

## 7AR1: BUILDING MECHANICAL SERVICES

B.ARCH.: 7<sup>th</sup> Semester

Max. Marks: 100

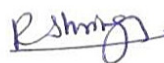
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Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	<b>Principles of Refrigeration and HVAC</b> <b>Basics of Thermodynamics:</b> Heat, Transfer of heat, Change of state, Temperature, Specific Heat, Latent Heat, Saturation Temperature, Evaporation, Condensation, Enthalpy, Entropy, Pressure-Temperature Relationship for liquids, Refrigerants, Refrigeration Cycle. <b>Human Comfort:</b> Humidity, Absolute Humidity, Relative Humidity, Specific Humidity, Temperature Range, Air Quality Parameters, Air Movement, Need of HVAC. <b>Principles of Air-Conditioning:</b> Psychometric Process, Air Cycle, Summer and Winter air conditioning, evaporative cooling, Constituents of Heat Load Estimation- Material, Orientation, Heat, Light, Occupancy, Building Use (Mathematical calculations are excluded). <b>Air Conditioning Zoning:</b> Purpose & advantages, Air distribution systems- Non Duct & Duct Systems, Air outlets, Compressors, Evaporators, Condensers, etc.	8
II	<b>HVAC System Components and Equipment</b> Window & Split units; Variable air-volume, water volume, vapor absorption system (Variable refrigerant Flow). Central Air conditioning systems: AC Plant Room, Direct Expansion and chilled water system, Types of compressors (air cooled and water cooled), Cooling Towers, Air handling units, Fan Coil Unit, Fresh air- sick building syndrome.	6
III	<b>Fire Prevention, Protection &amp; Life Safety</b> Causes of building fire: Triangle of fire <b>Prevention:</b> Materials for different building components and their fire rating, Considerations for: Building Heights, F.A.R. & Open Space, service ducts and shafts, refuse chutes, electrical installations & emergency power supply, lightening protection, escape lighting and escape signage, fire and smoke dampers, opening and glazing (façade fire prevention) <b>Life Safety:</b> Fire exits- numbers and arrangement, fire escape staircase and its pressurization, ramps, Compartmentation, Fire detection and alarm systems, safety drills. <b>Fire Protection:</b> Fire extinguishing and fire fighting installations- types of extinguishers, dry and wet riser system, automatic sprinkler system, fire tank and pump house.	6
IV	<b>Elevators and Escalators</b> <b>Types of Elevator and escalator mechanism, Design considerations:</b> location in a building, serving floor, grouping, lift size, lift car dimensions, door arrangements, waiting time analysis, sky lobby. <b>Types &amp; installation provisions of elevators &amp; escalators:</b> passenger lift, hospital (stretcher lift), goods lift, car lifts, dumbwaiters, travelators, step type escalator, belt type escalators, cleat type escalator, levytator etc.	4
V	<b>Mechanical Layout Design</b> Application of air conditioning system in hotels hospital and commercial building. Ventilation System design for basement, car park, toilet and kitchen ventilation (air washer and scrubbers), air cooling systems. Schematic layout for fire protection in building showing exits, escape routes, fire extinguishers (sprinkler systems), tanks and pump room. <i>All designs to be integrated with concurrent Design Studio.</i>	6
	<b>TOTAL</b>	<b>30</b>

## REFERENCE BOOKS:

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	John W. Mitchell, James E. Braun; Heating, Ventilation, and Air Conditioning in Buildings ; John Wiley & Sons Inc.	2012
2.	William K.Y. Tao , Richards R. Janis; Mechanical and electrical Systems in Buildings; Pearson Education Inc.	2014
3.	M.Y.H. Bangash, T. Bangash; Lifts, Elevators, Escalators and Moving Walkways; Travelators/Taylor & Francis/Balkema	2007
4.	Bureau of Indian Standards; National building code of India-2016; Bureau of Indian Standards	2016
5.	William H. Severns and Julian R Fellows; Air conditioning and Refrigeration; John Wiley & sons, London	1987




