for the external viva-voce.

7	Practical Training (Final year - IX & X Semesters)	400	Continuous Evaluation	(i) Two Hundred and Forty (240) marks are allotted for report submission and seminar presentation. (ii) One Hundred and Sixty (160) marks are allotted for the external viva-voce.
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9.0 RETOTALLING, REVALUATION & REAPPEARANCE

- 9.1 Retotalling of the semester-end examination answer script of a course is permitted on a request made by the student by paying the prescribed fee within fifteen days of the announcement of the result.
- 9.2 Revaluation of the semester-end examination answer script of a course is permitted on a request made by the student by paying the prescribed fee within fifteen days of the announcement of the result.
- 9.3
- a. A student who has secured 'F' Grade in any course (which have semester-end examination component) shall have to reappear at the subsequent semester-end examination held for that course.
 - b. A student who has secured less than 40% of the maximum marks in the continuous evaluation component of any course is eligible to attend Special Instruction classes held during summer vacation, by paying the prescribed fee. However a student is permitted to attend **“only once”** in that particular course during his/her entire program of study.
- 9.4 A student who has secured 'F' Grade in Practical Training shall have to improve his/her port-folio and reappear for viva-voce at the time of special examination to be conducted in the summer vacation.

10.0 SPECIAL EXAMINATION

- 10.1 A student who has completed his/her period of study and still has “F” Grade in not more than 5 courses, is eligible to appear for the special examination, which shall be conducted in the summer vacation.

11.0 BETTERMENT OF GRADES

- 11.1 A student who has secured second class and desires to improve his/her grades can appear for betterment examination only in theory courses of any semester of his/ her choice, conducted in summer vacation along with the special examination. Betterment of Grades is permitted **“only once”** immediately after completion of the program of study.

12.0 GRADING SYSTEM

- 12.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.

Table 2: Grades & Grade Points

SL No	Grade	Grade points	Absolute Marks
1	O (Outstanding)	10	90 and above
2	A+(Excellent)	9	80 – 89
3	A (Very good)	8	70 – 79
4	B+ (Good)	7	60 – 69
5	B (Above Average)	6	50 – 59
6	C (Average)	5	40 – 49
7	F (Fail)	0	Less than 40
8	Ab (Absent)	0	---

12.2 A student who earns a minimum of 5 grade points (C grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course.

13.0 GRADE POINT AVERAGE

13.1 A Grade Point Average (GPA) for the semester will be calculated according to the formula:

$$\text{GPA} = \frac{\sum [C \times G]}{\sum C}$$

Where

C = number of credits for the course,

G = grade points obtained by the student in the course.

13.2 Semester Grade Point Average (SGPA) is awarded to those candidates who pass in all the courses of the semester.

13.3 To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time.

13.4 CGPA required for classification of class after the successful completion of the programme is shown in Table 3.

Table 3: CGPA required for award of Degree

Distinction	≥ 8.0*
First Class	≥ 7.0
Second Class	≥ 6.0
Pass	≥ 5.0

* In addition to the required CGPA of 8.0, the student must have necessarily passed all the courses of every semester in **first attempt**.

14.0 ELIGIBILITY FOR AWARD OF THE B.Arch. DEGREE

14.1 Duration of the programme:

A student is ordinarily expected to complete the B.Arch. programme in ten semesters of five years. However, a student may complete the programme in not more than seven years including study period.

14.2 However the above regulation may be relaxed by the Vice Chancellor in individual cases for cogent and sufficient reasons.

14.3 A student shall be eligible for award of the B.Arch. degree if he/she fulfill all the following conditions.

- a) Registered and successfully completed all the courses and projects.
- b) Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of his/her study within the stipulated time.
- c) Has no dues to the School, Hostels, Libraries, NCC, NSS etc, and
- d) No disciplinary action is pending against him/her.

15.0 DISCRETIONARY POWER

Notwithstanding anything contained in the above sections, the Vice-Chancellor may review all exceptional cases, and give his decision, which will be final and binding.

RULES

1. In respect of all theory examinations, the paper setting shall be done by an external paper setter having a minimum of three years of teaching experience. The panel of paper setters for each course is to be prepared by the Board of Studies of the school concerned and approved by the Academic Council. The paper setters are to be appointed by the Vice Chancellor on the basis of recommendation of Director of Evaluation / Controller of Examinations.
2. The theory papers of end-semester examination will be evaluated by internal/external examiner.
3. Panel of examiners of evaluation for each course is to be prepared by the Board of Studies of the department concerned and approved by the Academic Council.
4. The examiner for evaluation should have a minimum of three years teaching experience.
5. The appointment of examiners for evaluation of theory papers will be done by the Vice Chancellor on the basis of recommendation of Director of Evaluation / Controller of Examinations from a panel of examiners approved by the Academic Council.
6. The attendance marks for each course shall be allotted as follows :

Percentage of Attendance	Marks
76% to 80%	1
81% to 85%	2
86% to 90%	3
91% to 95%	4
96% to 100%	5

Ist SEMESTER

Sl. No.	Course Code	Course Name	S/L/Th/P (Hrs)		Credits	Marks			End Exam Duration
						I	E	T	Hours
1	AURMT 101	Mathematics for Architects	Th	2	2	50	50	100	3
2	AUREG 102	Technical Communication	Th	2	2	50	50	100	3
3	AURAR 103	Introduction to Art and Architecture	Th	3	3	50	50	100	3
4	AURAR 104	Building Materials-I	Th	3	3	50	50	100	3
5	AURCE 105	Engineering Mechanics	Th	3	3	50	50	100	3
6	AURAR 106	Basic Design -1	S	6	6	200	200	400	5
7	AURAR 107	Architectural Drawing and Graphics-I	S	6	4	50	50	100	5
8	AURAR 108	Building Construction- I	S	6	4	50	50	100	5
9	AURAR 111	Sketching Workshop	P	3	3	100	-	100	-
Total				34	30	650	550	1200	

Ist SEMESTER

AURMT 101 MATHEMATICS FOR ARCHITECTS

Credits: 2

UNIT 1

Matrices: Adjoin, transpose and inverse of matrices, orthogonal matrix, Rank of matrix, Consistency and inconsistency of linear equations.

UNIT 2

Statistics & Probability: Measures of Central Tendency and Measures of Dispersion. Kurtosis, Curve fitting, Method of Least Squares (Straight Line and Parabola), Correlation and Regression.

UNIT 3

Differential Calculus: Tangent and Normal, Curvature (Cartesian and parametric forms only), Telor's and Mclaurin's expansion. Indeterminate forms, Maxima, Minima for a function of one variable.

UNIT 4

Partial differentiation, Euler Theorem, Total differential coefficient, Change of variables, Taylor's and Mclaurin's expansion for two variables, Maxima, Minima for a function of two variables.

UNIT 5

Integral Calculus: Reduction Formulae, Use of double and triple integrals, Calculation of areas using multiple integrals.

Recommended Books:

1. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 1998.
2. P. Kandasamy, K. Thilagavathy and K. Gunavathy, *Engineering Mathematics Vol – I & II*, S.Chand Publishers – 1998.

AUREG 102 TECHNICAL COMMUNICATION

Credits: 2

UNIT 1

Vocabulary: Words often confused, one word substitutes, Synonymous words, Pairs of words, Single word substitution

Grammar: Tenses and Aspects, Concord, Common Errors.

UNIT 2

Writing Skills: Letter writing, Information transfer- using charts, figures, tables, Official Correspondence-Memorandum, Notice, Agenda, Minutes, Circular letter, applying for a job, Resume writing and Cover letters.

UNIT 3

Business Correspondence-Types, sales letters; Social Correspondence- Invitation to speak, etc.

UNIT 4

Report writing; general and technical report, Definition, Types, structure.

UNIT 5

Technical proposals, Definitions, types and format. Research papers and articles.

Recommended Books:

1. Dictionary of Pronunciations.
2. Daniel Jones; *Phonetics (symbols and transcription)*

AURAR 103 INTRODUCTION TO ART AND ARCHITECTURE

Credits: 3

UNIT 1

Role and meaning of art; Different art forms – performing arts, commercial and industrial art. Examples of works by the impressionist artists like Claude Monet, Surrealism and abstract art, works of Vassili Kandinsky and Henry Moore etc. Art in architecture. Examples from the works of Indian artists like Husein, Satish Gujral, etc.

UNIT 2

Definitions and general understanding of architecture; Role of an architect in a building project and his relation with other consultants, contractor and client; Knowledge and skills required as inputs.

UNIT 3

Various courses to be studied by an architect and their relevance to practice; Types of architectural drawings to be prepared by an architect; municipal drawings, presentations drawings, working drawings, etc.

UNIT 4

Various factors influencing the architecture of a region; Architecture as a response to social, technological, cultural and environmental factors.

UNIT 5

Evolution of shelter forms as a response to climate, materials and methods of construction. Examples of vernacular architecture in different regions of the world, with particular reference to India.

Recommended Books:

1. Craven, C.Roy. Indian Art, a Concise History.
2. Kumar, Raj (Ed.) Essays on Indian Art and Architecture. Discovery Pub., New Delhi, 2003
3. Fisher, E.Robert. Buddhist Art and Architecture. Thames and Hudson, London, 1993.
4. Ghosh, A (Ed) Jain Art and Architecture, Vol 1-3, BharatiyaJnanpith, New Delhi.
5. James C.Snyder and Anthony Y. Catanese, Introduction to Architecture, New York: McGraw Hill.
6. Rappoport, Amos, House, Form and Culture.
7. Khare , Ajay, Temple Architecture of Eastern India , Shubhi Publications, New Delhi , 2005

AURAR 104 BUILDING MATERIALS - I

Credits: 3

UNIT 1

Brick: Types of bricks according to their composition, classification of bricks, tests for bricks.

UNIT 2

Stone: Classification of stones. Common building stones used in India. Characteristics and use of stones. Dressing of stone. Artificial stones.

UNIT 3

Sand: Sources of sand, classification, tests for sand. Grades of sand and their uses in mortar and concrete.

UNIT 4

Cement: Composition of ordinary cement. Function of cement ingredients. Properties of cement – soundness, setting time, strength etc. Grades of cement and different types of cement along with use in construction. Cement packing (including their volume & weight).

UNIT 5

Mortar: Types of mortar – lime mortar, mud mortar, lime-surkhi mortar, cement mortar. Different grades of mortar, their compositions and properties. Use and selection of mortar for different construction work.

Note: All the students should do a Market Survey on above listed building materials and a detailed report of the study should be submitted.

Recommended Books:

1. B. C. Punmia; *Building Materials and Construction*.
2. Bindra&Arora; *Building Materials and Construction*.
3. W.B. Mckay, '*Building Construction*', Vol. 1,2,3 Longmans, U.K. 1981.

UNIT 1

Force Systems in Plane: Principles of Statics – Definitions and examples of various types of force systems – Definition of resultant – Composition and resolution of forces – Moment of a force – Principles of moments of force – Couples – characteristics of a couple – on Transformations of a couple – Resolution of a force into a force and couple.

Equilibrium of a Rigid Body: Free body diagrams – Equations of equilibrium of rigid bodies acted on by concurrent and non-concurrent coplanar system of forces.

UNIT 2

Analysis of simple Plane Truss – Assumptions – Analysis of Truss by Method of joints - Method of sections – Graphical method

UNIT 3

Centroids and Centres of Gravity: Centre of gravity of parallel forces in a plane. Centroids and centre of gravity of composite areas and composite bodies – Distributed Loads on Beams.

UNIT 4

Moments of Inertia: Definition – Moments of inertia of areas by integrations. Radius of gyration – Parallel axis theorem– Perpendicular axis theorem - Moments of inertia of composite areas — Polar moment of Inertia-Mass moment of inertia of simple bodies like disc, cylinder, rod, sphere.

UNIT 5

Friction: Introduction- Types of Friction- Laws of Dry Friction- Angle of Friction- Angle of repose- Cone of friction- Problems related to dry friction-Characteristics of dry friction – Problems involving dry friction

Virtual Work: Definition of work and virtual work – Principle of virtual work for a particle and a rigid body – Principle of virtual work for a system of connected rigid bodies.

References Books:

1. Timoshenko and D.H. Young, Engineering Mechanics, McGraw Hill, Fourth edition
2. Engineering Mechanics by Singer, Prentice Hall India.
3. J.L. Meriam John Wiley & Sons, Engineering Mechanics
4. F.B. Beer and E.R. Johnston, Jr., Vector, Mechanics for Engineers Statics and Dynamics, Tata McGraw Hill, Fourth edition, 2002
5. I.B. Prasad, Applied Mechanics, Khanna Publishers, Delhi, Tenth edition 1984
6. A.K.Tayal, Engineering Mechanics

AURAR 106 BASIC DESIGN-I

Credits : 6

Introduction to design; Importance of design; Study and appreciation of design examples from natural and manmade environments.

Exercises in elements of design: point, line, plane, volume, colour, texture, light and shade
Principles of design: rhythm, harmony, contrast, symmetry, balance, emphasis and their application in architectural design.

Application of the principles of composition in two and three dimensions. Exercises in simple repetitive patterns using grids; flooring patterns and patterns for architectural elements like grills, gates etc, compositions with solids and voids.

Recommended Books:

1. Wucius, Wong. Principles of Two Dimensional Design. Van Nostrand Reinhold 1972.
2. Maier Manfred, Basic Principles of Design, Vol. 1, 2, 3, &4, Van Nostrand Reinhold, NY, (1977).
3. Ching, Francis D.K., Architecture: Form, Space and Order, 2nd ed. Van Nostrand Reinhold, New York, 1996.
4. Hanks, A. David. Decorative Designs of Frank Lloyd Wright, Dover Publications, Inc. New York 1999.
5. Hepler, E. Donald, Wallach, I. Paul. Architecture Drafting and Design, 3rd ed. McGraw-Hill Book Company, New York, 1977.
6. Itten, Johannes. Design and Form: The basic course at the Bauhaus, Thames and Hudson Ltd., London 1997.
7. Krier, Rob. Architectural Composition, Academy Editions, London, 1988.
8. Pipes, Alan. Drawing for 3-Dimensional Design. Thames and Hudson Ltd., London 1990.

UNIT 1

Introduction: Fundamentals of drawing and its practice, introduction to drawing equipment and its familiarization, use and handling.

Drawing: Drawing sheet sizes, layouts and composition. Simple exercises in drafting, line types, line weights, dimensioning, Typography- anatomy of type, styles. Free hand lettering, title panels and legends.

UNIT 2

Architectural Symbols: Representation of building elements, openings, materials, furniture and accessories, anthropometrics, vegetation, vehicles, terminology and abbreviations used in architectural representation.

UNIT 3

Measured and Scale Drawing: Scales and construction of scales, scaled drawings of simple objects, furniture, rooms, doors and windows etc. in plan elevation and section. Reduction and enlargement of drawings.

UNIT 4

Geometrical Construction: Constructing simple and complex geometrical shapes involving various drafting techniques. Methods of drawing regular polygons.

