

THIRD YEAR (6TH SEMESTER)

3RARC601: ARCHITECTURAL DESIGN - VI

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER				In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks		
THIRD	3RARC601	ARCHITECTURAL DESIGN – VI	1	0	8	100	50	50	200	9	8

OBJECTIVES:

- Design for the requirements of individuals, groups or community with limited land size and other parameters.
- Designing for simple and multi-use, single and multiple floors with parameters of building byelaws.

CONTENTS:

Residential: Residential buildings for defined clients and given requirements on specific plot/land in urban context.

Non-Residential: Designing for unknown users, the buildings other than residential uses e.g.. Middle order educational buildings, commercial and health-care facilities etc.

Suggested studio exercise:

Detached semi-detached houses, terraced housing, and Group housing.

Housing for specific socio-economic groups, schools, neighborhood shopping centers, commercial banks polyclinics/diagnostic centers.

APPROACH:

- Prototype case-studies may be done in groups of 3-5 students.
- Slide lectures on similar projects.
- Understanding to develop the design requirements/Architectural programme.
- Design time problems programs to prepare students for examinations.

References:

1. Ching, Francis D. K. (2007). *Architecture: Form, Space and Order*, John Wiley and Sons Inc., 3rd Edition, New Jersey, Canada, ISBN 978-0-471-75216-5
2. Lidwell, William, Holden, Kestina, Butler, Jill, "Universal Principles of Design", Rockport – Publications, Massachussets.
3. Evans, Martin. (1980). *Housing, Climate and Comfort*. Architectural Press, London.
4. Koeningsberger, et al. (1975). *Manual of Tropical Housing and Building (Part-II)*. Climate Design, Orient Longman Ltd. Hyderabad.

3RARC602: BUILDING CONSTRUCTION & MATERIALS - VI

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER				In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks		
THIRD	3RARC602	BUILDING CONSTRUCTION & MATERIALS - VI	1	0	6	100	50	50	200	7	7

OBJECTIVES:

- To introduce and familiarize the students with constituents, manufacturing process/ availability, Properties/ characteristics, defects, classifications, treatments, preservation and uses of traditional building materials used in construction.
- To understand the use of these traditional building materials in simple building works.

CONTENTS:

Ceramics:

Metals:

Plastics:

MATERIALS:

Terracotta, Faience, Fireclay, Stoneware, Earthen ware, Vitreous China, Porcelain, Jointing and Finishing.

Non ferrous — copper & copper based alloys (brass & bronze), tin, cadmium, chromium, zinc, lead, nickel.

Thermoplastics-Polythene, Polyvinyl chloride, Polyvinyl acetate, Poly-propylene, Polymethyl metha, Crylate, Polystyrene, Acrylonitrile butadiene styrene, Nylon, Polycarbonate.

Thermosetting Plastics-Polyster resin, Polyurethane, Synthetic resin.

Rubber.

CONSTRUCTION

R.C.C. (Formwork & Laying):

Foundations: isolated, combined, cantilever eccentric footing, grillage and raft foundation, Pile foundations— details of pile, varieties of piles, pile caps.

Beams, Columns, Lintel, column grid and frame construction. Slabs-simply supported & cantilevered.

Basement, Expansion joints

D.P.C. (Vertical):

Temporary Construction:

Centering, Shuttering, Scaffolding.

Doors & Windows (Metal):

Rolling Shutter, Collapsible Shutter, Gate, Grill & Railings, P.V.C. Doors and Windows.

APPROACH:

- The students would be familiarized with vernacular terminology prevalent in this part of the country.
- The emphasis will be on construction details as applicable to Indian conditions.
- Site visits and market surveys will be integral part of sessional work.

References:

1. McKay, W. B. (1955). *Building Construction*. Volume I, II, III and IV. Longmans. Harlow.
2. Ching, F. D. K., Adams & Cassandra (2000). *Building Construction Illustrated*. Wiley and Sons.
3. Barry R. (2007). *The Construction of Buildings – Barry* Volume I, II, III and IV. Blackwell Science Ltd.
4. Chudley, Roy (2005). *Construction Technology*. Longmans.
5. Mitchell & Charles F. (1934). *Building Construction (Elementary and Advanced)*. B. T. Batsford.
6. Rangwala, S. C. (2007). *Building Construction*. Charotar Publishing House.
7. Punmia B. C., Jain A. J., and Jain A.J. (2005). *Building Construction*. Laxmi Publications.
8. Rangwala S.C. (2014). *Building Materials*. Charotar Publishing House.
9. Gambhir M., Jamwal Neha. (2011). *Building Materials Products, Properties and Systems*. Tata McGraw Hill Publishers, New Delhi.
10. Gupta R. K. (2009). *Civil Engineering Materials and Construction Practices*. Jain brothers, New Delhi.
11. National Building Code of India, 2005, Bureau of Indian Standards.
12. Morris, M., (2000). *Architecture and the Miniature: Models*. John Wiley and Sons.
13. Raghuwanshi, B.S. (2001). *A Course in Workshop Technology - Vol. I and II*. Dhanpat Rai and Co.