## 7AR2: CONTRACT DOCUMENTS AND BYELAWS

B.ARCH.: 7<sup>th</sup> Semester

Max. Marks: 100

2L

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	<b>Building Contracts</b> Type of contracts and contract documents, detailed knowledge about various conditions of contract as published by the Indian Institute of Architects, interim certificates defect, liability period, retention amount and virtual completion. Articles of agreement, execution of work payment and Arbitration, arbitrators, umpire and nature of arbitration, Appointment, conduct, powers and duties of arbitrators and umpires, Procedure for arbitration, preparation and publication of awards and impeachment.	6
II	<b>Tenders</b> Types of tender documents, tender draft notices and invitation of tenders. Procedure for opening and selection of tenders & award of contract. Analysis and report to owner. Work order.	6
III	<b>Building Byelaws:</b> Brief history of Town planning Act 1954 with reference to Building Projects. Various factors for formalization of Bye Laws & its implications. Comprehensive study of Jaipur Building Bye-laws relating to Ground coverage, FSI Calculation, Building Height & Building use regulation. Study of special provisions in bye-laws in respect of Special category of Buildings Role of Approving authorities, special rules governing hill area development & coastal area management.	8
IV	<b>Approval &amp; Clearance:</b> Preparation and procedure of approval drawings. Methods of enforcement & monitoring. Fire clearance, Structure safety approval, Environment clearance, consent to establishment, Occupancy & completion certificate, Indemnity Bond, other special clearances.	6
V	<b>Other Laws:</b> An overview of laws related to the profession of Architecture and Physical Development. Introduction to Labour Act, Building construction worker act & Real estate Bill 2017.	4
	<b>TOTAL</b>	<b>30</b>

## REFERENCE BOOKS:

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	V.S.Apte; Architectural Practice & Procedure	2008
2.	Roshal Namavati; Professional Practice	2008
3.	Dr. K.G.Krishnamurthy; Construction Management	2005
4.	Ministry of Urban Development; Model Building Byelaws	2016
5.	Bureau of Indian Standards; National Building Code (NBC)	2016



## 7AR3: ACOUSTICS &amp; ILLUMINATION

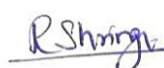
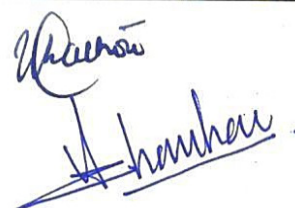
B.ARCH.: 7<sup>th</sup> Semester

Max. Marks: 100

2L

Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	<p><b>Fundamentals &amp; Behavior of sound:</b> Acoustics-need &amp; scope, pioneers and their works, Acoustics examples from past .Basic Theory: Generation, Propagation, Transmission, Reception of sound, Human ear and hearing, loudness perception, subjective effects. Basic terminology - Frequency, pitch, tone, timbre, sound pressure, sound intensity, loudness, threshold of audibility &amp; pain, wavelength and velocity of sound. Properties &amp; Characteristics of Sound. Reflection and absorption of sound. Inverse Square law, Decibel scale &amp; decibel addition.</p> <p>Behavior of sound in an enclosed space. Ray Diagrams, Sound paths, Effect of geometry and shapes. Sound Absorption coefficient, Reverberation, Calculation of reverberation time-Sabine formula. Acoustical defects in an enclosed space and their remedial measures.</p>	6
II	<p><b>Noise Control:</b> Physiological and psychological effects of noise. Types of noises-Structure borne &amp; Air borne noise, flanking of sound. Noise classification Outdoor and indoor noises. Transmission of noise &amp; Transmission loss, Noise control and sound insulation &amp; absorption. Sound leaks through openings.</p> <p>Acceptable noise levels for building types and indoor noise levels. Noise criteria curve &amp; noise reduction coefficient. Noise reduction through landscaping and design techniques. Land use planning for Noise control. Noise reduction from mechanical equipment their mounting details and insulation.</p>	4
III	<p><b>Design &amp; construction for sound:</b> Introduction to sound amplification and Distribution system. Selection of Acoustic materials like porous materials, membrane absorbers, cavity resonators, space absorbers, variable absorbers and their construction details and fixing. Environmental aspects of acoustical materials. Construction details of walls, partitions, floors, ceiling doors &amp; windows for Noise reduction.</p> <p>Acoustic design process in different types of buildings like Auditoriums, concert halls, lecture halls. Site selection, noise survey, room zoning and shape. Acoustical privacy in open plan offices. Halls for speech &amp; music .Raking of seats, stage forms etc.</p>	8
IV	<p><b>Illumination:</b> Introduction to illumination and Terms- lux, candle power , lumen, luminance, illuminance, luminous flux, luminous intensity ,glare etc. Evolution of lighting technologies. Light and vision . Photometry and measurement .Laws of Illumination such as inverse square law, cosine law, lamberts cosine law.</p> <p>Methods of lighting-ambient, task and accent. Classification of lighting systems-direct, diffused, indirect. Key technical terms such as CRI, CCT etc. Artificial light sources, types-incandescent, fluorescent, HID &amp; LID, LED and their application, advantages &amp; limitations.</p>	6
V	<p><b>Lighting Design:</b> Functional &amp; aesthetic uses of lighting. Characteristics of good lighting, Architectural lighting methods. Use of Artificial lighting as an element in Architectural scheme for Exhibitions, Museum, office, Residences, Outdoor Lighting road, façade &amp; landscape . Lighting techniques -Spot, Flood, Light beams etc.</p> <p>Lighting Design: Lumen method, Point by Point Method, Graphical representation of general Lighting scheme. Energy efficient lighting Design strategies.</p>	6
TOTAL		30