UNIT 5

Projection of planes and solids, Interpenetration of solids, Isometric and Axonometric projections.

Recommended Books:

1. B. Gupta; *A Text Book of Engineering Drawing*
2. N.D. Bhatt; *Engineering Drawing*.
3. Hiram. E. Grant; *Engg Drawing*, , *Mc. Graw Hill Book Company*.
4. Sherley W, MORGAN; *Architectural Drawing*, *McGraw Hill*
5. Arthur L. Gupstill, Watson ;*Rendering in Pen and Ink*,– *Gupstill Publications, New York*.

UNIT 1

Brick masonry: Various types of bonds, stopped ends, junctions, piers, jambs, footings, foundations, corbelling, damp proof course, window sills, thresholds, copings, mortar joints and pointing.

UNIT 2

Stone masonry: Stone walls, rubble work, ashlar work, masonry joints, window sills, plinth, cornices, surface finishes.

UNIT 3

Composite masonry: Brick backed ashlar, rubble backed ashlar, concrete backed masonry, hollow block masonry, ashlar faced concrete walls, marble faced masonry, tile faced concrete.

UNIT 4

Partition walls: Brick partition, reinforced brick partition, brick nogged partition, lath and plaster partition, precast concrete partition, glass block and glass Crete partition, and common wooden partition.

UNIT 5

Simple foundations: Simple foundation for masonry load bearing walls and piers, shallow foundations

Sessional work based on above topics.

Recommended Books:

1. W.B. MacKay, '*Building Construction*', Vol. 1,2,3,4 longmans, U.K. 1981.
2. B. C. Punmia; *Building Materials and Construction* .Laxmi Publications Pvt Ltd, New Delhi,1993.
3. Bindra&Arora; *Building Materials and Construction*.
4. Francis D. K. Ching, *Building Construction Illustrated VNR, 1975*.
5. R .Barry. *The Construction of Buildings. Vol.1-Vol-IV, The English Language book society, Crosby Lockwood staples, London.*

AURAR 111 SKETCHING WORKSHOP

Credits: 3

The students should be made to sketch the following themes as studio exercises along with inputs like light, shade, proportion and scale:

- Human figures / Postures
- Furniture
- Street Furniture / Outdoor sculpture
- Objects: Pen, Television, Flower pot, Tea-pot, Cups etc.
- Elements of nature
- Enclosed Spaces in courtyards, Plazas, Chowks
- Buildings
- Canteen & Restaurant.

IInd SEMESTER

Sl. No.	Course Code	Course Name	S/L/Th/P (Hrs)		Credits	Marks			End Exam Duration
						I	E	T	Hours
1	AURAR 201	Theory of Architecture	Th	3	3	50	50	100	3
2	AURES 202	Environmental Studies	Th	4	4	50	50	100	3
3	AURAR 203	Building Materials-II	Th	3	3	50	50	100	3
4	AURCE 204	Strength of Materials	Th	3	3	50	50	100	3
5	AURAR 205	Basic Design-II	S	6	6	200	200	400	5
6	AURAR 206	Architectural Drawing and Graphics-II	S	6	4	50	50	100	5
7	AURAR 207	Building Construction-II	S	6	4	50	50	100	5
8	AURAR 211	Visual Graphics	P	2	2	100	-	100	-
9	AURAR 212	Workshop	P	3	3	100	-	100	-
Total				36	32	700	500	1200	

IInd SEMESTER

AURAR 201 THEORY OF ARCHITECTURE

Credits: 3

UNIT 1

Proportioning systems in Architecture- Vitruvian man and Golden Section, Le Modular of Corbusier and Japanese Ken Theory of Proportions, A brief introduction to fractal nature and self similarity in natural forms.

UNIT 2

Organising principles of architectural composition – symmetry, hierarchy, datum and axis – different types of spatial organizations of masses linear, centralised, radial, clustered, grid organization illustrations of buildings

UNIT 3

Use and need of ornamentation in architectural design, different types of ornamentation in buildings, polychromy in architecture.

UNIT 4

Use of different materials like brick, timber, stone, concrete, glass for aesthetic and structural purposes

UNIT 5

A brief introduction to the architectural philosophies behind the works of architects likes Frank Lloyd Wright, Corbusier and Mies Vander Rohe, etc. Organic architecture, functionalism, structuralism, purism, hi- tech. and concepts of sustainable architecture.

Recommended Books:

1. Francis D.K. Ching; *Architecture: Form, Space and Order*.
2. Prammar V.S.; *Design Fundamentals in Architecture*.
3. Sharma , B.K. *An Introduction to Environmental Pollution*, Goel Publication House , Meerut
4. Trivedi, P.R. *Encyclopedia of Ecology and Environment* , IIEE, New Delhi
5. Crosbie, Michael J., *Green Architecture*, Rockport Publisher, Massachusetts.
6. Kevin Lynch ;*Site planning*;MIT Press, Cambridge, MA – 1967

UNIT 1

Multidisciplinary nature of environmental studies & Natural Resources: Multidisciplinary nature of environmental studies Definition, scope and importance. Need for public awareness .Natural Resources: Renewable and non-renewable resources. Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

UNIT 2

Ecosystems and Biodiversity and its conservation: Concept of an ecosystem. Structure and function of an ecosystem.Producers, consumers and decomposers .Energy flow in the ecosystem.Ecological succession.Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem :- Forest ecosystem .Grassland ecosystem .Desert ecosystem. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)Biodiversity and its conservation Introduction – Definition : genetic, species and ecosystem diversity. Biogeographical classification of India Value of biodiversity : consumptive use, productive use, social, ethical, aestheticand option valuesBiodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity .Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

UNIT 3

Environmental Pollution Definition Cause, effects and control measures of :-Air pollution. Water pollution.Soil pollution.Marine pollution.Noise pollution.Thermal pollution.Nuclear hazards. Solid waste Management : Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.Diastermanagement : floods, earthquake, cyclone and landslides

UNIT 4

Social Issues and the Environment :From Unsustainable to Sustainable development Urban problems related to energy. Water conservation, rain water harvesting, watershed management.Resettlement and rehabilitation of people; its problems and concerns.CaseStudies. Environmental ethics : Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation..Consumerism and waste products.

UNIT5

Human Population and the Environment and Environment Protection Act and Field work: Population growth, variation among nations. Population explosion – Family Welfare Programme.Environment and human health.Human Rights.Value Education.

HIV/AIDS.Women and Child Welfare.Role of Information Technology in Environment and human health.Case Studies.Environment Protection Act.Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act Wildlife Protection Act Forest Conservation Act Issues involved in enforcement of environmental legislation. Public awareness.Field work. Visit to a local area to document environmental assets river/forest/grassland/hill/mountain. Visit to a local polluted site Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

Recommended Books:

1. Text book of environmental studies for undergraduates courses by ErachBharucha, Published by – University Grants Commission, Universities Press,India.
2. Text book of environmental studies for undergraduates courses by Benny Joseph Published by Tata McGraw Hill Publishing company limited.
3. Text book of environmental studies by Kaushik&Kaushik.
4. Agarwal,K.C.2001 Environmental Biology,NidiPubl.Ltd.Bikaner.
5. Brunner R.C., 1989,Hazardous Waste Incineration,McGraw Hill Inc.480p.

UNIT 1

Ferrous Metals: Pig iron, cast iron, wrought iron – types, properties, steel – properties, types and uses of steel in construction, properties of mild steel and hard steel, defects in steel.

Nonferrous Metals and Alloys: Aluminium, copper, lead, nickel, important alloys like brass, bronze, etc – brief description of uses. Corrosion of both ferrous and non-ferrous metals – types and preventive measures.

UNIT 2

Concrete: Compositions and grades of concrete. Various steps in concrete construction – batching, mixing, transporting, compacting, curing, shuttering, jointing. Light weight concrete, ready-mix concrete, and precast concrete.

UNIT 3

Use of Additive and Mixtures in Concrete: Water repellent, Waterproofing compounds, Accelerators, Air entraining agents. Hardeners, Workability increasing agent/plasticizer, Fly ash. Their availability and uses.

UNIT 4

Timber: Structure, defects in timber, decay of timber, qualities of timber for construction. Seasoning, storage and preservation of timber.

UNIT 5

Clay Products and Mud: Tiles, their properties and use - terra-cotta, earthenware, stoneware, porcelain, vitreous. Mud – its stabilization and uses.

Lime: Classification of lime. Fat and hydraulic lime – properties and use.

Recommended Books:

1. B. C. Punmia; *Building Materials and Construction* .Laxmi Publications Pvt Ltd, New Delhi,1993
2. Bindra&Arora; *Building Materials and Construction* .
3. W.B. Mckay, '*Building Construction*', Vol. 1,2,3 Longmans, U.K. 1981.
4. Arthur Lyons; *Materials for Architects and Builders- An Introduction*; Arnold, London 1997.

UNIT 1

Simple Stress and Strain: Introduction; Definition of stress; Normal stresses in axially loaded bars; Stresses on inclined sections in axially loaded bars; Shear stresses ; Allowable stress and factor of safety. Normal strain; Stress-strain relationships; Hooke's law; Poisson's ratio; Thermal strain and deformation; Deformation of axially loaded bars; Stress-strain relationship for shear, Generalized Hooke's law for isotropic materials; Relationship between Modulus of elasticity and Modulus of rigidity and Bulk modulus.

UNIT 2

Beams: Introduction; Diagrammatic conventions for supports and loads; Calculation of beam reactions; Application of method of sections; Shear force in beams; Bending moment in beams; Shear force and bending moment diagrams for a) Cantilever b) Simply supported and c) Over hanging beams; Differential equations of equilibrium for a beam element.

Normal stresses in beams: Introduction; Basic assumptions; the elastic flexure formula; application of flexure formula.

UNIT 3

Two-Dimensional state of Stress and Strain: The basic problem; Transformation of stresses in two dimensional problems; Principal stresses in Two-dimensional problems; Maximum shear stresses in two dimensional problems; Mohr's Circle of stress for Two-dimensional problems; Construction of Mohr's circles for stress Transformation.

UNIT 4

Shear stresses in beams: Introduction; Shear flow; the shear stress formula for beams; Shear stress in beam flanges; Shear centre, Unsymmetrical bending of beams.

Torsion: Introduction; Torque and Torsional element, Behaviour of a member under torsion, Torsion of circular shafts – Basic assumptions, the torsion formula, Strength of circular and hollow shafts, Design of circular shafts, shafts of varying sections, Power and torque, Bending moment and Axial Thrust in shafts.

UNIT 5

Buckling of columns: Introduction; Examples of instability; Criteria for stable equilibrium; Euler load for column with pinned ends; Euler loads for columns with different end restraints; Limitations of the Euler's formulae; Generalized Euler buckling load formulae; Eccentric loads and the secant formula.

Text Books:

1. Engineering mechanics of solids by E.P.Popov, Prentice Hall of India, 2005.
2. Strength of Materials By R. Subramanian, Oxford University Press

Recommended Books:

1. Mechanics of Materials by James M. Gere & Stephen P. Timoshenko, CBS Publishers & Distributors, New Delhi
2. P.N. Singer and P.K. Jha, Elementary mechanics of solids, New Age International Pvt.Ltd
3. Strength of materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd., 1998.
4. B.C. Purmia, Laxmi Publication; *Strength of Material and Theory of Structures* (Vol-I)
5. Timoshenko, S.P., and D. H. Young, *Elements of Strength of Materials*, Fifth edition, East West Press, 1993.

AURAR 205 BASIC DESIGN-II**Credits: 6**

Design of small objects with respect to function, structure and aesthetics.

- Importance of physical factors in architectural design e.g. orientation, ventilation, adequate protection from rain, dust, insects, etc. And the human dimensions in various postures, their relation to dimensioning of everyday utilities like the table, chair, sink etc., Concepts of Anthropometrics and Ergonomics.
- Design of small structures – street furniture, kiosks, clock towers, milk booth, cycle stand, shop etc. and objects of interest with respect to form and construction.
- Study and design of part of residential buildings, with respect to indoor and outdoor spaces of buildings. Detail layout with circulation pattern of residential components such as bathrooms, kitchen, bedroom etc.
- A small weekend cottage incorporating all the above concepts.
- Time problem should be of 7 hours duration.

Reference:

All books and journals on architecture.

UNIT 1

Building Geometry: Study of isometric, axonometric and oblique views Reduction and enlarging of large forms such as site plans, etc.

UNIT 2

Sciography: Practical examples in the study of shade and shadows, points, lines, surfaces, geometrical solids of various forms and groups of forms leading to advanced examples of shades and shadows on buildings or parts of buildings.

UNIT 3

Perspective: Examples in one point or parallel perspective, two point or angular perspective, introduction to three-point perspective.

UNIT 4

Rendering: Introduction to the rules of composition and perspective in architectural rendering, colour study, values, tones and general approach to rendering with water colour, poster colour ,pen and ink.

UNIT 5

Pencil rendering and monochrome and wash rendering etc. treatment of sky, clouds, landscape elements, human figures, foreground and surroundings, shadow projections in renderings.

UNIT 1

Lintels and Arches: lintels of wood, stone, brick; arches: terms defined, forms of arches, i.e. segmental, semi – circular, elliptical, three centred, flat and relieving arch, etc. rough and gauged arch.

UNIT 2

Wooden Doors: Definition of terms, Types of doors, Battened/ledged/Braced door, Flush door, Panelled door, Venetian door, etc.

UNIT 3

Wooden Windows: Types of windows, Details of window, Casement window, top and bottom hung glazed, pivoted, louvered window, corner, bay window, etc.

UNIT 4

Carpentry and joinery: Terms defined, mitring, ploughing, grooving, rebating, veneering. Various forms of joints in wood work, such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon, etc.

UNIT 5

Details of glazed door, window and ventilator with iron frame.

Fixing Detail of Collapsible Door, Rolling Shutter.

Recommended Books:

1. W.B. MacKay, '*Building Construction*', Vol. 1,2,3,4 longmans, U.K. 1981.
2. B. C. Punmia; *Building Materials and Construction* .Laxmi Publications Pvt Ltd, New Delhi,1993.
3. Bindra&Arora; *Building Materials and Construction*.
4. Francis D. K. Ching, *Building Construction Illustrated VNR, 1975*.
5. R.Barry. *The Construction of Buildings. Vol.1-Vol-IV, The English Language book society, Crosby Lockwood staples, London*.

AURAR 211 VISUAL GRAPHICS

Credits: 2

Gestalt theories of visual perception, figure and ground relationship and principles of grouping.

Significance of colour in architecture, Colour wheel, Colour shades and tints.

Composition with primary, secondary and tertiary colours.

Composition with complimentary, split and analogous colours.

Study of light and shade effects on simple objects.

Significance of textural quality of different materials.

Exercises in three dimensional massing, right angled massing, diagonal massing and spherical massing.

AURAR 212 WORKSHOP

Credits: 3

Introduction to model making: need; role of scale-models in design; general practices.

Essentials of model making: understanding of various tools and machines employed Use of tools and materials available for model making such as papers, mount boards, Plaster of Paris (POP), clay, thermocole, softwood etc.

