5AR1: BUILDING PLUMBING SERVICES

B.ARCH.: 5th Semester **Max. Marks: 100**

2L **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**Water Supply: sources, demand, treatment and distribution of water.** Sources of water supply, Plumbing system types for various buildings. Quality of potable water. Calculation of water requirements for various building types based on Indian standards (BIS). Water treatment methods– Screening, Aeration, Sedimentation, Filtration, Disinfection, Softening. Storage and distribution of water. Choice of pipe materials, types of fixtures and fittings.	6
II	**Sanitation: Sanitary pipes, fittings and fixtures- Layout and design** Principles of sanitation, Study of Indian standards and plumbing by-laws (NBC). Introduction to various sanitary pipes, joints, fittings and fixtures, their function, placement and constructional details. Study of internal & external drainage system of various buildings including small residences, apartments, public buildings etc. Single stack system, one pipe and two pipe systems, testing of house drains, Gradients used in laying drains and sewers, Self-cleaning and non-scoring velocities for drain pipes,	6
III	**Sanitation: Waste water treatment and disposal methods** Study of Traps, Inspection chambers, Manholes, Septic tanks, Soak pits, and Public sewage line. Study of Disposal systems for domestic effluent from fitting to sewer line. Study of low cost sanitary systems (sulabh complexes) and other CBRI details. Waste water – Sewage disposal, primary treatment, secondary treatment and tertiary treatment. Modern types of Sewage Treatment Plants.	6
IV	**Storm water drainage & Rain water harvesting** Principles of storm water drainage. Types of drain pipes. Storm water gutter / Storage sumps. Study of storm water disposal at site and settlement level. Rain water harvesting system. Recycling of water. **Solid waste, collections, treatments and disposal** Prevalent SWM practices and deficiencies: Storage of waste at source, collection, segregation, transportation of waste. Disposal of solid wastes: Sanitary land filling, Composting, Incineration, Pyrolysis – advantages and limitations. Biogas system and Modern renewable energy system.	6
V	**Application: Layout design and construction** Layout design and details of water supply distribution system in a Campus. Layout design and details of sewage and drainage system for different building types. Storm water drainage and rain water harvesting system design for a building project. Course may be integrated with concurrent architectural design.	6
	TOTAL	**30**

REFERENCE BOOKS:

S. No.	NAME OF AUTHORS / BOOKS/ PUBLISHER`	YEAR OF PUBLICATION
1.	B.C. Punmia, “Waste Water Engineering”, Laxmi Publications.	2009
2.	S.J. Arceivala, “Waste Water Treatment for Pollution Control”, Tata McGraw Hills Publication.	2008
3.	K.N. Duggal,”Elements of Environmental Engineering”, Chand & Co.	2010
4.	“Uniform Illustrated Plumbing Code – India (UIPC-I)”, Indian Plumbing Association	2014
5.	Charanjeet S. Shah; Water Supply and Sanitation; Galgotia Publication	2015
6.	H.S. Bhatia; Environmental Services (Plumbing); Galgotia Publication	