## REFERENCE BOOKS:

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Egan David; Architectural Acoustics; Mcgraw-Hills Book Co. New York	1988
2.	Leslie I. Doelle; Environmental Acoustics; MC graw-Hill book company, New York	
3.	Norbert Lachner; Heating, Cooling, Lighting - Design methods for Architects; Johnwiley & Sons New York	2001
4.	BIS; Handbook on Functional requirement of Buildings, (Part 1-4) ; BIS	
5.	Christina Augustesen; Lighting Design Principles, implementation case studies; Birkhauser, Boston	2006

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## 7AR4: ARCHITECTURAL DESIGN-VI

B.ARCH.: 7<sup>th</sup> Semester

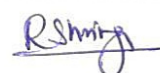
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UNIT	CONTENTS	CONTACT HOURS
I	<b>Theme:</b> Understanding the co-relation between the sight and the building / buildings through the integration of various site and landscape elements.	5
II	<b>Parameters:</b> Environmental and visual concerns in design such as building & open space orientation, sunlight & shade, wind movement, view & vistas, access, circulation & parking, topography, slope & drainage. Integration of various environmental and visual concerns in the built & open spaces.	5
III	<b>Expected Sills:</b> To develop ability to locate a building / buildings on site as per local building regulations, climate and site conditions in order to achieve mutually beneficial relation between built and open spaces using various available natural & man made elements such as land form, plant material, water bodies, pavements, buildings and site structures. To develop ability to plan and design access, circulation and parking at site level.	10
IV	<b>Design Outline:</b> Integration of built & open spaces in the design of multi-functional complex programmatic building project at District level in Urban or Rural context ideally on a building site required for a built up area of 2500 – 5000 Sqm. Course to be integrated with building mechanical services, acoustics & illumination, settlement planning & universal design.	5
V	<b>Projects:</b> A minimum of two design projects to be given in the semester from the list of suggested projects in various categories of building types : Residential: Group, Spatial Housing, etc. Educational: Diploma, Degree, Professional colleges, Science centre, etc. Public: Law courts, Art & Cultural Centre, etc. Health: Naturopathy & Yoga Centre, Hospice, Drug De-addiction centre, etc. Hospitality: Holiday, Beach, Hill, Dessert Resort, etc. Entertainment: Sports / Social Club, Water Park, etc.	110
	<b>TOTAL</b>	<b>135</b>

## REFERENCE BOOKS:

S.No.	NAME OF BOOK / AUTHOR/ PUBLISHER	YEAR OF PUBLICATION
1.	John Ormsbee Simonds,; "Landscape Architecture"; McGraw Hill	1997
2.	Charles W. Harris, Nicholas T. Dines; "Time-Saver Standards for Landscape Architecture"; McGraw Hill	2001
3.	Joseph De Chiara, Micheal J. Crosbie; Time-Saver Standards for Building Types; McGraw Hill	2001
4.	Ernest & Peter Neufert; "Architect's Data Part-I & II"; Black Well Science	2012
5.	Achyut P. Kanvinde & H. James Miller; "Campus Design in India"; United States Agency for International Development	1962