Techniques of scale-modelling:use of different scales; templates; measuring aids; conventions followed.

Techniques for preparation of presentation models, simulation of various materials and textures such as wood, glass, aluminium, steel, bricks, roofing tiles, flooring, corrugated sheets etc.

Photography in built models, using lighting and natural background.

IIIrd SEMESTER

Sl. No.	Course Code	Course Name	S/L/Th/P (Hrs)		Credits	Marks			End Exam Duration
						I	E	T	Hours
1	AURAR 301	Climatology in Architecture	Th	3	3	50	50	100	3
2	AURAR 302	History of Western Architecture	Th	3	3	50	50	100	3
3	AURAR 303	Building Materials-III	Th	3	3	50	50	100	3
4	AURCE 304	Theory of Structures - I	Th	3	3	50	50	100	3
5	AURAR 305	Architectural Design-I*	S	9	6	200	200	400	10**
6	AURAR 306	Building Construction-III	S	6	4	50	50	100	5
7	AURAR 311	Computer Aided Design-I	P	3	3	100	-	100	-
8	AURAR 312	Climatology Lab	P	3	3	100	-	100	-
Total				33	28	650	450	1100	

NOTE:

*AURAR 305 Architectural Design-I, 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with one external member.

** Examination will be conducted for TWO days each of 5 Hrs. duration; the first day work of the students shall be retained in the sealed examination hall.

IIIrd SEMESTER

AURAR 301 CLIMATOLOGY IN ARCHITECTURE

Credits: 3

UNIT 1

Climate and Thermal Comfort

- Global climatic factors, elements of climate, classification & characteristics of tropical climates, site climate.
- Thermal balance of the human body, Thermal comfort indices.
- Relation of climatic elements to comfort, Bioclimatic chart.

UNIT 2

Solar Geometry & Design of Solar Shading Devices

- Apparent movement of the sun, and sun path diagram.
- Solar angles, Shadow angles, Solar shading masks.
- Significance of building orientation
- Effect of Landscaping on microclimate modification

UNIT 3

Heat Flow through Materials

- Thermal quantities – heat flow rate, conductivity (k-value) & resistivity
- Conductance through a multi-layered body, surface conductance, transmittance – calculation of U- value
- Periodic heat flow, Time lag and decrement factor.

UNIT 4

Ventilation and Day lighting

VENTILATION

- Air movement in and around buildings
- Basic objectives of ventilation
- Ventilation due to stack effect
- Ventilation due to pressure effect
- Combined ventilation due to pressure and stack effect

DAYLIGHTING

- Sources of light, significance of Day lighting
- Classification of Daylight, Daylight Factor and Sky Component.
- Day lighting in Tropics and hot dry climates and warm humid climates

UNIT 5

Design Principles for Different Climates

Building design & lay out planning considerations for various climates

Climatic design criteria for:

- Hot and dry climate
- Warm and humid climate
- Composite climate

Recommended Books:

1. O.H. Koenigsberger and others, *Manual of Tropical Housing and Building – Part I – Climatic Design*, Longmans, London, 1980.
2. B.Givoni, *Man, Climate and Architecture*, Applied Science, Banking, Essex, 1992.
3. Victor Olgyay, AladárOlgyay, *Design with climate: bioclimatic approach to architectural regionalism*, Princeton University Press, 1963.
4. M.Evans – *Housing, Climate and comfort* – Architectural Press, London, 1980.
5. Donald Watson and Kenneth Labs., *Climatic Design* – McGraw Hill Book Company – New York – 1983.

UNIT 1

Development of prehistoric and historic architecture

Egyptian Architecture

- a. Characteristic features
- b. Secular Architecture
- c. Mastabas.*Example: Mastaba of Thi, Sakkâra*
- d. Pyramids.*Example: Step pyramid of Djoser (Zoser), Sakkâra; Bent pyramid of Dahshur, Great pyramid of Cheops, Gizeh.*
- e. Temples. *Example: Temples of Khons and Karnak*

UNIT 2

Ancient West Asiatic Architecture

- a. Characteristic features
- b. Sumerian Architecture, Ziggurats.*Example: White Temple Warka*
- c. Babylonian Architecture.*Example: City of Babylon*
- d. Assyrian Architecture.*Example: City of Khorsabad*
- e. Persian Architecture.*Example: City of Susa*

UNIT 3

Classical Greek Period

- a. Characteristic feature of Aegean Architecture
- b. Hellenic period and Hellenistic period
- c. Greek orders.*Example: Doric, Ionic and Corinthian*
- d. The Acropolis at Athens. *Example: Parthenon, Propylaea.*
- e. Theatre, Stadium and Agora

UNIT 4

Classical Roman Period

- a. Characteristic feature of Etruscan and Roman Architecture
- b. Roman Orders. *Example: Doric, Ionic, Corinthian, Tuscan and Composite*
- c. Temples.*Example: Temples of Saturn and Pantheon*
- d. Basilica of Trajan, Baths (Thermae) of Caracalla
- e. Amphitheatre.*Example: Coliseum*
- f. Forum, Circus, Triumphal arch, Aqueduct, Bridge, Road Sewer and Fountain

UNIT5

Early Christian period

Characteristic feature

Basilican Churches.*Example: St. Peter, Rome*

Byzantine Period

Characteristic feature,

Example: Hagia Sophia

Romanesque Period

Characteristic feature

Example: Pisa Cathedral complex

Gothic Period

Early Gothic style and Late Gothic style

Example: Notre Dame, Paris

Recommended books:

1. Sir Banister Fletcher, *A History of Architecture*, University of London, the Antholone Press, 1986.
2. S. Lloyd and H.W. Muller, *History of World Architecture – Series*, Faber and Faber Ltd. London, 1986.
3. Hiraskar ;*The Great Ages of World Architecture*
4. Kenneth Frampton, *Modern Architecture: A Critical History*; Thames and Hudson, London, 1994.
5. Sigfried Gideon, *Space Time and Architecture: The growth of a New Tradition*, Hazard University Press, 1978.

UNIT 1

Plastics: Polymer types, thermo setting and thermo plastics, resins, common types of mouldings, fabrication of plastics, polymerization and condensation, plastic coatings. Composite materials, classification, properties and uses - linoleum, plastic coated paper, polythene sheets, reinforced plastic, plastic laminates and Poly Vinyl Chloride (PVC)

UNIT 2

Laminates and Veneers: Resin bonded plywood, types of laminates, laminated wood, insulating boards and other miscellaneous boards, veneers from different varieties of timber, their characteristics and uses, Medium Density Fibre (MDF) and High Density Fibre (HDF) boards.

UNIT 3

Glass: Sheet glass, plate glass, float glass, wired glass, laminated glass, obscured glass coloured glass, heat absorbing glass, etched glass, stained glass, tinted glass, glass block - their sizes and uses. Glazing putty.

UNIT 4

Paints and Distempers: Compositions of paints and their uses. Writing specifications for whitewashing, distemping, cement-based paints, oil emulsion paints, enamel paints. Uses of tar paints, aluminium paints.

Lacquers, Polishes and Varnishes: Method of application for lacquers, polishes and staining varnishes.

UNIT 5

Miscellaneous Materials: Properties and uses of Asbestos, cork, felt, mica, rubber, gypsum, sealants, heat and sound insulation materials.

Note: All the students should do a Market Survey on above listed building materials and a detailed report of the study should be submitted.

Recommended Books:

1. B. C. Punmia; *Building Materials and Construction* .Laxmi Publications Pvt Ltd, New Delhi,1993
2. Bindra&Arora; *Building Materials and Construction*.
3. W.B. Mckay, '*Building Construction*', Vol. 1,2,3 Longmans, U.K. 1981.

UNIT - I**Deflections of Beams:**

Introduction; strain-curvature and Moment-Curvature relation; Governing differential equation for deflection of elastic beams; Alternative differential equations of elastic beams; solution of beam deflection problem by Direct integration; Introduction to moment area method; Derivation of Moment area theorems; conjugate-beam method; slope and deflection of beams using moment area method and conjugate-beam method.

UNIT-II

Strain Energy; Strain energy due to normal stress, bending stress, shear stresses and torsion; Modulus of resilience, Maxwell's Reciprocal theorems, and Betty's law. Applications of Castigliano's theorem, Unit load method to find deflections in determinate a) beams b) Trusses.

UNIT III

Introduction to Arches; Analysis of two and three hinged arches of Parabolic and Circular shapes: Eddy's theorem, Bending moment, Normal thrust and radial shear due to concentrated load and uniformly distributed loads.

UNIT IV***Analysis of Indeterminate Structures:***

Analysis of Statically Indeterminate structures: Introduction, Degree of Indeterminacy of rigid joint and pin joint plane structures

Propped Cantilevers

Analysis of propped cantilever by method of consistent deformations.

Fixed Beams

Fixed moments for a fixed beam of uniform section for different types of loading; Effect of sinking of support; Effect of rotation of a support; Bending moment diagram for fixed beams.

Clapeyron's Theorem of Three Moments

Analysis of continuous beam by Clapeyron's theorem of three moments.

UNIT V

Analysis of Rigid joint plane structures: fixed beams, continuous beams and frames (second degree redundancy) using Energy methods. Analysis Trusses (up to second degree redundancy) using Energy Method

Text Books:

1. Pundit & Gupta, Structural Analysis, Tata McGraw Hill Publishing Company Ltd, New Delhi
2. Junarkar, Mechanics of structures, Charotar Book Stall, 2nd edition, 1957.
3. Structural Analysis By LS Negi, RS Jangid, TMH outline Series

Recommended Books:

1. Timoshenko and Young, Elementary Strength of Materials, Affiliated East West Press Pvt. Ltd, 5th edition, 1968.
2. Singer. F.L, Strength of materials, Harpe Collins Publishers India Ltd., Delhi.
3. Jain and Arya, Strength of Materials, Khanna Publishers, New Delhi.
4. Vazirani.V.N and Ratwani.M.M, Analysis and Design of Structures, Khanna Publishers, New Delhi.

AURAR 305 ARCHITECTURAL DESIGN - I

Credits: 6

The design issues to be addressed:

- Formulations of concept.
- Design methodology through bubble diagram.
- Interior volumes and space articulation through different materials.
- Understanding the climatic data & human behaviour in space planning.
- Integration of form and function.

The list of suggested topics to be covered as design problems:

Major Design Problem:

Kindergarten school, Primary health centre, Small residential building, Museum, Small resort, etc.

Minor Design/Time Problem:

Doctor's clinic, Small cafeteria, Highway restaurant, Architect's office, Departmental store, etc.

Viva voce

Final external Viva-Voce on all the design assignments done in the semester

Note: At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

Reference:

All books and journals on architecture.

UNIT 1

Flooring:Types of flooring, methods of laying, furnishing of floors with different floor finishes like cement, coloured cement, mosaic, terrazzo, tiles etc. special consideration for rubber, linoleum and PVC flooring, flag stone Flooring, parquet flooring.

UNIT 2

Foundation & Basement:Wall foundation, isolated and combined foundation in RCC. Raft foundation. Parts of pile foundation and its type, grillage foundation, construction detail of basement wall, Retaining wall, floor and foundation.

UNIT 3

Damp-Proofing:Definition, causes and effects of dampness. Materials, general principles and methods of damp-proofing.

Water-Proofing:Definition, reasons and preventive measures for water leakage. water-proofing of flat roofs. Methods for water-proofing: finishing, bedding concrete and flooring, mastic asphalt and jute cloth, use of water-proofing compounds.

Termite-Proofing:Definition, general principles and methods of termite-proofing.

UNIT 4

Wood Framing Detail:Details of joist, Girder, Bridging, Floor platform, Truss joints, different connections.

UNIT 5

Staircase:Layout and its construction details, Different elements of staircase, Types of staircase, Details of various types of staircase in wood, RCC and steel.

Text Books:

1. S.C.Rangwala, *Building Construction*, Charotar Publishing House Pvt. Ltd, India, 2010.

Recommended Books:

1. W.B. MacKay, '*Building Construction*', Vol. 1,2,3, Longmans, U.K. 1981.
2. B. C. Punmia; *Building Materials and Construction*. Laxmi Publications Pvt Ltd, New Delhi, 1993.
3. Bindra & Arora; *Building Materials and Construction*.

AURAR 311 COMPUTER AIDED DESIGN - I

Credits: 3

Creating two-dimensional architectural drawing with special emphasis on presentation and visualization using CAD applications.

- Introduction to AutoCAD.
- Getting started with AutoCAD.
- Starting with advanced sketching.
- Working with drawing aids.
- Editing sketched objects.
- Creating text and tables.
- Basic dimensioning, geometric dimensioning and tolerancing.
- Editing dimensions.
- Dimension styles, multi-leader styles and system variables.
- Adding constraints to sketches.
- Model space viewports, paper space viewports and layouts.
- Template drawings.
- Plotting drawings.
- Hatching drawings.
- Working with blocks.

Practice and preparation of 2D documentations based on class projects in the previous semester in Architectural Designs.

Details of task to be determined each semester by the individual instructor.

AURAR 312 CLIMATOLOGY LAB

Credits: 3

The course is designed to develop the awareness of the students on the problems faced due to the unwanted direct or indirect solar radiation penetration into the building, while the main idea of architect is to utilize daylight, to create visual links between indoor and outdoor, to let the direct solar radiation when radiation is required during under heated period of the year and to avoid solar radiation to enter the building during over heated period. The students will learn various solar control methods and their applicability.

Assignment 1

Function of different instruments with sketch:

- Wet and dry bulb Hygrometer
- Sunshine recorder
- Cup and counter anemometer
- Wind vane
- Rain guage
- Lux meter

Assignment 2

Psychometric chart to find the saturated point humidity, DBT & WBT

Assignment 3

Relation of climate elements to comfort the Bio-climatic chart and climatic evaluation by region.

Assignment 4

The motion of the Earth around the Sun.

Assignment 5

Stereographic projection / Sun path diagram.

Method of calculating solar altitude / Azimuth angle / Shadow angle

Assignment 6

Obstruction of the sky vault and shading mask.

Shadow angle and shadow angle protractor.

Assignment 7

External solar control

External shading devices

Assignment 8

Effective tempraturenomograph

Assignment 9

Daylighting for Tropics

Wind effects and air flow patterns

Assignment 10

Design considerations for

Hot and Dry Climate

Hot and Humid Climate

Composite Climate

Recommended Books:

1. O.H. Koenigsberger and others, *'Manual of Tropical Housing and Building (Part-I) Climatic design'*, Longmans, London 1974.
2. M. Evans; *'Housing, Climate and Control. Architectural Press'*, London,1980.
3. B.Givoni; *Man, Climate and Architecture. Applied science. Barking Essex. 1982.*
4. IS: 3362-1977, *Code of Practice for natural ventilation of residential building.*
5. Victory Olgyay, *'Design with Climate: Bio climatic approach to Architectural Regionalism'*, Van Nostrand Reinhold, New York, ISBN -0-442-01110-5

IVth SEMESTER

Sl. No.	Course Code	Course Name	S/L/Th/P (Hrs)		Credits	Marks			End Exam Duration
						I	E	T	Hours
1	AURCE 401	Surveying	Th	3	3	50	50	100	3
2	AURAR 402	History of Eastern Architecture-I	Th	3	3	50	50	100	3
3	AURAR 403	Building Economics and Sociology	Th	3	3	50	50	100	3
4	AURCE 404	Theory of Structures- II	Th	3	3	50	50	100	3
5	AURAR 405	Architectural Design-II*	S	9	6	200	200	400	10**
6	AURAR 406	Building Construction-IV	S	6	4	50	50	100	5
7	AURAR 411	Computer Aided Design-II	P	3	3	100	-	100	-
8	AURCE 412	Surveying Lab	P	2	2	100	-	100	-
Total				32	27	650	450	1100	

NOTE:

*AURAR 405 Architectural Design-II, 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with one external member.