5AR2: HISTORY OF ARCHITECTURE-III

B.ARCH.: 5th Semester **Max. Marks: 100**

2L **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**RENAISSANCE & BAROQUE ARCHITECTURE** **Renaissance Architecture:** Characteristic features of the Renaissance Architecture. Famous designers and Works of the period Brunelleschi : Florence Cathedral, S. Maria Novella, S. Andrea Alberti: Palazzo Rucellai, S. Maria Novella; Bermanate: Tempietto, Plan of St. Peter's; Michelangelo: Laurentian Library, Campidoglio, St. Peter's Palladio: Villa Barbaro, Villa Americo Capra, S. Giorgio Maggiore **Baroque Architecture:** Characteristic features of the Baroque Architecture. Famous Designers and works of the period Bernini: St. Peter's- Plaza, S. Andrea.; Borromini: S. Carlo alle Quattro Fontane, S. Ivo Della Sapienza; Christopher Wren: St. Stephen, Walbrook ; St. Paul's Cathedral	6
II	**NEOCLASSICAL & INDUSTRIAL ARCHITECTURE** **Neoclassical Architecture:** Characteristic features of Neoclassical Architecture. Famous Designers and works of the period. Robert Adam: Kedleston Hall, Syon House; William Chambers: Somerset House; Louis Boullee: Cenotaph for Sir Issac Newton, Library of the King Claude Nicolas Ledoux: Salt works of Arc and Senans Karl Friedrich Schinkel: Royal Guard House, Altes Museum Sir John Soane: Bank of England; Thomas Jefferson: Monticello House, Virginia State Capitol. **Industrial Architecture:** Characteristic features of Industrial Architecture. Famous Designers and works of the period. Joseph Paxton: Crystal Palace; Henri Labrouste: Bibliotheque Ste.-Genevieve, Bibliotheque Nationale; Gustave Eiffel: Eiffel Tower, Statue of Liberty Emanuele Rocco: Galleria Umberto; George Gilbert Scott: St Pancras Station Charles Garnier: Paris Opera House	6
III	**LATE 19TH CENTURY MOVEMENTS** Characteristic features of Art and Architectural movements of late 19thCentury. People and places associated with the movements. Famous Designers and works of the period. **Art & Crafts Movement:** John Ruskin & William Morris; Philip Webb: Red House; Richard Norman Shaw: New Zealand Chambers; Greene & Greene: Gamble House **Art Nouveau:** Victor Horta: Tussel House, Hotel Van Etevelde; Hector Guimard: Paris Metro Entrances; Antonio Gaudi: Casa Mila, Casa Batllo and Church of Sagrada Familia; Charles Rennie Mackintosh: Glasgow School of Art, Hill House **Viennese Secession:** Otto Wegner: Postal Savings Bank; Josef Maria Olbrich: Secession Building; Adolf Loos: The essay "Architecture and Ornament", Steiner House, Moller House and Goldman & Salatsch Store.	6
IV	**EARLY 20TH CENTURY MOVEMENTS** Characteristic features of Art and Architectural movements of early 20thCentury. Famous Designers and works of the period. People and places associated with the movements. **Deutscher Werkbund:** 1st and 3d Exhibition Peter Behrens: AEG Turbine Factory; Bruno Taut: Glass house **Futurism:** Filippo Marinetti: Futuristic Manifesto; Antonio Sant' Elia: La Cita Nuova	6

	Constructivism: Vladimir Tatlin: Monument to the Third International; Konstantin Melnikov: Soviet Pavilion, Rusakov Workers' Club **Expressionism:** Erich Mendelsohn: Einstein Tower; Rudolph Steiner: Goetheanum **De Stijl:** Theo Van Doesburg& Piet Mondrian; Gerrit Rietveld: Schroeder House; J.J.P. Oud: Seaside Houses, Café de Unie. **Art Deco:** William Van Alen: Chrysler Building; Shreve, Lamb & Harmon: Empire State Building; B. Marcus Priteca: Pantages Theatre	
V	**British Colonial India** In search of appropriate style; development of hybrid styles; Indo Sarcenic, Indo Gothic and Indo Deco styles. Famous Designers and works in the major cities namely Madras, Calcutta, Bombay and Delhi. **Madras** Caldwell & Havilland: St Andrews Church; Robert F. Chisholm: Senate House and National Art Gallery; Henry Irwin: Madras high court, Chennai Central Railway Terminus **Calcutta** Thomas Lyon: Writer's Building; Charles Wyatt: Government Building; William Emerson: Victoria Memorial **Bombay** George Gilbert Scott: Rajbai Tower-Bombay University Library; Fredrick William Stevens: Victoria Terminus, Municipal Hall; George Wittet: Gateway Of India and Prince of Wales Museum **Delhi** Sir Edwin Lutyens: India Gate. Viceroy's House; Herbert Baker: Parliament House, Secretariat Buildings	6
	TOTAL	**30**

REFERENCE BOOKS:

S. No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Marian Moffett, Michael Fazio, Lawrence Wodehouse; Buildings Across Time; McGraw Hill	2004
2.	Francis D. K. Ching, Mark M. Jarzombek, Vikramaditya Prakash; A Global History of Architecture, John Wiley & Sons	2007
3.	David Watkin, A History of Western Architecture, Laurance King Publishing, London	2005
4.	John Lang, Madhavi & Miki Desai, Architecture and Independence, Oxford University Press, New Delhi	1997
5.	Kenneth Frampton; World Architecture 1900-2000: A critical Mosaic, Volume 8 South Asia; Springer-Verlag Wien New York	2000