3RARC603: STRUCTURES - VI

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER				In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks		
THIRD	3RARC603	STRUCTURES - VI	2	2	0	50	50	-	100	4	4

OBJECTIVES:

- To understand the reinforcement cement concrete design of structural elements.

CONTENTS:

- Design of continuous beams & Portal Frames.
- Requirement of joints in R.C.C. Construction: Construction joints, Expansion joints,
- Theory & Design of Cantilever retaining walls.
- Theory of Domes, Shells & Folded Plates.
- Design of stairs: Effective span of stairs, Distribution of Loading on stairs, Simple case of design of stairs.

APPROACH:

- The lectures by the experts in the fields will be arranged to make the students go independent design of structural elements.

References:

1. Nautiyal B. D. (2011) "*Introduction to Structural Analysis*". B.H.U.
2. Punmia P. C. (2012) "*Strength of Materials & Mechanics of Structures*". L.P.
3. Khurmi R. S., (2009) "*Strength of Materials*". S. Chand.
4. Ramamrutham S.(2004) "*Strength of Materials*". Dhanpat Rai Pub.

3RARC604: THEORY OF DESIGN

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER				In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks		
THIRD	3RARC604	THEORY OF DESIGN	1	2	0	50	50	-	100	3	3

OBJECTIVES:

- Understanding of the period in terms of its location, climate as well as the socio-cultural, historical, economic and political influences of the time.
- Study of the different building and the development of architectural form and character based on the developments in construction and technology exemplified through specific building examples that identify the works of the period.
- Understanding the intentions of the period and architects as a solution to the need or demands of the period.

CONTENTS:

- 1) **Picturesque and Neo-Classical Architecture:** Purity and structural honesty of antiquity preferred over ornamentation and exaggeration of Baroque. Representation of ancient Roman monuments in imaginary compositions. Archeological purism and importance of pictorial values in historical settings. Recreation of antique Roman simplicity and splendor for modern living. Study of important palaces and public buildings in Britain and France.
- 2) **Enlightenment and beginnings of Modern:** Belief in creation of 'new' and 'ideal' world through return to fundamentals, 'true' and 'original' values. Romanticizing elementary geometrical forms with undecorated surfaces. Iron and glass construction for openness and lightness; Art Nouveau, Repetitive, orthogonal, skeletal systems for horizontal and vertical expansion. Later attempts to dissociate reference to past styles.
- 3) **Modern Architecture:** Social intentions and search for ideal world. Pluralism in place of past unit of styles. Search for paradigms in a-historical sources; return to fundamentals and origins in geometry, nature, and paradigms of technology. Simplicity, abstraction, non-objective, non-representative and neglect of content and ornament. Expressions of construction and technology. Equating technology and progress with present. Functionalism and functional appropriateness. Thoughts and works of Frank Lloyd Wright, Walter Gropius, Le Corbusier, Mies van der Rohe, Alvar Aalto, Louis Kahn, Dutch De Stijl, Italian Futurists and Russian Constructivists. International Style. Oversimplification of the Modern Movement into functional, steel and glass, cubes. Monotonous functionalist abstractions and Modernism as a style. Disenchantment of Modern cities and fall of Modern Movement.
- 4) **Post Modern Architecture:** Post Modern Architecture as a revision of Modern Architecture and resistance to functional containers of 60's. Objective, representational and emphasis on content. Pluralistic and differing trends.

5) **Post Modern Historicism:** Rooted to place and history. Regard for expression:

ornament, symbolism, and context with irony and humour, exemplified through the works of James Stirling, Michael Graves, Charles Moore, Arata Isozaki.

6) **Neo-Modern:** Disregard historical imagery to recapture ideals of Modern architecture of 20's. Hi-Tech metal abstractions of Richard Rogers, Norman Foster, showing structure and equipment as implied ornament. References to Russian Constructivists. The early works of New York Five including later works of Richard Mier as complicated, exaggerated and sophisticated revival of the Modern grid and Corbusier's geometry. Synthesis of Hi-Tech and Historicism in the works Aldo Rossi, Mario Botta, Cesar Pelli.