** Examination will be conducted for TWO days each of 5 Hrs. duration; the first day work of the students shall be retained in the sealed examination hall.

IVth SEMESTER

AURCE 401 SURVEYING

Credits: 3

UNIT 1

Chain Surveying: Principles of surveying, linear measurements, equipment required, selection of station, obstacles in chaining, errors in chaining, chaining on sloping ground.

UNIT 2

Compass Surveying: Prismatic compass, components and uses, reduced and whole circle bearings, magnetic declination and dip, local attraction, compass traversing & balancing the closing error.

UNIT 3

Levelling: Dumpy level, temporary adjustments, reduction of levels, height of instrument and rise & fall methods, errors in levelling, curvature and refraction, reciprocal levelling, profile levelling, cross sectional levelling.

UNIT 4

Plane table Survey and Contouring: Equipment and methods of plane table survey, two point & three point problems, contouring, characteristics of contour lines, direct and indirect methods of contouring, interpolation of contours, uses of contours.

UNIT 5

Theodolite Surveying: Theodolite its temporary adjustments, measuring of horizontal and vertical angles, Theodolite traversing, balancing the closing error, Introduction to modern surveying equipments, Total Station, GPS, Aerial Photography, Digital Levels and Auto-Levels. (Preliminary information and use).

Recommended Books:

1. "Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
2. Duggal S K, "Surveying (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.
3. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
4. P. B. Shahani – Text of surveying Vol. I, Oxford and IBH Publishing Co – 1980
5. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
6. Chandra A M, "Plane Surveying", New age International Pvt. Ltd., New Delhi, 2002.
7. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., New Delhi, 2002.

UNIT 1

Indus valley civilization:Description, physical characteristics, ancient history, early culture, building resources, building techniques and processes.

UNIT 2

Buddhist architecture:Evolution & golden age; Rock cut Architecture – Stupas, Chaitya, Vihara, Pillars, Ajanta, Ellora, etc.

UNIT 3

Hindu Architecture: Development of temple from example like Ladh Khan Temple at Deogarh, Kailasanath, Bhattargaon Temple, Mundeshwari Temple etc.

UNIT 4

North Indian Temple Architecture:Architecture style of Orissan temple with examples.Khajuraho group of temples &Rajputana Temples at Gwalior and Vrindavan.Temple Architecture of Bihar and Bengal.Brick temples of eastern India.

UNIT5

South Indian Temple Architecture:Pallava, (exampleRathas) Chola, Pandyas, Madurai, Vijayanagar styles with few examples.

Emphasis should be on use of the structural techniques, stones, fine arts, and special features, use of landscape, water bodies and construction method employed.

Student to practice sketches and make a report and get it evaluated regularly.

Recommended books:

1. Brown, P. *Indian Architecture (Buddhist Hindu)* Vol. 1 Bombay 1942 & subsequent publications
2. Fergusson , J.A. *A history of Indian and Eastern architecture*, London 1876, revised 1891
3. Grover, S. *The Architecture of India, Buddhist & Hindu*, Sahibabad, 1980.
4. Michell,G, *The Hindu Temple* , London
5. Khare, Ajay, *Temple Architecture of Eastern India*, Shubhi Publications, New Delhi, 2005
6. Sterlin Henry, *Architecture of World, India*, Germany, ISBN-38228-9658-6.

ECONOMICS

UNIT 1

Micro Economics: The market, budget constraint, choice, demand and supply, uncertainties, equilibrium, technological constraints, profit maximization and cost minimization, monopoly and oligopoly, production welfare and public good.

Macro Economics: GNP, NNP, demand and supply, inflation, interest rate, employment, saving and investment, monetary and fiscal systems and policies.

UNIT 2

General discussions on various economic issues such as public versus private participation, equity, labour intensive versus capital intensive projects.

General economics of the basic inputs into building construction- land, labour, capital and materials. Financing for projects, sources costs and utility in financing. Agencies and institutions directly and indirectly influencing economic aspects of project.

SOCIOLOGY

UNIT 3

Definition, scope and use of sociology. Relation between sociology and architecture and its application.

Basic concepts of sociology: society, groups, community, association, institution, culture, civilization and personality in terms of their characteristics and types.

UNIT 4

Social structure of India: Caste and class, family and marriage, their characteristics.

Rural and Urban societies – their characteristics, features and problems like crime, slum and poverty.

UNIT 5

Social change: Biological, technological and cultural factors of social change.

Social aspects of housing and neighbourhood in the context of changing society and growing population.

Structure of decision making processes related to community projects.

Recommended Books:

1. Amos Rappoport, *House Form and Culture*
2. Wallis, Wilson D and Willey, M.M, *Textbook of Sociology, 1st ed., KhelSahitaya Kendra, New Delhi, 2001.*
3. Charon, Joel M. *The Meaning of Sociology, 6th ed., Prentice Hall, New Jersey, 1999.*
4. Thio, Alex. *Sociology: a brief introduction, 4th ed. Allyn and Bacon, Boston, 2000.*
5. Schaefer, Richard T. *Sociology: a brief introduction, 4th ed. McGraw Hill, Boston, 2002.*
6. Bilton, Tony and Oth. *Introductory Sociology, 3rd ed. Palgrave, New York, 1997.*
7. Stone, P.A. *Building Economy: Design Production and Organisation a synoptic view, 2nd ed., Pergamon Press, Oxford, 1976.*
8. Koutsoyiannis, A. *Modern Microeconomics, 2nd ed., ELBS with MacMillan Press, 1994.*
9. Nobbs, Jack and Hopkins, Ian. *Economics: a core text, 4th ed. McGraw-Hill, London, 1995.*
10. Teck, HoonHian and Oth. *Economics: theory and applications, McGraw-Hill, Taiwan, 1998.*
11. Dewett, K.K. *Modern Economic Theory, ShyamLal Charitable trust, New Delhi, 2005.*

UNIT 1**Slope Deflection Method**

Slope - deflection equations; Principles of the method; Applications of the method to the analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with sidesway.

UNIT 2**Moment Distribution Method**

Principles of the method; Application of the method to analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with side sway.

UNIT 3**Matrix methods of Analysis**

Flexibility and stiffness; Flexibility matrix; Stiffness matrix; Relationship between flexibility matrix and stiffness matrix.

Flexibility Method (Matrix Approach)

Analysis of continuous beams and rigid jointed plane frames (Single bay, single storey with vertical legs only) by flexibility method with matrix approach.

UNIT 4**Stiffness Method (Matrix Approach)**

Analysis of continuous beams, rigid jointed plane frames (Single bay, single storey with vertical legs only) and pin jointed plane frames (second degree of redundancy) by stiffness method with matrix approach.

UNIT 5**Plastic Behavior of Structures**

Idealized stress - strain curve for mild steel; Ultimate load carrying capacity of members carrying axial forces; Moment - Curvature relationship for flexural members; Evaluation of fully plastic moment; Shape factor; Collapse load factor; Upper and lower bound theorems; Collapse load analysis of indeterminate beams and single bay, single storied portal frames.

Text Books:

1. Structural Analysis By LS Negi, RS Jangid, TMH outline Series
2. Structural Analysis, a Matrix Approach by GS Pandit and SP Gupta, Tata McGraw-Hill

Recommended Books:

1. C.K. Wang, Statically indeterminate Structures
2. Weaver & Gere, Matrix Methods of Structural Analysis
3. J.S. Kinney, Indeterminate Structural Analysis, Naroja Publishing house, 1st Printing, 1987
4. GS Pandit, SP Gupta, R. Gupta, Theory of Structures-Vol. I and II, Tata McGraw-Hill, 2nd Reprint, 2003
5. Vazirani and Ratwani, Analysis of Structures Vol. II.
6. Limit Analysis of Structures by Manicka&Selvam

AURAR 405 ARCHITECTURAL DESIGN - II**Credits: 6****The design issues to be addressed:**

- Organization of functional activities in relation to user requirements and the site.
- Relating the system of horizontal and vertical circulation, open spaces, parking etc.
- Responding to socio-economic factors such as income levels, privacy, territoriality, interaction etc.
- Considering materials, structure and services in relation to the design proposal.
- Integration of plan forms and three dimensional compositions.
- Detailing for the physically handicapped and the elderly.

The list of suggested topics to be covered as design problems:

Major Design Problem:

Primary School, Students hostel, Holiday resort, Row houses, Residential apartment complex, Shopping Complex, etc.

Minor Design/Time Problem:

Artists' Exhibition Space, Small hotel, Housing for specific communities in urban and rural areas such as home for the aged, Fishermen's house, etc.

Viva voce

Final external Viva-Voce on all the design assignments done in the semester

Note: At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

Reference:

All books and journals on architecture.

UNIT 1

Roofs: Types of roof, parts of roof and roof truss. Flat roof with wood and RCC, simple jack arch, various type and spans of timber and steel roof truss.

UNIT 2

Roof Coverings: Technical terms, classification, various types of roof coverings. Rainwater gutter details.

UNIT 3

Domes and Shells: Various form of arches, domes, various geometrical forms of shell and plate structure construction detailing and methods of centring.

UNIT 4

Cladding: Details of cladding of wall with stone, tiles, timber and steel framing

UNIT 5

Large Span Structures: Types and forms of roofing in steel and RCC, their applications to factories sheds, halls, Hangers, canopies, North light roofing in steel and RCC, Patent Glazing, Coffered Slab, Flat Slab.

Text Books:

1. S.C.Rangwala, *Building Construction*, Charotar Publishing House Pvt. Ltd, India, 2010.

Recommended Books:

2. W.B. MacKay, '*Building Construction*', Vol. 1,2,3 longmans, U.K. 1981.
3. B. C. Punmia; *Building Materials and Construction* .Laxmi Publications Pvt Ltd, New Delhi, 1993.
4. Bindra&Arora; *Building Materials and Construction*.

AURAR 411 COMPUTER AIDED DESIGN - II

Credits: 3

Working on basic operations of three-dimensional architectural drawing with special emphasis on advanced CAD applications.

- Defining block attributes.
- External references.
- Advanced drawing options.
- Grouping and advanced editing of sketched objects.
- Data exchange & object linking and embedding.
- Technical drawing with AutoCAD.
- Isometric drawings.
- The user coordinate system (UCS).
- Three dimensional (3D) Modelling in AutoCAD.
- Creating solid models.
- Modifying 3D objects.
- Editing 3D objects.

Practice and preparation of 2D documentations based on class projects in the previous semester in Architectural Designs.

Details of task to be determined each semester by the individual instructor.

AURCE 412 SURVEYING LAB

Credits: 2

- Obstacles in chaining.
- Distance between two inaccessible points using compass.
- Compass traversing-closing error.
- Determination of reduced levels – height of instrument method.
- Determination of reduced levels – rise & fall method.
- Plane table traversing by radiation method.
- Measurement of horizontal angles by method of repetition.
- Determination of height of an object when base is accessible.
- Determination of height of an object when base is not accessible.
- Demonstration of total station.

Vth SEMESTER*

Sl. No.	Course Code	Course Name	S/L/Th/P (Hrs)		Credits	Marks			End Exam Duration
						I	E	T	Hours
1	AURAR 501	Architectural Acoustics	Th	3	3	50	50	100	3
2	AURAR 502	Water Supply & Sanitation	Th	3	3	50	50	100	3
3	AURAR 503	History of Eastern Architecture - II	Th	3	3	50	50	100	3
4	AURAR 504	Site Planning & Landscape Design	Th	3	3	50	50	100	3
5	AURCE 505	Concrete Structures	Th	3	3	50	50	100	3
6	AURAR 506	Architectural Design – III**	S	9	6	200	200	400	15***
7	AURAR 507	Building Construction - V	S	6	4	50	50	100	5
8	AURAR 511	Working Drawings – I****	P	6	4	100	-	100	Viva
Total				36	29	600	500	1100	

NOTE:

*Study tour of minimum two weeks duration is to be arranged to places of Architectural interests in India or abroad. Two staff members shall be deputed for this tour.

**AURAR 506 Architectural Design-III, 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with one external member.

*** Examination will be conducted for THREE days each of 5 Hrs. duration; the first & second days work of the students shall be retained in the sealed examination hall.

****AURAR 511 Working Drawings-I, 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with one external member.

AURAR 501 ARCHITECTURAL ACOUSTICS

Credits: 3

UNIT 1

Sound Engineering

Introduction to architectural acoustics - Characteristic and measurement of sound, frequency, intensity, decibel scale, auditory range, effects of sound on humans, loudness.

Room Acoustics

Acoustics and acoustical environment. Behaviour of sound in an enclosed space. Principles of geometrical acoustics, reverberation and reverberation time calculations – Sabine's formula and its interpretation, dead and live rooms.

UNIT 2

Design of Auditorium

Size, shape, sitting arrangement design criteria for speech and music, acoustical defects in an auditorium, sound foci and dead spots, acoustical correction design and modification techniques.

UNIT 3

Electro-acoustics

Introduction of Electro-acoustical systems, Unidirectional and Stereophonic sound system, Digital and Surround-sound systems, Design criteria for Theatres, Motion picture halls, Multiplexes, Home Theatre System, Conference Room.

Open air Acoustics

Free field propagation of sound, absorption from air and natural elements, effect of barriers, effect of landscape elements, thermal and wind gradient. Design of open-air theatre and planning of building. Reduction of noise by screening.

UNIT 4

Environmental Noise Control

Noise sources, air borne and structure borne sound, NC curve, Propagation of noise of mechanical operation and impact noise, sound transmission through wall and partition, Vibration isolation – control of mechanical noise, floating floor, wall, ceiling treatment.

Design Principles- reduction of noise at the source, Reduction of noise near the source. Application of sound absorption material, Reduction of noise by Town Planning and Regional Planning consideration.

UNIT 5

Acoustical Material

General description of acoustical materials - acoustical tiles, fibreboard, resonator absorption unit absorber, carpets, acoustical plaster, resilient packing composite materials, etc. – Their use, selection criteria and construction.