Max. Marks: 100

UNIT	CONTENTS	CONTACT HOURS
I	<p><b>Introduction and History of Human Settlement</b></p> <p>Definition and vocabulary of urban and regional planning. Definitions of town planning. Early human settlements — Causal factors and pattern of development. Human settlements of River valleys civilization (e.g. Indus-valley civilization, Egyptian civilization, etc. Early Vedic civilization patterns, Canonical patterns as per various Indian contexts.</p> <p>Human settlements during ancient Greek period, ancient Roman period, Medieval period (Western and Indian), Renaissance period, India during Islamic period, India during colonial period.</p> <p>Effects of Industrial Revolution on planning of cities (history and present scenario). Ancient System of Town Planning In India -Extracts from Chanakya's Arthashastra, Manasara's Vastushastra, planning thought behind Fatehpur Sikri, Shahjahanabad, Jaipur and Delhi. Basic Skill Development exercise: Introduction to graphic representation reading of drawing.</p>	10
II	<p><b>Forms of Human Settlements</b></p> <p>Structure and form of Human settlements: Linear, non-linear and circular, Combinations. Reasons for development, advantages and disadvantages, case studies, factors influencing the growth and decay of human settlements.</p> <p>Documentation of case study/ Literature reference study of suitable scale for understanding of the urban context.</p>	5
III	<p><b>Planning Theories and Techniques:</b></p> <p>Planning concepts related to garden city, geddesian triad, neighbourhood planning, radburn layout, ekistics, satellite towns and ribbon development.</p> <p>Various theories of planning like landuse theory, exploratory theories, speculative theories etc. Principles of Planning, Zoning, zoning regulations, Site planning. Types of plans- development plans, action plans, structure plans. Planning process of Master plan/Development plan preparation and its components, Approaches to physical and social planning, stake holders in planning process. Planning laws, legislation and amendments i.e. ULCAR, LAA, 73<sup>rd</sup> and 74<sup>th</sup> constitutional amendments, etc.</p> <p>Special Economic Zones (SEZs), UDRPFI recommendations.</p> <p>Levels of planning and steps for preparation of a town plan, survey techniques in planning, concepts, functions, components and preparation of a development plan. Defining characteristics of identified area.</p> <p>Planning project implementation techniques i.e. BOOT, BOT, BOLT, etc</p>	5
IV	<p><b>Urban Planning and Urban Renewal</b></p> <p>Post-independence Planned cities in India i.e. Chandigarh, Gandhinagar, Vidhyadhar Nagar, etc. Globalization and its impact on cities, Urbanisation, emergence of new forms of developments, self-sustained communities, SEZ, transit oriented development, integrated townships, case studies.</p> <p>Urban Renewal: Meaning, Redevelopment, Rehabilitation and Conservation. Urban renewal schemes i.e. JNNURM, etc.</p> <p>Case study and literature review of planning concepts and norms for selected area.</p>	6
V	<p><b>Transport Planning</b></p> <p>Introduction to transport planning: Network characteristics, Analysis and interpretations Intersections, Hierarchy and their design of roads, survey methods i.e. Trip generation, trip distribution, Modal Split Origin Destination survey, etc. Traffic signs. Level of services. Transport modes, technology and selection</p> <p><b>Planning Studio:</b> Selection of site, data collection, data analysis and presentation.</p>	5
	<b>Total</b>	<b>75</b>

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## REFERENCE BOOKS:

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	C.A.Doxiadis, Ekistics; "An Introduction to the Science of Human Settlements"; Hutchinson, London.	1968
2.	Arthur B. Gallion & Simon Eisner; "Urban Pattern"; D. Van Nostrand Co., New York	1963
3.	Ministry of Urban Development; "Urban Development Plans: Formulation & Implementation Guidelines"	1996
4.	A.K.Jain; "Urban Transport Planning and Management"; APH New Delhi	2009
5.	Sandhu. R. S.; "Sustainable Human Settlements"; Asian Experience, Rawat publications.	2001