7) **Deconstructivism:** Narrative and representational. Sources in Russian Constructivism. Non perfection in the works of Frank Gehry, Peter Eisenman, Bernard Tschumi, Daniel Libeskind, questioning traditional purity of form, geometry and structure.

METHODOLOGY:

- Lectures to be specifically conducted with the visual aids and seminars presented by students.
- Students will make written assignments and seminar presentations on architectural characteristics that identify the building types and the intentions of the period in response to context and time.
- Students will make free-hand sketches and orthographic Drawings in the tutorials of specific building examples to familiarize them with the architectural character that identifies the work of a particular period.

References:

1. Kenneth Frampton, "*Modern Architecture; A Critical History*" by, Tames and Hudson
2. Willam Jr.Curtis, "*Modern Architecture since 1900*", Phaidol
3. Sir Banister Fletcher,(1996) *A History of Architecture, University of London, The AntholonePress,*
4. Spiro Kostof – (1985) *A History of Architecture - Setting and Rituals,* Oxford UniversityPress, London,
5. Leland M Roth;(1994) *Understanding Architecture: Its elements, history and meaning;* CraftsmanHouse;
6. Pier Luigi Nervi, General (1972) Editor - *History of World Architecture - Series,* Harry N.Abrams, Inc.Pub., New York,
8. S.Lloyd and H.W.Muller,(1986) *History of World Architecture - Series,* Faber and Faber Ltd., London,
10. Gosta,E.Samdstp, (1970) *Man the Builder,* Mc.Graw Hill Book Company, New York,
11. Webb and Schaeffer;(1962) *Western Civilisation Volume I;* VNR: NY
12. Vincent Scully©1991) *Architecture; Architecture – The Natural and the Man Made;* Harper Collins Pub:
13. Charles Jencks, "*The language of Post Modern Architecture*".
14. Heinrich Clotz, "*History of Post Modern Architecture*".
15. Marvin Trastctenberg, "*Architecture from Prehistory to Post modernism*"

3RARC605: SPECIFICATIONS & ESTIMATION

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER				In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks		
THIRD	3RARC605	SPECIFICATIONS & ESTIMATION	1	2	0	50	50	-	100	3	3

OBJECTIVES:

- To initiate the students into theory and practice of estimation and quantity surveying.
- To develop the understanding of specification writing.

CONTENTS:

Specification:

Definition. Importance and scope of the subject. Correct form of writing specifications —avoiding ambiguity and conflicting statements. Form and sequence of clauses, study and uses of standard specification viz: drafted by C.P.W.D etc.

Writing detailed specifications for various building materials e.g. bricks, sand, lime, timber, glass and paints etc.

Writing detailed specifications for various building constructions works e.g. earthwork for foundations, concreting the trenches for foundations, superstructure in cement mortar, R.B. work, plastering and painting, lime punning, flooring, whitewashing, distempering and painting. Snowcem wash, stone masonry, mud thuska, terracing and others.

Estimating:

Estimates-types of estimates-approximate and detailed methods of estimating- plinth area method, carpet/floor area method cubic content method, approximate quantity method and number system, detail estimates-procedure of estimating taking out quantities schedule of rates.

Exercise in estimating (with different methods) of small buildings, estimating exercises for interior schemes, plumbing work and electrical installations etc.

Rate analysis:

Principles of analysis of rates, rates of labour and materials, exercises in rate analysis of different building works, e.g. earthwork for foundations, flooring, timber work etc.

Introduction to P.W.D accounts procedure, measurement book, daily labour, muster roll, stores, stock and issue of material from stock, indent form, impress account, cash book, mode of payment.

APPROACH:

- The course would be covered through lectures and tutorials.
- The students' seminars will help realize the grasp on the subject matter.