Recommended Books

1. A. B. Wood; *A Text book of sound.*
2. T. M. Yarwood; *Acoustics.*
3. Duncan Templeton; *Acoustics in The Built Environment.*
4. J E Moore; *Design for good Acoustics and noise control.*
5. K.A. Siraskar; *Acoustics in Building Design.*

UNIT 1

Water Supply: Sources of water supply, standards of purity and treatment of water, qualities of potable water. Domestic water distribution system, various kinds of water meters, capacity of over head tanks and pumping plants required, calculation of water consumption. Domestic water piping systems. Cold and hot water distribution within the building. Layout of water supply lines in a domestic house. Water supply to high rise buildings: problems encountered and systems adopted.

UNIT 2

Sewerage: Characteristics of sewage, Quantity of sewage and storm water, infiltration, runoff calculation, Manning's formulae, partial flow diagram. Design of Sewers, shapes of sewers, factors affecting the design of sewers. Materials and joints used in sewer systems. Sewage treatment-(self- Purification), Disposal of sewage from isolated building, sewage breakdown. Details of a Septic tank and capacity calculation.

UNIT 3

Sanitation: Basic principles of sanitation and disposal of various kinds of waste matter from building. Brief description of various systems of sewage disposal and their principles. Plumbing definitions and related terms, plumbing systems (one pipe, two pipe etc), House drainage system, Drainage of sub-soil water. Manholes, Sub drains, culverts, ditches and gutters, drop inlets and catch basins, roads and pavements, storm overflow/regulators.

UNIT 4

Plumbing and Sanitary Appliances: Specifications and sketches of sanitary fittings like wash basins, water closets, urinals, bidets, sinks, etc for buildings. Uses of different valves like gate valves, float valves, flap valves, ball valves, flush valves, etc, different types of taps, faucets, stop cocks, bib cocks, and 'P', 'Q', 'S', floor and bottle traps used in buildings.

UNIT 5

Design of Plumbing Systems: Design considerations on drainage scheme. Preparation of plan, Planning of bathrooms, lavatory blocks and kitchen in domestic and multi-storeyed buildings.

Indian standards for sanitary conveyance. Model bye laws regarding sanitation of buildings. House/service connection. Manholes and septic tanks in relation to buildings. Intercepting chambers, inspection chambers and their proper location and ventilation of sewers. Laying and testing of sewer. Gradients used in laying of drains and sewers, and respective sizes.

NOTE: The treatment of the course will be mainly descriptive along with tutorial assignments related to the architectural designs already prepared by the students and also planning and layout of water supply and sewerage system plan.

Recommended Books:

1. B. C. Punmia; *Water Supply and Sanitation*.
2. S.C. Rangwala, *Water Supply and Sanitary Engineering*, Charoter Publishing House.
3. C.S, Shah; *Water supply and Sanitation Engineering*. Galgotia Publications.
4. B.S. Birdie, *Water supply and Sanitary Engineering*, Dhanpat Rai and Sons.
5. National Building Code of India.

UNIT 1

Introduction – Rise of Indo-Islamic Architecture

- Special features of Mosque
- Special features of Tomb
- Influences of Indo-Islamic Architecture in India
- Use of arches, vaults, domes, squinches, pendentives, jaalis, minarets, etc.
- Special features – use of landscape, water bodies and gardens.

UNIT 2

Sultanate Architecture

- Slave Dynasty
- Tughlaq Dynasty
- Lodhi Dynasty

UNIT 3

Provincial Styles of Sultanate Period

- Punjab, Bengal, Jaunpur, Gujarat, Malwa, Bijapur and Golconda with examples

UNIT 4

Mughal Style prevalent during the reign of

- Babur
- Humayun
- Akbar
- Jahangir
- Shah Jahan

UNIT 5

Nawabi Architecture of the Post Mughal Period,

- Awadh (Lucknow)
- Hyderabad
- Punjab

Rajputana Architecture and revival of Indian architecture under British patronage.

Recommended Books

1. Asher Catherine, *Architecture of Mughal India*
2. Sterlin Henry, *Architecture of World, India (Islamic)*, Germany ISBN– 38228-9658-6
3. Tadgell Christopher, *The History of Architecture in India*, London 1990
4. George Michell ;*Architecture of the Islamic World — (its history and social meaning)*, Thames and Hudson, London, 1978.
5. Robert Hillenbrand,;*Islamic Architecture, Form, Function and Meaning*, Edinburgh University Press, 1994.
6. Brown Percy, *Indian Architecture (Islamic Period) VolIII* ;Taraporevala and Sons, Bombay, 198; and subsequent publications

7. G.H.R. Tillotson – The tradition of Indian Architecture Continuity, Controversy – Change since 1850, Oxford University Press, Delhi, 1989.

AURAR 504 SITE PLANNING AND LANDSCAPE DESIGN

Credits: 3

UNIT 1

Site Planning Process: Need, Definition, scope and relationship in between site planning & landscape Architecture. Site Analysis, Analysis of all natural and man-made factors of site.

UNIT 2

Evolution of Garden Design: A brief study of different garden types: Principles of Persian gardens, Mughal gardens, Spanish Gardens, Italian Gardens, French Gardens, English Gardens, Japanese gardens.

UNIT 3

Visual and Function role of trees in Landscape design, Landscaping design for microclimate modification, Role of water in landscape design. Principles of Xeriscape, Landscaping for water conservation, Berms and landforms, Roadside plantation and planting for noise reduction.

UNIT 4

Plant selection criteria, Plant characteristics: Structure, form and foliage of various trees and shrubs, climbers and groundcovers. Study and identification of tropical plants and trees through field studies.

UNIT 5

Man made Elements of Landscape: Hard and soft landscaping, street furniture, lighting fixtures, signage and sign boards, fences, paving materials, surface drainage, design of rock garden and terrace garden, Indoor landscaping.

Exercise: Landscape Design for any one of the Architectural Design problems.

Recommended books:

1. Kevin Lynch ;*Site planning* ;MIT Press, Cambridge, MA – 1967
2. J. O. Simonds; *Landscape Architecture*; McGraw Hill.
3. J. E. Ingels; *Landscaping – Principles and Practice*.

UNIT 1

Introduction to Concrete technology and steel: Composition of concrete, properties, grade of concrete, Introduction to mix design, Characteristic strength, durability, modulus of rigidity, stress-strain diagram of concrete. Types, sizes and grades of steel, stress-strain diagram of steel. Introduction to working stress, ultimate load and limit state methods.

UNIT 2

Limit state method: Flexure of RCC beams of rectangular section. Under reinforced, balanced and over-reinforced sections. Analysis and design of singly and doubly reinforced beams of rectangular sections. Design of T-beams: Effective flange width. Analysis and Design of T-Beams.

UNIT 3

Shear, Torsion and Bond: Limit state of collapse in shear, types of shear failures, Truss analogy, shear, span/depth ratio, Calculation of shear stress, types of shear reinforcement, Design for shear in beams. Analysis for torsional moment in a member. Torsional shear stress in rectangular sections. Reinforcement for torsion in RC beams. Concept of bond, development length, anchorage.

UNIT 4

Design of one-way and two-way slabs (using IS 456): Design of simply supported slabs on four sides with and without torsional reinforcement at corners. Design of two-way slabs with different edge conditions (with torsion at corners). IS code provisions. Introduction to Flat Slabs

UNIT 5

Columns: Short columns, minimum eccentricity, column under axial compression. Analysis and design of short columns coursed to uniaxial moment. Analysis and design of short columns coursed to bi-axial moments.

Footings: Types of footings. Distribution of base pressure. General Design considerations for footings. Design of Isolated rectangular and square footing,

Note:

1. All the Design of Concrete Structural Elements must be based on "Limit State Method"
2. Students are allowed to bring IS 456: 2000 and SP-16 in the examination hall for referring the design solutions.

Recommended Books:

1. Pillai&Menon, Reinforced Concrete Design, Tata Mc.Graw Hill, Second edition, 6th Reprint 2005.
2. A.K.Jain, Reinforced Concrete Design (Limit state design)–Nem Chand & Bros, Roorkee, 6th edition 2002.
3. P.C.Verghese, Limit State Design of Reinforced Concrete, Prentice hall India, 2nd edition, 2003.
4. S.N.Sinha, Reinforced Concrete Design, Tata Mc.Graw Hill, 2nd edition, 2nd reprint 2000.

List of IS Codes

- 1) IS 456:2000: Plain and Reinforced concrete code of practice
- 2) SP-16: For Design of Columns only

AURAR 506 ARCHITECTURAL DESIGN - III

Credits : 6

- Design theory and application in more complex problems covering functional relationship, climatic condition, social aspects along with structural considerations and **basic building services**.
- Design Programme prepared by the students should take into account relevant building bye-laws and provision of **National Building Code**:
- The broad parameter for the design assignments are:

Main Design Problem (approx. 9 classes/week):

1. Any one of the following: Commercial – cum – Residential complex (high rise) /Town Hall & Civic Centre (8 weeks)
2. Exhibition Pavilion / Country Club house (5 weeks)

Design (Time) Problem (8 hrs.)

Any one of the above, not covered in the class.

Viva voce

Final Viva-vice on all the design assignments done in the semester.

Reference:

All books and journals on architecture.

UNIT 1: FORMWORK, SHORING, UNDERPINNING, SCAFFOLDING

Types of formwork, Formwork for various construction elements, Removal of formwork, Types of Shoring, Methods of underpinning, Types of Scaffolding.

UNIT 2:SUSPENDED CEILINGS

Methods of suspended framing materials like – timber, pressed steel, aluminium, different covering materials – acoustical board, gypsum board, PVC tiles etc. special consideration of fire and acoustical insulation.

UNIT 3: THERMAL INSULATION

Basics of Heat transfer, Thermal insulation materials and general methods, Thermal insulation of Roofs, Exposed walls, Exposed doors and windows, Cavity construction for thermal insulation.

UNIT 4: SOUND INSULATION

Basics of Sound transmission, different types of sound absorbents, different methods of sound insulation, cavity construction for sound insulation.

UNIT 5: EXPANSION AND CONSTRUCTION JOINTS

Provision of joints in buildings, types of joints: expansion joints, isolation joints, contraction joints, sliding joints, construction joints, and floor joints; materials and methods for provision of these joints at various locations of the buildings.

Reference Books:

1. W.B. MacKay, '*Building Construction*', Vol. 1,2,3,4, Longmans, U.K. 1981.
2. B. C. Punmia; *Building Materials and Construction*. Laxmi Publications Pvt Ltd, New Delhi, 1993.
3. Bindra & Arora; *Building Materials and Construction*.
4. Francis D. K. Ching, *Building Construction Illustrated VNR, 1975*.
5. R. Barry. *The Construction of Buildings. Vol. I-Vol-IV, The English Language book society, Crosby Lockwood staples, London.*

AURAR 511 WORKING DRAWINGS - I

Credits: 4

Explanation and demonstration of basics in working drawings, study of process and symbols, labelling and dimensioning of working drawings.

Building construction drawings to be prepared as a part of contract document with proper labelling and dimensioning techniques.

Prerequisites: Sessionals, Architectural Detailing

- Layout plan of the whole complex and excavation plan of one building
- Foundation plan
- Ground floor plan along with schedule of internal finishes
- Upper floor plans along with schedule of internal finishes
- Terrace / roof plan including roof drainage
- All 4 side elevation with labelling of one building
- Minimum 2 sections including one through staircase and toilets
- Door, window and hardware schedule.
- Municipal Submission Drawings.

VIth SEMESTER

Sl. No.	Course Code	Course Name	S/L/Th/P (Hrs)		Credits	Marks			End Exam Duration
						I	E	T	Hours
1	AURAR 601	Estimating, Costing & Specifications	Th	3	3	50	50	100	3
2	AURAR 602	Mechanical & Electrical Services	Th	3	3	50	50	100	3
3	AURAR 603	Contemporary Architecture	Th	3	3	50	50	100	3
4	AURCE 604	Steel Structures	Th	3	3	50	50	100	3
5	AURAR 605	Housing	Th	3	3	50	50	100	3
6	AURAR 606	Architectural Design – IV*	S	9	6	200	200	400	15**
7	AURAR 611	Working Drawings – II***	P	6	4	100	-	100	Viva
8	AURCE 612	Structural Design (R.C.C.)****	P	3	3	100	-	100	Viva
Total				33	28	610	490	1100	

NOTE:

*AURAR 606 Architectural Design-IV, 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with one external member.

** Examination will be conducted for THREE days each of 5 Hrs. duration; the first & second days work of the students shall be retained in the sealed examination hall.

***AURAR 611 Working Drawings-II, 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with one external member.

****AURCE 612 Structural Design (R.C.C.), 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with one external member.

UNIT 1

Introduction to Estimation & Costing For Building

1. Definition of “Building estimate”
2. Purpose of Estimating.
3. Different Types of Estimate.

Approximate Estimate

1. Importance & purpose of Approximate / Rough estimation
2. Different methods of approximate estimate

UNIT 2

Detailed Estimate

1. Preparation of Detailed estimate.
2. Function of “Measurement form” & “Abstract of estimate form”.
3. Description & significance of Item in BOQ.

UNIT 3

Methods of Measurement of Works

1. Different methods estimating building works.
2. Estimation of a simple building at different stages:
 - Foundation up to plinth
 - Superstructure
 - Finishing works
3. Reinforcement Quantities for RCC Works.
Calculation of quantity for Reinforced concrete(RC) for:
Column, Lintel, Slab & Beam.

UNIT 4

Analysis of Rate & Quantity of Materials

1. Purpose of Rate analysis.
2. Quantity of Materials.
3. Different components of rate

UNIT 5

General Specifications& Types of Contract

1. General idea of specifications of composite works in a building.
2. Types of Tender / contract and their reflection in BOQ.
3. Writing Items for BOQ for Item rate contract.

Reference Books:

1. M. Chakraborty; *Estimating, Costing, Specification & Valuation.*
2. B.N. Dutta; *Estimating & Costing.*
3. P. N. Khanna. *Handbook of Civil Engineering.*

UNIT 1**Electrical Services:**

Electrical systems-Basics of electricity- single/three phase supply-protective devices in electrical installations-Earthing for safety-Types of earthing-Types of wires, wiring systems & their choice -Planning electrical layout for a building-Main and distribution boards. Layout of substation.

UNIT 2**Lighting & Illumination:**

Classification of lighting, artificial light sources,Spectral energy distribution, luminous efficacy, Design of modern lighting- Lighting for stores, schools, hospitals and house lighting. PSALI.

Illumination: Principles of illumination- visual tasks- Factors affecting visual tasks-Luminous flux, Candela, solid angle illumination-utilization factor-depreciation factor-Laws of illumination.

UNIT 3**Ventilation:**

Definition and necessity, Requirements of air changes for different building occupancies, Functional requirements of Ventilation systems, Systems of Ventilation, Mechanical/Artificial Ventilation.

UNIT 4**Air-Conditioning and Thermal Insulation:**

Thermal insulating materials and their coefficient of thermal conductivity, general methods of thermal insulation: Thermal insulation of roofs, exposed walls.

Principles of air conditioning, air cooling, different systems of ducting and distribution, essentials of air-conditioning system.