**7AR7: ELECTIVE-III  
UNIVERSAL DESIGN**

B.ARCH.: 7<sup>th</sup> Semester

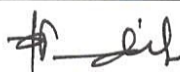
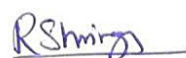
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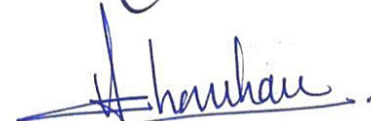
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UNIT	CONTENTS	CONTACT HOURS
I	<p><b>Introduction:</b> Universal design and its significance, need and role in various design fields in current context for people with different abilities. Universal Design awareness and education at national and international level.</p> <p>Seven International principles: Equitable Use, Flexibility in Use, Simple &amp; Intuitive Use, Perceptible Information, Tolerance for Error, Low Physical Effort, and Size &amp; Space for Approach &amp; Use.</p> <p>Five Indian Principles of Universal Design: Equitable, Usable, Cultural, Economic and Aesthetic.</p>	6
II	<p><b>Understanding Disability:</b> Types of disabilities based on mental, physical, function, age and extreme physical proportions. Study of groups comprising of people with disabilities and the necessary design requirements with respect to aspects of anthropometrics i.e. visibility, access and usage.</p>	6
III	<p><b>Universal Design: Guidelines &amp; Legal Provisions:</b> United Nations Convention on the Rights of Persons with Disabilities; UNCPRD, 2008. Acts, Bills, Policies, and Building guidelines in India: Disability Act 1995, Rights of Persons with Disabilities Bill 2012, CPWD Guidelines for Barrier Free Built Environment for Disabled and Elderly and Standard Emergency Evacuation Guidelines for Disabled by National Building Code.</p>	6
IV	<p><b>Universal Design: Building Level:</b> Design Standards for accessibility and usage in various building typologies both constructed as well as existing buildings: Residential, Institutional, Commercial, Hospitals &amp; Health facilities, Public Transit Buildings, Recreational Buildings and Hospitality Buildings. Design and Construction Strategies with respect to all kinds of disability at <b>Building Interior:</b> floor, walls, doors, windows, counters, railings, sanitary fixtures and signage. <b>Building Exterior:</b> pathways, parking, signage, levels and grooves, main entrance/ exit and approach to plinth. <b>Building Circulation:</b> vertical and horizontal elements such as corridors, staircases, lifts, elevators, ramps.</p> <p>Materials and surface finishes available, their types and construction techniques.</p>	18
V	<p><b>Universal Design: Urban Level;</b> For Streets, Pathways, Pedestrian Crossings, Foot over Bridges, Curb Ramps, Parking, Public Toilets, Parks, Bus Stops, Street Furniture, Signage. Materials available and their types and construction techniques.</p>	9
	<b>TOTAL</b>	45

**REFERENCE BOOKS:**

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Preiser Wolfgang, Universal Design Handbook	2001
2.	Adrian B. Robbins, Margaret A. Wyld, Building for a life time, The design for fully accessible homes	1994
3.	Steven Winner, Accessible Home Design,	
4.	Accessibility for the Disabled: A Design Manual for a Barrier Free Environment, UNCPRD	2008
5.	CPWD, Guidelines and space standards for barrier free built environment for Disabled and Elderly Persons	1998