References:

1. Dutta, B. N. (2003) *Estimating and Costing*, UBS Publishers
2. Birdie, G. S. *Estimating and Costing*
3. Chakraborti, M. Estimation, *Costing and Specifications*, Laxmi Publications
4. Kohli, D.D and Kohli, R.C. (2004) *A Text Book of Estimating and Costing*, S.Chand & Company Ltd.
5. Brook, Martin. (2004) *Estimating and Tendering for Construction Work, 3rd edition*, Elsevier.
6. Ashworth, A. (1999) *Cost studies of buildings*, Pearson Higher Education
- 8
7. Buchan, R., Grant, F. and Fleming, E. (2006) *Estimating for Builders and Quantity Surveyors*, 2nd edition, Butterworth-Heinemann
8. Cross, D.M.G. (1990) *Builders' Estimating Data*, Heinemann-Newnes
9. McCaffer, R. and Baldwin, A. (1991) *Estimating and Tendering for Civil Engineering Works*, 2nd edition, BSP
10. Sher, W. (1997) *Computer-aided Estimating: A Guide to Good Practice*, Addison Wesley Longman
11. (2004) *Standard Handbook for Civil Engineers*, McGraw-Hill
12. Standard Schedule of Rates for Delhi, CPWD & UPPWD.
13. Standard Specifications, CPWD & UPPWD
14. I. S. 1200 Parts I to XXV – Method of Measurement of Building and Civil Engineering Works, Bureau of Indian Standards
15. National Building Code of India (Latest Edition), Bureau of Indian Standards.

3RARC606: BUILDING SERVICES – III (ME i.e. LIFT, HVAC etc.)

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER			In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks			
THIRD	3RARC606	BUILDING SERVICES – III (ME i.e. LIFT, HVAC etc.)	1	2	0	50	50	-	100	3	3

OBJECTIVES:

To develop an understanding of the advanced building services such as Air conditioning and lifts and their application in the design proposals of buildings of slight complex nature such as multistoried. The thrust shall be on understanding the use and application of the services and not the calculation or numerical part.

CONTENTS:

Air Conditioning Systems:

- Principles of Air-conditioning
- Psychometric chart
- Refrigeration Cycle and the air cycle
- Comfort cooling systems—Unitary air conditioning and remote air conditioning
- working of window air conditioners and central air conditioning their parts and the standers and prescribed locations for the respective parts
- Air Distribution Systems-fans, filters, ductwork, outlets, dampers.
- Norms for Air-conditioning.
- Cooling load for air conditioning.

The emphasis shall be on educating the student as to how the system works and the location of various distribution systems such as the AHU, cooling plant cooling tower, fan-coil units and ducts.

Lift Services:

- Types of Lifts
- Working of lifts with details of lift section describing Various parts of lifts
- Definitions regarding lifts such as average travel lift carrying capacity, rated load, rated speed, RTT etc.
- Installation requirements and the information to be provided by the architect for the installation
- Grouping of lifts and design standards of a lift lobby.
- function and working of Escalators.

The emphasis shall be on the drawing of the correct plan and section of the lift and the lift

SUGGESTED EXERCISE:

well showing various parts and how to group them in a building core for the various functions they perform.

-site visits of buildings where different types of Air-conditioning systems and lifts have been installed their working and the merits and demerits of the system.

-In an already designed project of a multi-strayed building installation of an air-conditioning system and lifts the location of their parts and how they will be connected.

APPROACH:

- Specialized lectures from technical people in the field.
- Practical and site based exercises to make the data more comprehensive.

References:

1. Mitchell's (1997) *Building Construction: Environment & Services*, Peter Burberry, 8th Edition, Longman.
2. B. Stein and J. Reynolds (2005) *Mechanical and Electrical Equipment for Buildings*, 10th Edition, , Wiley & Sons Inc.
3. R Rush (,1991) *The Building Systems Integration Handbook*, , American Institute of Architects.
4. *Building Services: A Guide to Integrated Design: Engineering for Architect*, RP Parlour, 2008, Integral Publishing.
1. *Understanding Buildings: A Multi-disciplinary Approach*, E Reid, MIT
2. William H. Severns and Julian R. Fellows,(1988) "*Air-conditioning and Refrigeration*", John Wiley and Sons, London,
5. A.F.C. Sherratt, (1980) "*Air-conditioning and Energy Conservation*", The Architectural Press, London,
6. ASHRAE Publications.
7. National Building Code of India (Latest Edition), Bureau of Indian Standards.

3RARC607: PRNCIPLES OF HUMAN SETTLEMENTS

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER				In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks		
THIRD	3RARC607	PRNCIPLES OF HUMAN SETTLEMENTS	2	1	0	50	50	-	100	3	3

OBJECTIVES:

The course aims at introducing the history of development of settlement planning and also gives emphasis on tracing broad principles of settlement design.

CONTENTS:

Man's role in designing and developing settlements. Various factors influencing development of settlements.

Introduction to settlement planning followed during various river valley civilizations.

General information of various settlement planning principles and examples from ancient India and study of the principles described in the ancient Indian text. Planning in the pre independent India i.e. contribution of Mughal and British .