UNIT 5**Vertical transportation:**

Building design and vertical transportation, Demand for vertical transportation

- Lift and Escalators: types, uses, functioning, automatic control system.
- Plans & sections to explain different parts of lifts and escalators.
- Planning for vertical transportation
-

Exercise: Preparation of electrical layout of a simple residential building.

Recommended books:

1. Derek Philips; *Lighting in Architectural Design*.
2. G.K.Lal, *Elements of Lighting*, 3-D Publishers.
3. R.G. Hopkinson and J.D.Kay, *The lighting of buildings*, Faber and Faber, London, 1969.
4. Philips *Lighting in Architectural Design*, McGraw Hill, New York, 1964.
5. I.E.S. Handbook.

6. International Lighting Review – Quarterly Journal.
7. E.R. Ambrose, *Heat Pumps and Electric Heating*, John Wiley and Sons Inc, New York, 1968.
8. Handbook for Building Engineers in Metric Systems, NBC, New Delhi, 1968

AURAR 603 CONTEMPORARY ARCHITECTURE

Credits: 3

UNIT 1

Introduction, Advent of Steel , Glass and Ferro-concrete

- Advent of Steel: James Bogardus, Henry Labrouste
- Great Exhibitions and their contributions
- Gustave Eiffel
- Development of Ferro concrete: Auguste Perret, Tony Garnier

UNIT 2

Development of ‘New Art & Architecture’

- Art Nouveau movement: Victor Horta, Otto Wagner, Antonio Gaudi
- H.P. Berlage, H. H. Richardson and ‘True Construction’
- Balloon Frame Structure and Plane Surfaces in America

Chicago School & Organic Developments

- Chicago School: Louis Sullivan
- Organic Architecture: Frank Lloyd Wright

UNIT 3

Functionalism in Architecture

- Walter Gropius and Bauhaus
- Le Corbusier

Development of International Style

- Mies van der Rohe
- Philip Johnson
- Louis I Kahn

UNIT 4

20th Century World Architecture

- Works of some master architects like, Eero Saarinen, Alvar Aalto, Oscar Niemeyer, Richard Neutra, Norman Foster, Frank O. Gehry, I. M. Pei, Kenzo Tange.

UNIT 5

Indian Architecture since Independence

- B. V. Doshi
- Charles Correa
- Raj Rewal
- A. P. Kanvinde
- Laurie Baker
- Iconic Buildings in India

Recommended books:

1. Sigfried Giedion ; *Space, time and Architecture*.
2. Vincent Scully Jr; *Modern Architecture*.
3. Vikram Bhatt and Peter Sciver; *After the masters (Contemporary Architecture of India)*.
4. Kenneth Frampton; *Modern Architecture*.
5. Library of Contemporary Architects.

AURCE 604 STEEL STRUCTURES**Credits: 3****UNIT 1****General:**

Fundamental Concepts of design of structures, Use of Tubular, Square, Rectangular rolled steel sections in steel structures. Stress Strain relationship for steel.

Bolted connections: Failure of a joint, Strength and efficiency of a joint, Lap Joint, Butt joint and Eccentric connections.

UNIT 2**Welded Connections:**

Types of welds, stresses in welds, Design of welded joints subjected to axial load, Eccentric welded connections.

UNIT 3**Tension Members:**

Allowable stress in axial tension, net effective sectional area for angle and Tee sections, Design of tension members, Lug angles.

UNIT 4**Compression Members:**

Effective length, radius of gyration and slenderness of compression members, Allowable stresses in compression, Design of axially loaded compression members, Built up compression members (I Section & two channels) Laced and Battered columns, eccentrically loaded columns, Column splices.

UNIT 5**Beams:**

Allowable stresses in bending, shear and bearing, Effective length of compression flange, laterally supported and unsupported beams, Design of plated beams, Design of rivets connecting cover plates with the flanges of beams.

* All the designs conforming to latest revised code of IS-800 (2007).

Note:

Students are allowed to bring IS 800 in the examination hall for referring the design solutions.

Recommended books:

- 1) S.K.Duggal, Design of Steel Structures – Tata McGraw Hill
- 2) S.S.Bhavikatti, Design of Steel Structures – I.K.International Publishing House Pvt. Ltd

References:

- 1) N.Subramanian, Design of Steel Structures, Oxford University Press
- 2) K.S.Sai Ram, Design of Steel Structures, Pearson Education
- 3) Limit State Design of steel structures IS:800-2007-V.L.Shah and Veena Gore, Structures Publications, Jai – Tarang, 30 Parvati, Pune
- 4) Ramachandra, Design of Steel Structures, Standard Book

AURAR 605 HOUSING

Credits: 3

UNIT 1

Housing need & Demand - Review of different forms of housing globally, Housing Density, Calculation of future need. Housing resources and options available in housing.

UNIT 2

Housing Agencies and Policies:Housing Agencies and their contributions to housing development - HUDCO, State Housing Boards, Housing Co-operatives and Banks. Housing Policies in India and other countries like UK & USA.

UNIT 3

Socio Economic Aspects: Social factors influencing Housing Design, affordability, economic factors and housing concepts - Slum upgradation, and sites and services schemes, Public Private Partnerships related to Housing.

UNIT 4

Housing standards: Different types of Housing standards - Methodology of formulating standards - Relevance of standards in Housing Development.

UNIT 5

Housing design process: Different stages in project development - Layout design including utilities and common facilities - Housing design as a result of environmental aspects, development of technology and community interests.

Case studies of Public Sector housing, Government housing, Private and Co-operative housing - their advantages and disadvantages.

Project Report and Appraisal.

Recommended books:

1. Babur Mumtaz and Patweikly, *Urban Housing Strategies*, Pitman Publishing, London, 1976
2. GeoffreyK.Payne, *Low Income Housing in the Development World*, John Wiley and Sons, Chichester, 1984
3. John F.C.Turner, *Housing by people*, Marison Boyars, London, 1976
4. Martin Evans, *Housing, Climate and comfort*, Architectural Press, London, 1980

5. *Forbes Davidson and Geoff Payne*, Urban Projects Manual, Liverpool University Press, Liverpool, 1983.
6. Beureau of Public Enterprises.

AURAR 606 ARCHITECTURAL DESIGN - IV

Credits: 6

- Design theory and application in the problems covering functional relationship, climatic condition and social aspects along with structural considerations. The project should also include all types of **building services** required for modern buildings and a **complete report**.
- Design Programme prepared by the students should take into account relevant building bye-laws and provision of **National Building Code**:
- The broad parameter for the design assignments are:

Main Design Problem (approximately 9 classes/week)

3. Sports Complex / Three star Hotel (7 weeks)
4. Auditorium(1000 Capacity) / Amusement park (5 weeks)

Design (Time) Problem (6 hrs.)

Any one of the above, not covered in the class

Viva voce

Final Viva-vice on all the design assignments done in the semester

Note:

Design programme prepared by the students should take into account applicable building bye-laws and provisions of building bye-laws.

Reference:

All books and journals on architecture.

AURAR 611 WORKING DRAWINGS - II

Credits : 4

Objectives

Building construction drawings to be prepared as a part of contract document with proper labelling and dimensioning techniques.

Prerequisites: Working Drawing I, Architectural Detailing.

- External finishes of all types included in the complex; the drawings shall include all details required. Development of 'skin sections'.
- Details of toilets including plan, elevation, sections.
- Details of kitchen including plan, elevation, sections.
- Layout of sanitary and plumbing lines on site and connection with the main sewer/ septic tank.
- Electrical layout of a typical floor including specification of fixtures.
- Details of lift pit, lift shaft and lift machine room.
- Site plan of the whole complex including landscaping layout and few chosen details.
- Specific details required in the building complex.
- Details of Sub-Cellars, Ramps, Retaining Walls.

Mode of Drawings: Manual and Mechanical.

AURCE 612 STRUCTURAL DESIGN (R.C.C)

Credits: 3

Typical design of different R.C. Structural components: Beam, Slab, Column, Stair case and Foundation.

Design Exercise: Complete Analysis and Design of a R.C Frame building, under different types of load combinations.

Seminar presentation on various aspects of Reinforced concrete structures.

IS Codes:

1. IS 456: 2007.
2. SP-16
3. SP-34

Note:

Same IS-Code and books should be referred as mentioned in the theory course

VIIth SEMESTER*

Sl. No.	Course Code	Course Name	S/L/Th/P (Hrs)		Credits	Marks			End Exam Duration
						I	E	T	Hours
1	AURAR 701	Advanced Construction & Materials	Th	3	3	50	50	100	3
2	AURAR 702	Advanced Structural Systems	Th	3	3	50	50	100	3
3	AURAR 703	Advanced Services	Th	3	3	50	50	100	3
4	AURAR 704	Building Construction & Management	Th	3	3	50	50	100	3
5	AURAR 705	Introduction to Town Planning	Th	3	3	50	50	100	3
6	AURAR 706	Architectural Design – V**	S	12	8	200	200	400	20***
7	AURAR 711	Pre- Thesis Seminar	P	3	3	100	-	100	-
8	AURAR 721	Urban Design	Th	3	3	50	50	100	3
	AURAR 722	Interior Design							
	AURAR 723	Vernacular Architecture							
	AURAR 724	Research Methodology							
Total				33	29	600	500	1100	

NOTE:

*Study tour of minimum two weeks duration is to be arranged to places of Architectural interests in India or abroad. Two staff members shall be deputed for this tour.

**AURAR 706 Architectural Design-V, 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with one external member.

*** Examination will be conducted for FOUR days each of 5 Hrs. duration; the first, second & third days work of the students shall be retained in the sealed examination hall.

AURAR 701 ADVANCED CONSTRUCTION AND MATERIALS

Credits: 3

Objectives of course:

To introduce the students to the latest developments in construction and building materials. Students should be able to grasp the construction Techniques and their adoptability to architectural forms.

UNIT 1

Advanced Construction Methods: Pre-stressed concrete beams slabs frames, lift slab construction, post tensioning, multi-storied building frames, circular slabs and beams. Uses of surface finishes of cement.

UNIT 2

Pre-Engineered (Pre-Cast) Concrete: Folded plates like V-type, trough type, pyramidal, prismatic and RCC geometrical staircases, hyperbolic paraboloids,

UNIT 3

Study of space frames, suspended roofs, membrane structures, cable structures. Study of Pre-engineered building systems (steel), various components, forms and their advantages.

UNIT 4

Curtain walls: types of curtain walls, components, structural solutions, construction and erection. glass wall system-glass; sheet metal wall systems sheet metal cladding, architectural skins.

UNIT 5

Advanced Building Materials: Synthetic boards, fire proof/ resistant boards/tiles, acoustic materials, composite panels and their applications, non- load bearing gypsum blocks, Polycarbonate sheets, Aluminum Composite Panels, Stainless Steel, High Density Fibre boards, Ready-Mix Concrete, Lightweight Concretes, Green Building construction materials.

Recommended Books

1. James Ambrose, *Building Construction Enclosure System*.
2. Andrea Deplazes (Ed), *Constructing Architecture: Materials processes structures- A Hand Book Second Extended edition*.
3. Robert E Fischer, *Engineering for Architecture 1989*.
4. R Barry, *The construction of Buildings Volume 4, 4th Edition*.
5. Schall, Rolf. *Curtain Walls: Design Manual. Reinhold Pub., New York, 1962*.

Objectives of the Course:

- To inform the students about the recent developments in structural forms.
- To increase the student's ability to identify the structural forms suitable for architectural expression.

UNIT 1

Construction and form, Structure and Form Equilibrium under simple tension or compression, the catenary and the arch, the simply supported beam, the domical shell.

UNIT 2

Structural elements: Beams and slabs Arches and catenaries; vaults, domes and curved membranes; Trusses, Portal frames and space frames.

Relation between structure and architecture, Geometry of form and structural function, Aesthetic theories of the expression of structural function in architectural form.

UNIT 3

Skeletal Structural Systems: single and double layer grids, space-frames, braced domes, ribbed domes, Network domes, Lamella domes, Geodesic domes, Braced and folded grid structures.

UNIT 4

Folded plates, shells, cycloidal shells, Hyperbolic paraboloids, free forms.

UNIT5

Tensile Cable and Membrane Structures: Cable structures: Singly curved suspended roofs, combination of cables and struts.

Guest Lectures by Faculty of Civil Engineering.

Recommended Books:

1. Candela, Felix. Architecture and Structuralism. 1963.
2. Lane, Allen. Developments in Structural Form. Penguin Books Ltd, London, 1975.
3. Macdonald, J. Angus. Structure and Architecture, 2nd ed. Architectural Press, Oxford, 2003.
4. Michaels, Leonard. Contemporary Structures in Architecture. 1950.
5. Schall, Rolf. Curtain Walls: Design Manual. Reinhold Pub., New York, 1962.
6. Siegel, Curt. Structure and Form in Modern Architecture. Crosby Lockwood and son Ltd., London, 1962.
7. Subramanian, N. Principles of Space structures. Wheeler and Co., Allahabad, 1983.
8. Zannos, Alexander. Form and Structure in Architecture: The role of statical function. Van Nostrand Reinhold Co., New York, 1987.

Objectives of the Course:

To develop understanding of special services, definitions and terms used, working of equipment, installation of facility, special provisions to be made in building design.

UNIT 1

Special services in High rise buildings: Types of lifts, Passenger, Capsule, Hospital bed lift, goods lift etc. Working and operation of lifts, parts of lifts; industry standards and capacity calculations. Provisions to be made in buildings for installation, Introduction to working and design of escalator. Cooking gas distribution in High-rise buildings.

UNIT 2

Electronic Systems in Buildings: Telephone and communication, networks in buildings EPABX, Security systems, Burglar alarms, video surveillance, access control, design of computer labs, access flooring, server rooms, DTH Internet and Television Network.

UNIT 3

Fire Safety in buildings: portable fire fighting equipment, NBC standards, built in wet riser system, sprinkler system, fire hydrant, class of fire and occupancy, Fire safety design, planning for fire protection, Fire detection & fire fighting, Different fire fighting methods to be adopted in buildings.

UNIT 4

Swimming Pools: Pool tank design, patio, finishes, Water circulation, cascades, channels, filtration and water treatment, Water quality and disinfection, balancing tank.

Hotel services: Specialty services required for hospitality industry, Laundry services, Kitchen services, Channeled Music, Internet.

UNIT 5

Environmental services: waste generation in Industrial buildings, various types of waste, solid, liquid, gas, treatment and disposal facilities, waste generation in hospital buildings, design provision for its disposal,

Alternative energy sources for buildings: hot water solar energy system, applications of photo voltaic cells, biomass digesters, wind energy.

Recommended Books

1. Faber, Oscar and Kell, J.R. *Heating and Air-Conditioning of Building. Architectural Press, Surrey, 1945.*
2. Prasad, Manohar. *Refrigeration and air-conditioning, 5thed. New Age Intl. Pub., New Delhi, 1996.*
3. Tiwari, Satish. *Water and Energy resources.*

UNIT 1

Introduction to Construction Industry, building construction practices, current management practices, Project planning and project scheduling and project controlling, Role of Decision in project management, Method of planning and programming, Human aspects of project management, work breakdown structure, Life cycle of a project, disadvantages of traditional management system.