**7AR7: ELECTIVE-III**  
**RESEARCH METHODOLOGY**

B.ARCH.: 7<sup>th</sup> Semester

Max. Marks: 100

3S

UNIT	CONTENTS	CONTACT HOURS
I	<b>Research – Introduction &amp; Design:</b> Research meaning and its significance in Architecture, Relationship between Design & Research, Areas of Research in Architecture, Qualitative and Quantitative Paradigms, Characteristics of Scientific research, Levels of Research, Components of research design, Identification of area of research, Defining the problem, formulation of hypothesis, collection of data through different primary and secondary sources. Analyzing the data and inferring from the data, concepts of dependent and independent variables. Defining the scope and limitations of a Research plan, Significance of the research outcome.	9
II	<b>Research – Types &amp; Techniques:</b> Historical research, comparative Research, Qualitative Research, Co-relational research, Experimental Research, Normative Research, Case study Research, Simulation & Modeling Research Pilot studies, Educational Research. Descriptive technique, pictorial technique, analytical technique, statistical technique semantic technique etc.	12
III	<b>Research Tools:</b> Interview techniques – Questionnaires, face to face interviews, internet survey, Designing a questionnaire, interview schedule. Visual Techniques – Observation (Participant / non-participant), Activity mapping, accretion & erosion trace observation, cognitive maps etc. Sampling techniques such as systematic, stratified, random etc.	9
IV	<b>Research Analysis</b> Understanding the relative advantage, disadvantages and application of various methods and choosing a method appropriate for a research to achieve its objectives, understanding the nature of data collected and methods of analysis suitable for that data i.e. graphical, numerical, descriptive. Introduction to the simple statistical methods of analyzing numerical data – frequencies / percentages, mean, median, mode, correlation, chi square test etc.	9
V	<b>Research writing</b> Different sections of a Research report, Technical writing and language. Abstract, synopsis, Executive summary. Writing Bibliography & References.	6
	<b>Total</b>	<b>45</b>

**REFERENCE BOOKS:**

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Groat L, Wang D.; Architectural Research Methods; John Wiley & Sons, Inc.	2002
2.	Kaplan A.; The Conduct of Inquiry; Chandler, San Francisco	1964
3.	Zumthor P.; Thinking Architecture; Birkhauser, Basel, Switzerland	2010
4.	Shinde S.P. (Dr.); Methodology of Research and issues in Education; Surabhi Educational Society, Hyderabad	2008
5.	Creswell J.W.; “Research Design : Qualitative & Quantitative Approaches”; Thousand Oaks : Sage	1994



## 7AR7: ELECTIVE-III

## ARCHITECTURAL JOURNALISM

B.ARCH.: 7<sup>th</sup> Semester

Max. Marks: 100

3S

UNIT	CONTENTS	CONTACT HOURS
I	<b>Introduction:</b> Architectural Journalism as a career and as an occupation of documenting, reporting, validating, writing, editing, photographing and forming opinion and criticism of a project or an architect's work. Role of Architectural Journalism in promoting architectural design theory and developing critical thinking.	3
II	<b>Architectural Journalism: Emergence &amp; Evolution</b> Global as well as Indian scenario. Emergence of Printed material such as Architectural Magazines and Journals such as Domus, Mimar, Indian Architect & Builder and Research Papers, Monographs, Biographies, Conference Proceedings, Articles and Coverage in national newspapers, as well as online Media.	6
III	<b>Tools of Architectural Journalism:</b> Resource finding, Writing content and verifying it through various sources like books, articles, papers, surveys, videos. Use of graphics like sketches, drawings, graphs, pie charts and photographs etc.	6
IV	<b>Critical Discourse:</b> appreciating or criticizing through project Documentations, Essays and Critical Writings with respect to architecture by Ada Louise Huxtable, Paul Goldberger, Robert Campbell, Reyner Banham, Peter Blundell Jones, Robert A. M. Stern, Lewis Mumford, Kenneth Frampton, Gautam Bhatia, Kaiwan Mehta, Rahul Mehrotra etc.	15
V	<b>Design &amp; Writing:</b> The student will use tools specific to architecture and construction to access, manage, integrate, and create information. The student is expected to create info-graphics, articles which document a project and critically analyze the pros and cons of one's work.	15
	<b>TOTAL</b>	<b>45</b>

## REFERENCE BOOKS:

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Kenneth Frampton; World Architecture 1900-2000: A Critical Mosaic; Vol.8 South Asia, China Architecture & Building Press	2000
2.	Rahul Mehrotra; Architecture in India since 1990; Pictor	2011
3.	Stern Robert A.M.; Architecture on the edge of Postmodernism, Collected Essays 1964-1988; Yale University Press, New Haven & London	2009
4.	Mohammad Al-Asad with Majid Musa; "Architectural Criticism & Journalism : Global Perspectives"; Umberto Allemandi & Co.	2005
5.	Groat L, Wang D.; Architectural Research Methods; John Wiley & Sons, Inc.	2002