Settlement planning principles developed and contributed by Egyptians, Greeks and roman etc. study of city planning during medieval and renaissance period.

Study of selected historical examples of villages, towns , forts, palaces gardens, public places etc. Note: the sessional will be in the form of report, seminars and presentations

METHODOLOGY:

- Lectures to be specifically conducted with the visual aids and seminars presented by students.
- Students will make written assignments and seminar presentations on architectural characteristics that identify the building types and the intentions of the period in response to context and time.

References:

1. Lynch Kevin (1960) *The image of the city*, MIT Press, Cambridge, Massachusetts, United States
2. Howard James (1993) *The Geography of Nowhere*, Simon & Schuster, US.
3. Bacon Edmund (1967) *Design of Cities*, Thames & Hudson, London, UK.
4. Noah Hysler-Rubin (2011) *Patrick Geddes and Town Planning: A Critical View*, Routledge Publisher, London, UK.
5. Geddes Patrick (1915) *Cities in evolution*, Williams and Norgate, London, UK

3RARCP608: WORKING DRAWING (PRACTICAL)

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER				In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks		
THIRD	3RARCP608	WORKING DRAWING (PRACTICAL)	0	1	3	50	-	50	100	4	3

OBJECTIVES:

To understand design limitations due to authority guidelines and making drawing/details necessary for final execution of a project.

CONTENTS:

- Familiarizing with Building Bye-laws through Local Developments Authority Guidelines, National Building Codes. Interpretation of the Bye Laws applicable to residence in plotted developments, Group Housings, Commercial Buildings, Educational Buildings and other Public Institutions.
- Making a complete Local Development Authority drawing for a small two storied residence that may have been designed in any of the previous semesters with desired modifications needed as per Local Authority and NBC guidelines.
- Making complete set of working Drawings and Details for the residence presented earlier or any other small project designed in any of the previous semester. The drawings to also incorporate electrical and plumbing details complete with schedule and all specifications. The Working Drawings and details to include:
 1. Site plan
 2. Foundation layout with details of foundations.
 3. Ground floor Plan.
 4. First Floor Plan.
 5. Terrace Plan
 6. Sections
 7. Elevations.
 8. Doors and Windows
 9. Doors and Windows details
 10. Electrical Layout in at least one of the two Floors.
 11. Plumbing Layout in at least one of the two Floors.
 12. Toilet details complete with all fixtures and their specifications.
 13. Kitchen details complete with all fixtures and their specifications.
 14. Flooring pattern on either of the two Floors.
 15. Staircase Details including railings.
 16. Details of Grills, Parapet or railings.
 17. Typical wall section showing foundation, DPC, skirting, sill, lintel slab and terracing details.

APPROACH:

- Course would be covered through lectures and display.
- Regular studio work for total grasp.

References:

1. National Building Code of India 2005. Govt. of India Bureau of Indian Standards.
2. Development Authority Bye-laws.
3. Master Plan.
4. Model – Bye-laws by TCPO.
5. Various BIS Codes.

3ARC6010: SEAMLESS LEARNING

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER				In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks		
THIRD	3ARC6010	SEAMLESS LEARNING	0	0	2	100	-	-	100	2	1

Course objectives:

- To sensitize among the students importance of values in a social system.
- To develop a sense of social responsibility among the students and encourage them to take up the initiative to serve for the noble cause.

METHODOLOGY

1. The course shall be inclusive of the various activities which shall be performed under the expert guidance of the course instructor.

3ARC6011: CO- CURRICULAR ACTIVITIES

	SUBJECT CODE	SUBJECT NAME	L	T	P/S	Evaluation				Contact Hours	Credits
YR		SIXTH SEMESTER				In Sem.	End Sem. Theory	End Sem. Jury and/or Exam.	Total Marks		
THIRD	3ARC6011	CO- CURRICULAR ACTIVITIES	0	0	2	100	-	-	100	2	1

Course objectives:

- To sensitize among the students importance of co-curricular activities in a social system.
- To give an opportunity of brushing up the skills to a limit of perfection and facilitating for the overall development of the students.
- To encourage the students for taking up the challenge of competing with the students of the other schools to ensure the enhancement of their interaction and coherent development.

METHODOLOGY

1. The students shall be informed about the various competitions/ conferences, being organized in and around at National and International level, by the respective club and/ or course co-ordinators.
2. The students shall be given effective guidance related to the respective clubs and other activities.
3. The students shall be enrolled in at least one club as a mandate.