UNIT 2

Elements of Network & Critical Path Method and PERT analysis: Event, activity, dummy, network rules, graphical guidelines for network, numbering of events. CPM network analysis & PERT time estimates, time computation & network analysis.

UNIT 3

Project time reduction and optimization: Project cost, Indirect project cost, direct project cost, slope of the direct cost curve, Total project cost and optimum duration, contracting the network for cost optimization, steps in cost-time optimization

UNIT 4

Project updating: Frequency of updating of project schedules, Data required for updating, steps in the process of updating.

Resource allocation: Resource usage profile: Histogram, Resource smoothing and Resource leveling, Computer applications in project management.

UNIT 5

Project Management Tools: Introduction to Project Management Tools like Primavera, Theory and their uses. Case-Study of a construction project using these software tools.

Recommended books:

1. Dr. B.C.Punmia et al. *Project planning and control with PERT and CPM*, Laxmi Publications, New Delhi
2. S.P.Mukhopadyay, *Project management for Architect's and civil Engineers*, IIT, Kharagpur, 1974
3. Jerome D.Wiest and Ferdinand K.Levy, *A Management Guide to PERT, CPM*, prentice Hall of India Pub, Ltd., New Delhi, 1982
4. R.A. Burgess and G.White, *Building production and project Management*, The construction press, London, 1979.

AURAR 705 INTRODUCTION TO TOWN PLANNING

Credits: 3

UNIT 1

Definitions of town planning, levels of planning and steps for preparation of a town plan, survey techniques in planning, concepts, functions, components and preparation of a development plan.

UNIT 2

Planning concepts related to garden city, Geddesian triad, neighbourhood planning, Radburn layout, Ekistics, satellite towns and ribbon development.

UNIT 3

Ancient system of town planning in India, Indus valley civilization - Mohenjodaro, Harappa, Extracts from Chanakya's Arthashastra, Manasara's Vastushastra, planning thought behind Fatehpur Sikri, Shahjahanabad, Jaipur and Delhi.

Le Corbusier's contribution to town planning - Selected examples to include concentric city, radiant city, CIAM, linear industrial city and Chandigarh.

UNIT 4

Zoning and development control - Concepts in Regional and Metropolitan planning, land subdivision regulations and zoning, nature of regulations and control, the comprehensive role of urban design in town planning process.

UNIT 5

Introduction to human settlements - growth and decay of human settlements, influence of socio-economic factors in the development of human settlements.

Recommended Books

1. John Ratcliffe, *An Introduction to Town and Country Planning*, Hutchinson 1981
2. Arthur B. Gallion and Simon Eisner, *The Urban Pattern - City planning and Design*, Van Nostrand Reinhold company
3. Rangwala, *Town Planning*, Charotar publishing house
4. G.K. Hiraskar, *Town Planning*
5. Rame Gowda, *Urban and Regional planning*
6. S.K. Khanna, *Highway Engineering*, C.E.G. Jhusto, Nemchand & Bros. Roorkee 1997
7. N.V. Modak, V.N. Ambedkar, *Town and country planning and Housing*, Orient Longman, 1971

AURAR 706 ARCHITECTURAL DESIGN-V

Credits : 8

- Design theory and application in more complex problems covering functional relationship, climatic condition, social aspects along with structural considerations and **basic building services**.
- Design Programme prepared by the students should take into account relevant building bye-laws and provision of **National Building Code**:
- The broad parameter for the design assignments are:

Main Design Problem (approx. 12 classes/week)

1. Group Housing/Gated Community with Common Facilities/Campus Planning. (8 weeks)
2. Specialist Hospital / Multiplex (5 weeks)

Design (Time) Problem (8 hrs.)

Any one of the above, not covered in the class

Viva voce

Final Viva-vice on all the design assignments done in the semester.

Note:

Design programme prepared by the students should take into account applicable building bye-laws and provisions of building bye-laws.

Reference:

All books and journals on architecture.

AURAR 711 PRE-THESIS SEMINAR

Credits: 3

The course provides students with a framework to understand some emerging concepts in architecture and projects of design complexity and equip the student with adequate architectural design research methods for the realization of thesis concept. During the course of study, the course of the thesis is developed and the project articulated.

Objectives of the Course: To impart knowledge to students, on the tools and methods needed to handle a design project of reasonable complexity individually.

Introduction to architectural thesis Project, Difference between design thesis and design studio, selection of topics for architectural design thesis, design thesis topics based on building typologies, preparation of synopsis, Methodology of design thesis

Emerging concepts in architecture due to changes in social, economic, technological variables. Review of design projects related to real world instances and relevant to community at large.

Review of projects of design complexity, involving themes, sub themes and architectural expression.

Research in architecture: Tools and Methods required to handle a design project. Scientific methods of research with special emphasis on architectural research methods. Architectural enquiry visual, observations, questionnaire formats of enquiry, Literature Review and case studies. Data analysis techniques interpretation of data.

STAGE I:

Thesis report writing and presentation:

- Formats for presentation of data, case studies and analysis.
- Formats for presentation of thesis design- media appropriate in the architectural profession such as two dimensional drawing, physical models, three dimensional computer models.
- Report Writing: Techniques in report writing, presentation of contextual information relevant to interpretation of the data collected and design; reporting the design development from concept to design solution, explain the relation of the design to existing knowledge on the topic in the form of coherently written thesis report.

The inputs to the students on various design thesis topics would be in the form of Expert /Guest Lectures.

Each student should submit TWO topics, one related to the Thesis, and the other related to any Research Topic. Each student in consultation with the faculty shall choose a thesis topic, and collect necessary data, review literature on the chosen topic and present a written paper and seminar at the end of the semester.

Recommended books:

1. Mukhi, H.R. Technical Report Writing: Specially prepared for Technical and Competitive Examinations, New Delhi: SatyaPrakashan, 2000.
 2. Barrass, Robert. Writing At Work \b a guide to better writing in administration, business and management, London: Routledge, 2003.
 3. Seely, John. The Oxford guide to effective writing and speaking, 2nd ed., Oxford ; New York : Oxford University Press, 2005.
 4. Jo Ray McCuen, Anthony Winkler. Readings for writers, 9th ed., Fort Worth : Harcourt Brace College Publishers, 1998.
- Treese, Malra. Effective reports, 2nd ed., Boston: Allyn and Bacon, 1985.

UNIT 1

Emergence of urban design as a discipline- Concepts of urban design- Urban design theories of Gordon Cullen and Kevin Lynch.

UNIT 2

Basic Principles and Techniques in Urban Design: Urban scale, Mass and Space; Understanding components of urban fabric; Making a Visual survey; Understanding the various urban spaces in the city and their hierarchy- Spaces for residential, commercial, recreational and industrial use: Special focus on streets ;Expressive quality of built forms, spaces in public domain.

UNIT 3

Study of Urban Spaces Through History: A brief Analysis of urban spaces in history - in the West (Greek, Roman, Medieval and Renaissance towns) and the East (Vedic, temple towns, medieval and Islamic towns) ; Relevance of the historical concepts in the present context;

UNIT 4

Critical analysis of Planned Urban Areas in some Indian cities like Chandigarh, Bhubaneswar with respect to Streets, Plazas, Central Business Districts, Neighbourhoods.Methodology for conducting an Urban Design Survey.

UNIT 5

Renewal, Redevelopment and Formulating Urban Design Policies: Understanding **urban renewal** and the need for it, Scope, challenge and Implementation methods; Public participation; Townscape policies and urban design guidelines for new developments- Case studies.

Recommended books:

1. *The Concise townscape*- Gordon Cullen,The Architectural press
2. *Image of the city* - Kevin Lynch
3. *Architecture of town and cities* - Paul D. Speriregon, The MIT press
4. *Urban design* - Ornament and decoration, Cliff Moughtin, Bath Press
5. *Urban design* - street and square, Cliff Moughtin, Bath Press
6. *Town and square* - Paul Zucker
7. *The urban pattern* - Arthur B Gallion, CBS publishers
8. *Architecture and the urban experience* - Raymond J Curran. Van Nostrand Reinhold Company
9. *Indian city in the arid West* - Kulbhashan Jain, Aadi Centre
10. *Indian mega city and economic reforms* - A.K.Jain, Management publishing Company.

AURAR 722 INTERIOR DESIGN

Credits: 3

UNIT 1

The profession of Interior Design; Role of an Interior Designer- past and present; Scope of services; Interior Design Process. Interior Design and Concepts: Elements and Principles of design- an overview and their applications in interior designing.

UNIT 2

Interior Space planning and human dimensions. Focuses on physical, psychological behavioural and human factors, study of proxemics, behavioural settings.

Introduction to the fundamentals of Interior Design such as Lighting, Furniture, Space, Materials, Furnishings, Art etc.

UNIT 3

Colours in interiors – Colour Theory, Effect of light on colour, various colour schemes like analogues, complementary, triadic etc. Colour symbolism. Psychology of colour, Industrial colour codes. International standards.

UNIT 4

Introduction to Furniture and Accessories: An overview of historical perspective of furniture and styles, accent pieces and accessories from Egyptian period to the present. Basic Furniture vocabulary. Styles of Interiors – Italian, English, French, Japanese styles etc.

UNIT 5

Interior lighting – direct and indirect lighting, location and light grid systems, types of luminaires, quality of lighting. Ambient, task and accent lighting. Exposure to eminent interior designers' works- Indian and international. Indoor plants and interior landscaping.

Business perspectives of Interior design – an overview of practice of interior design in India.

Recommended books:

1. Archi World. Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.
2. Friedmann, Arnold and Others. *Interior Design: An Int. to Architectural Interiors*. Elsevier, New York, 1979.
3. Miller, E. William. *Basic Drafting for Interior Designers*. Van Nostrand Reinhold, New York, 1981.
4. Kurtich, John and Eakin, Garret. *Interior Architecture*, VanNostrand Reinhold, New York, 1993.
5. Rao, M. Pratap. *Interior Design: Principles and Practice*, 3rd ed. Standard Pub., 2004.

UNIT I

Introduction to Vernacular architecture: Evolution of traditional shelter forms, Vernacular architecture as a process – Survey and study of vernacular architecture: methodology- Cultural and contextual responsiveness of vernacular architecture: an overview

UNIT II

Climate responsive Vernacular architecture: Traditional examples from hot and dry climates, cold climates, warm and humid climates and composite climates.Examples like the Igloo, Taos and Acoma Pueblo buildings. Sustainability in Vernacular Architecture.

UNIT III

Planning and Construction Aspects: Influence of Spatial planning in vernacular settlements, cultural aspects, symbolism, colour, art, materials of construction and techniques of construction in vernacular buildings.

UNIT IV

Vernacular architecture in various regions of the world: underground dwellings in China and Troglodyte buildings and earth sheltered building. Proportioning systems such as Ken in Japanese Vernacular Architecture Significance of religion in the shaping of vernacular settlements and buildings.Role of Vastu shastra and FengShui.

UNIT V

Vernacular architecture India: Western influence on vernacular architecture in India, Colonial influence on traditional houses Goa and the evolution of traditional bungalows. Vernacular settlement patterns of homogenous communities such as fishing settlements etc. Examples of vernacular architecture from different states in India.

Recommended Book:

1. Paul Oliver, Encyclopedia of Vernacular Architecture of the World, Cambridge University Press,1997.
2. Amos Rapoport, House, Form & Culture, Prentice Hall Inc. 1969.
3. R W Brunskill: Illustrated Handbook on Vernacular Architecture, 1987.
4. V.S. Pramar, Haveli – Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd.,Ahmedabad, 1989.
5. Kulbushanshan Jain and Minakshi Jain – Mud Architecture of the Indian Desert, AadiCentre,Ahmedabad 1992.63
6. G.H.R. Tillotsum – The tradition of Indian Architecture Continuity, Controversy – Change since 1850, oxford University Press, Delhi, 1989.
7. Carmen Kagal, VISTARA – The Architecture of India, Pub: The Festival of India, 1986.
8. S. Muthiah and others: The Chettiar Heritage; Chettiar Heritage 2000
9. Architecture without Architects: A Short Introduction to Non-Pedigreed Architecture by Bernard Rudofsky,University of New Mexico Press; Reprint edition (15 July 1987).

UNIT 1

Definition: What is research – formation of hypothesis, Types of research, Social research vis-à-vis architectural research

UNIT 2

Formation of research methodology: Formation of goal, objectives, scope and limitation, Data collection – process and methods, Analysis – statistical and other Outputs of research

UNIT 3

Various types of Architectural researches: Interpretive historical research, Quantitative, Qualitative and Mixed Methods of research, Co-relational research, Experimental and quasi-experimental research, Simulation and modeling research, Logical argumentation.

UNIT 4

Guidelines to construct research tools: Questionnaire, Structured and unstructured surveys, Ethical issues relating to the researchers

UNIT 5

Report writing: Types, Styles, Salient features, Bibliography writing, Citation, etc.

Recommended Book:

1. Kothari C.R., Research Methodology: Methods and Techniques, 2nd Edition, New Age International Publication, 2004.
2. Raman Meenakshi and Sharma Sangeeta, “Technical Communications – Principles and Practices”, Oxford University Press, New Delhi.
3. Marans, Daniel Stokols Stokols. Specifications of Environmental Simulation: Research and Policy Issues. Springer Us, 2013.
4. Fraser, Murray. Design Research in Architecture an Overview. London: Ashgate, 2013.
5. Groat, Linda N, and David Wang. Architectural Research Methods, 2nd Edition. Wiley, 2013.
6. Hughes, Richard, and Shivani Tanna. Specifications of GPST Stage 3: Written and Simulation Exercises. Jp Medical Ltd, 2013.
7. Lin, Lin Huang. Specifications of Advanced Research on Computer Education, Simulation and Modeling. Springer, 2011.
8. Sharma, S C. Specifications of Operation Research: Simulation and Replacement Theory. Discovery Publishing House, 2006.

VIIIth SEMESTER

Sl. No.	Course Code	Course Name	S/L/Th/P (Hrs)		Credits	Marks			End Exam Duration
						I	E	T	Hours
1	AURAR 801	Professional Practice & Building Regulations	Th	3	3	50	50	100	3
2	AURAR 802	Disaster Resistant Buildings & Management	Th	3	3	50	50	100	3
3	AURAR 811	Design Thesis*	S	21	14	600	-	600	Viva
4	AURAR 821	Sustainable Architecture	Th	3	3	50	50	100	3
	AURAR 822	Barrier Free Architecture							
	AURAR 823	Energy Efficient Green Architecture							
5	AURAR 831	Appropriate Technology	Th	3	3	50	50	100	3
	AURAR 832	Intelligent Buildings							
	AURAR 833	Introduction to Conservation							
Total				33	26	800	200	1000	

NOTE:

*AURAR 811 Design Thesis, 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with an external member.

VIIIth SEMESTER

AURAR 801 PROFESSIONAL PRACTICE & BUILDING REGULATIONS Credits: 3

UNIT 1

Role of Professional body - Indian Institute of Architects, its working, constitution and bye laws, categories of membership, election procedures. Code of conduct. Role of its conventions, Its publications etc.

Architects Act'1972: Detailed study of the act and its provisions and recent amendments. Role and responsibilities of Council of Architecture. Role of its electorate, procedure of membership.

UNIT 2

Professional Responsibilities and Liabilities of the architects, Responsibilities of Client and Contractor(s), copy rights, scale of charges, variation of charges, mode of payment, termination of services. Arbitration. Specialized building services. Professional Service Tax.

Building bye laws, submission plans, Methods of municipal approval, Development Controls and Zoning regulations, National Building Code and other regulatory aspects such as Master plan and Zonal plans.

UNIT 3

Architects in practice

- a. Private practice - Partnership office management, methods of organization, filing, documentation and working.
- b. Salaried appointment - Public sector, Private sector jobs, procedure of operation in government organization.

UNIT 4

Contracts and Construction process

Types of building contracts, their merits and de-merits. Preparation of tender documents, method of writing tenders, opening of tenders. Preparation of contract documents, general conditions of contract, interim certificates, defect liability periods, retention amount, security deposits, mobilization money and virtual completion.

UNIT 5

Architectural Competitions: Its purpose, Types of Architectural competitions, Its guidelines for participation, prizes, assessment, etc.

Recommended Books

1. Roshan Namavati; *Professional Practice*.
2. Code of Professional Practice : I. I. A.
3. Architect Act 1972.
4. Handbook of Professional Documents- 2005, by Council of Architecture.

UNIT 1

Basic understanding of fragile Eco-systems and factors that cause global climatic changes. Overview of major natural disasters, design and planning solutions for disaster mitigation, organizational and management aspects.

UNIT 2

Introduction to Natural Disasters: Understanding the effects of natural calamities such as floods, tropical cyclones, earthquakes, landslides, forest fires, draughts and Tsunami.

UNIT 3

Factors Causing Disasters: Climate changes, global sea rise, coastal erosion, environmental degradation, large dams & earth tremors, roads buildings & landslides, urbanization & desertification, cyclone effects on coastal towns.

UNIT 4

Design and Retrofitting of Buildings for Earthquake resistance: Design, construction and detailing of buildings, materials and methods to be adopted for earthquake resistant buildings and retrofitting of earthquake affected buildings.

UNIT 5

Case studies of natural disasters in India: Earthquakes at Bhuj, Latur, etc., Cyclones in coastal Andhra Pradesh & Orissa, Landslides in Uttarakhand, Nilgiris, Himachal etc, Floods in Bangladesh, and Droughts in Rajasthan & Tsunami in Tamil Nadu.

Recommended Books

1. S.Rajagopal - *Problems of housing in cyclone prone areas* - SERC, Vol.2, Chennai, 1980
2. Office of the UN Disaster Relief Coordinator - *Disaster prevention and mitigation*, Vol 12, Social and Sociological aspects - UNO, NY, 1986
3. F.C.Cony et.al - *Issue and problems in the prevention of disaster and housing* - A review of experiences from recent disasters - Appropriate reconstruction and training information centre, 1978. S.Ramani, *Disaster management - Advanced course on modern trends in housing* - SERC, Vol 2, Chennai, 1980

AURAR 811 DESIGN THESIS

Credits: 14

Students have to submit and present their work for this project in following stages:

In continuation to the Thesis presentations made in Stage I, in the Seventh Semester in the course AURAR 711 Pre-Thesis Seminar the next stages will follow.

Stage II:

Site Analysis and Project Requirements

Detailed site analysis should reflect complete physical and environmental characteristics of the project site.

Project requirements should have complete requirement of the project under the scope, in terms of facilities and area with reference to the case studies made earlier.

Stage III:

Concept Design and Design Feasibility

This stage will have the following:

- Basic concept/principal ideas leading to the design
- Site Plan, zoning of activity spaces, movement patterns and building blocks.
- Schematic floor plans of all the buildings under the scope of the project
- Conceptual built form, in terms of elevations, sections, views, study models etc.

Stage IV:

Design Development

This stage should comprise of detail design of the project with the following drawings to suitable scale:

- Site plan
- Building plans of all the building units and all floors.
- Furniture layout for typical areas.
- Elevations and sections of all building units.
- Working Drawings (min 2 nos) and services drawing (min 2 nos).
- Study model
- Perspective/view of interior
- Walk through (optional)

Stage V:

Finalization of Project drawings

Students have to produce all the drawings of the previous review along with the corrected drawings based on the comments of that review for final approval on the design.

Stage VI:

Project Synopsis

Students have to submit Thesis report (3 copies) summarizing the salient points of their project.

Stage VII:

Thesis report

Students have to submit Thesis report (3 copies) comprising write ups, case studies and drawings in the format as specified by the school.

Stage VIII:

Final presentation to external jury

Final design, comprising project introductions, case study/literature study, site analysis and the final proposal and model, is to be submitted for assessment by a panel of jury members comprising of external experts.

AURAR 821 SUSTAINABLE ARCHITECTURE

Credits: 3

UNIT 1

Introduction to the ideas, issues and concepts of sustainable architecture, global environment and the built environment, principles of environmentally and ecologically supportive architecture.

UNIT 2

Study of sustainable architecture, use of energy, materials, health and global environment as related to the construction and operation of buildings.

UNIT 3

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

UNIT 4

Integration of PV and wind systems in buildings, wind, solar and other non conventional energy systems, solar and thermal applications for heating and cooling, electricity generation.

UNIT5

Case studies of contemporary sustainable architecture.

Reference books

Books and manuals from TERI and other organizations.

AURAR 822 BARRIER FREE ARCHITECTURE

Credits: 3

UNIT 1

Types of disability, mobility devices and controls.

UNIT 2

Construction and maintenance standards, classification of buildings and access provisions.

UNIT 3

Design elements within buildings, site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, stairways, lifts, toilets, signage, guiding and warning systems, floor materials.

UNIT 4

Design elements outside the building – kerb at footpath, road crossing, public toilet, bus stop, toilet booth, and signage.

UNIT 5

Provision in residential building, auditorium, parks, restaurants, railway station. Modern building bye-laws.

References:

- 1. Building without barriers for the disabled, Harkness, Sarh P/690.554 HAR/B*
- 2. Disability and rehabilitation Handbook/ Goldenson, RM/362.2002 DIS/M*

UNIT I

Introduction to Energy Efficiency in Buildings: Definition of energy and its uses in buildings, Renewable and Non-Renewable energy sources. Significance of Energy Efficiency in the contemporary context, Simple passive design considerations involving Site Conditions, Building Orientation etc.

UNIT II

Solar Passive Architecture- Passive Heating: Plan form and Building Envelope -Heat transfer and Thermal Performance of Walls and Roofs, Direct Gain Thermal Storage of Wall and Roof - Roof Radiation Trap - Solarium - Isolated Gain

UNIT III

Passive Cooling: Evaporative Cooling - Nocturnal Radiation cooling - Passive Desiccant Cooling – Induced Ventilation - Earth Sheltering - Wind Tower - Earth Air Tunnels

UNIT IV

Green Buildings and Rating Systems: Efficient use of daylighting, energy reduction in artificial illumination, use of compact fluorescent lamps, use of grey water, waste recycling, reduction and reuse of water, Green building concepts and brief introduction to green rating systems such as LEED, GRIHA, etc.

UNIT V

Contemporary and future trends: Areas for innovation in improving energy efficiency such as Photo Voltaic Cells, Thermal Energy Storage, Recycled and Reusable Building materials, Nanotechnology, smart materials and the future of built environment,

Recommended Book:

1. Manual on Solar Passive Architecture, IIT Mumbai and Mines New Delhi, 1999
2. Arvind Krishnan & Others, “Climate Responsive Architecture”, A Design Handbook for Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2001
3. Majumdar M, “Energy-efficient Building in India”, TERI Press, 2000.
4. Givoni .B, “Passive and Low Energy Cooling of Buildings”, Van Nostrand Reinhold, New York, 1994
5. Fuller Moore, “Environmental Control Systems”, McGraw Hill INC, New Delhi - 1993
6. Sophia and Stefan Behling, Solpower, “The Evolution of Solar Architecture”, Prestel, New York, 1996
7. Patrick Waterfield, “The Energy Efficient Home: A Complete Guide”, Crowood press ltd, 2011.
8. Dean Hawkes, “Energy Efficient Buildings: Architecture, Engineering and Environment”, W.W. Norton & Company, 2002

AURAR 831 APPROPRIATE TECHNOLOGY

Credits: 3

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

UNIT 1

Study of soil and its composition and properties, suitability of soil for mud walls, stabilized soil blocks, block making machines.

UNIT 2

Wattle and daub walls, rammed earth walls, adobe walls, Waterproofing of mud walls.

UNIT 3

Walls, vaults and domes using soil cement blocks, Nubian vault roof.

UNIT 4

Use and applications of bamboo as an alternative material for walling and roofing.

UNIT 5

Ferro-Cement/ Micro-concrete, Fire-resistant thatch for roofing.

Recommended Books

1. VenuBharati, by Vinoo Kale, AproopNirman Nagpur.
2. Research notes and digests by CBRI Roorkee Burnt clay roofing ,ferrocement roofing units.
3. Auroville Publications.
4. BMTPC Manuals.

UNIT 1

Building Intelligence

- Introduction to intelligent Buildings - history and development
- Intelligent Buildings- Features and definitions
- Use of artificial intelligence in building systems
- Developments in technology contributing to the intelligent buildings concept

UNIT 2

Building Automation and Controls

- Interfaces and components of Building Automation Systems
- Hardware and software requirements of Building Automation System

UNIT 3

Building Automation Techniques

- Expert systems, genetic algorithms, Artificial Neural Networks Fuzzy Systems, and their application in Intelligent Buildings especially for HVAC, Electrical, Fire, Vertical Transportation, safety and security systems and energy management and design

UNIT 4

Various aspects of Intelligent Building Design

- Environmental controls- traditional building controls, Lighting control- integration of automatic lighting control for buildings
- Sensors, actuators, and end devices-including adjustable speed drives, chillers complete packaged air-conditioning, Fire and Life Safety integration with the automated buildings
- Security integration for the tenants of automated buildings
- Elevators integration for the tenants of automated buildings

UNIT 5

Case-studies of Intelligent Buildings from India and Abroad.

Recommended Books:

1. Dubin, Freds; Energy Conservation Standards: For building design, construction and operation.
2. ASHRAE Journals.

UNIT I

Introduction to conservation: Definition of Conservation, Distinction between Architectural and Urban Conservation, Adaptive reuse and Preservation, Meaning of Heritage and Types of Heritage. Types, Need and Purpose of Heritage Conservation, Degrees of Intervention in historic buildings and monuments

UNIT II

History of various global conservation movements, Role of International agencies like ICCROM, UNESCO, Venice Charter and Burra Charter. Bombay Heritage Act. Role of Intach.

UNIT III

Conservation Practice: Listing and grading of monuments- documentation of historic structures- assessing architectural character guidelines for preservation, rehabilitation and adaptive re-use of historic structures- Case studies of historic buildings and buildings with heritage value. Reuse and Redevelopment of historic buildings and precincts.

UNIT IV

Urban Conservation: Character and issues of historic cities, Concept of heritage zones in cities—case studies of temple towns and heritage precincts. Planning and Management aspects in Conservation

UNIT V

Conservation Planning: Conservation as a planning tool. - financial incentives and planning tools such as Transferable, Development Right(TDR)-urban conservation and heritage tourism- case studies

Recommended Book:

1. Donald Appleyard, “The Conservation of European Cities”, M.I.T. Press, Massachusetts, 1979.
2. James M. Fitch, “ Historic Preservation: Curatorial Management of the Built World” University Press of Virginia; Reprint edition, 1990
3. Robert E. Stipe, A Richer Heritage: Historic Preservation in the Twenty-First Century” , Univ. of North Carolina press, 2003.
4. Conservation Manual , Bernard Fielden; INTACH Publication, 1989.
5. B.K. Singh, “State and Culture”, Oxford, New Delhi
6. A.G. K. Menon ed. “Conservation of Immovable Sites”, INTACH Publication, N.Delhi., 1988

FINAL YEAR (IX & X SEMESTERS)

Sl. No.	Course Code	Course Name	S/L/Th/P (Hrs)		Credits	Marks			End Exam Duration
						I	E	T	Hours
1	AURAR 911	Practical Training*	P	-	60	400	-	400	Viva
Total				-	60	400	-	400	

NOTE:

*AURAR 911 Practical Training, 40% of continuous evaluation marks shall be evaluated by conducting viva-voce with an external member.

Students are eligible to undergo Practical Training at Architectural Firms, run by a Chief Architect, having at least FIVE years of Practical Experience. Registration Details of the Chief Architect with the Council of Architecture India, should be furnished by the Student.

Staff members are to be deputed twice during the year to the Architecture firms where the students are undergoing Practical Training, once during the initial phase and one more time during the middle of the programme, to have interaction with the Chief Architect and assess the performance of the students.

Students should submit the following particulars at the end of the Practical Training Programme:

1. Training Certificate given by the Chief Architect.
2. Work Log Book & Type of Works involved, duly certified by the Chief Architect.
3. Attendance Report and Leave Report.
4. Performance Certificate in sealed envelope given by the Chief Architect, rated in terms of the Student's (a) Punctuality, (b) Leadership qualities, (c) Communication Skills, (d) Technical understanding level, and (v) Site Supervision performance.
5. Set of Municipal Drawings made by the Student during practical training.
6. Set of Working Drawings made by the Student during practical training.
7. Set of Presentation Drawings made by the student during practical training.
8. Report of Estimation and Costing done by the Student
9. Report of Project Site Visits made by the Student.

Method of evaluation for 400 marks should be made available to the students before leaving for the practical training.

FINAL YEAR (IX & X SEMESTERS)

AURAR 911 PRACTICAL TRAINING

Credits: 60

Each candidate shall have to prepare a detailed report along with necessary drawings, sketches, measurement records, readings, observations, survey analysis, log sheets about the following aspects.

1. Critical appraisal of any building that his office has designed and executed. The building should be in use and the students may record the reactions of the users to support his appraisal in addition to photographs, drawings etc.
2. Site Supervision and practices – A detail report of any part of a building that has been personally supervised by the student/ his supervisor. If the student does not get an opportunity to supervise their office work, he can give site report of any other work. It may include checking site measurements, preparation of a bill, Site instructions and checking of the executed work.
3. Log Sheet and Office Certificate – A student shall fill the log sheets, as a record of his every day work and shall submit the same, along with the certificate and confidential report from his Employer. The student must maintain at least 90% of attendance.
4. A student shall submit all the working details prepared by him during his practical training along with quantity survey of a small project or any special work done during his training such as any computer programme, lighting scheme, glazing details for energy efficiency and calculations, acoustical details, etc.

*The student is advised to stick to the syllabus and keep preparing his training report while working in the office where he is undergoing the training, and prepare themselves ready for the viva-voce to be conducted at the School at the end of the Practical Training programme.