5AR3: ARCHITECTURAL STRUCTURES-V

B.ARCH.: 5th Semester **Max. Marks: 100**
2L **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**RCC Beams Design**: Introduction to different types of beams, Design of rectangular beams; design of singly reinforced beams, design of doubly reinforced beam, design of T-beam, design of L-beam	8
II	**RCC Columns Design:** Introduction to RCC column, Design of square column, Design of rectangular column, Design of circular column	4
III	**RCC Slabs Design:** Introduction to RCC slab, Difference between one way slab and two way slab, Design of one way slab, Design of two way slab, Design of cantilever slab	6
IV	**RCC Footing Design:** Introduction, Pressure distribution beneath footing, Design of Rectangular footing, Design of square footing, Design of circular footing, Design of combined rectangular footing	6
V	**Retaining Wall Design:** Introduction, Types of retaining walls, Design of T-shaped retaining wall	6
	TOTAL	**30**

REFERENCE BOOKS:

S. No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	S Unnikrishnapillai & Devdasmenon, Reinforced concrete design; Third Edition, "Mcgraw hill publication education"	2002
2.	B C Punmia, Design of R.C.C. Structures; "Laxmi Publication"	2006
3.	P.C. Varghese, Limit state design of Reinforced concrete; Second Edition, "PHI learning private limited"	2011
4.	Ramanutham,Design of reinforced concrete design; "Dhanpat Rai Publication"	2011
5.	Kenneth M.leet & Dionisiobernal, Reinforced concrete design; "The McGraw Hills Companies"	2000

5AR4: ARCHITECTURAL DESIGN-IV

B.ARCH.: 5th Semester **Max. Marks: 250**
9S

UNIT	CONTENTS	CONTACT HOURS
I	**Theme**: Understanding the integration of structure and construction systems in design of Built Spaces.	5
II	**Parameters:** Structure and construction as disciplines that evolve making of a space. Structural systems as choices based on program, space and form character. Structure as a space maker and structure as order.	5
III	**Expected Skills:** To develop ability to study and analyze natural and man-made structural systems, co-relation between function, structure, space and form. Different structural models in building systems. Models as analytical tools of decision making. Understanding of Gravity loads transfer, structural grid and Framing systems. Co-relation between Structural Grid, Design Grid and Parking Grid.	10
IV	**Design Outline:** Integration of structure and construction in the design of a Multi-functional simple programmatic Building Project at Neighborhood level in Urban or Rural context, ideally on a Building Site for a built-up area of 501-1000 sq. m. The Course may be integrated with Structures, Building materials & construction and Interior Design.	5
V	**Projects:** A minimum of two Design Projects to be given in the semester from the list of suggested topics in various categories of Building types: Residential: Apartments, Students Hostel etc.; Educational: Primary, Secondary school, etc.; Commercial: Neighborhood shopping Centre, bank etc.; Recreational: Health clubs, Gymkhana etc.; Public: Neighborhood Centre, Marriage halls, etc.; Religious: Temple, Mosque, Gurudwara, Church etc.	110
	TOTAL	**135**

REFERENCE BOOKS:

S. No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Richard Weston; Materials Form and Architecture; Laurence king Publishing, Singapore	2003
2.	Gunter Pfeifer, Antje M. Liebers, Per Brauneck; Exposed Concrete Technology & Design; BirkHauser, Switzerland	2005
3.	Catherine Croft; Concrete Architecture; McGraw Hill, New Delhi	2004
4.	Donald Watson & Michael J. Crosbie; Time Saver Standards for Architectural Design, McGraw Hill	2004
5.	Francis D.K. Ching, Building Construction Illustrated, John Wiley & Sons	2001

5AR5: BUILDING MATERIALS & CONSTRUCTION-V

B.ARCH.: 5th Semester **Max. Marks: 200**

2L, 3S

UNIT	CONTENTS	CONTACT HOURS
I	**Damp Proofing** MATERIALS: Causes and effect of dampness, techniques and methods of damp prevention, materials used for damp proofing– flexible, semi-rigid and rigid materials. Damp proofing treatments in buildings. CONSTRUCTION: General preparatory work for damp proofing. Treatment of foundations, dampness from adjacent ground, treatment of foundation on poor soil, treatment above ground level. External and internal tanking, in-situ damp proofing treatment, cavity wall construction.	6L + 9S
II	**Water Proofing** MATERIALS: Difference in water proofing and damp proofing, various systems of water proofing, materials for water proofing such as bitumen felt and paints, epoxy formulations, lime concrete, slurry coats, polyethylene film, glass fiber tissue reinforced bitumen, etc. CONSTRUCTION: Preparatory work for water proofing. Water proofing for different roof types such as concrete and masonry flat or sloping roofs, timber sloping roof, shell roofs etc. Parapet and coping details, water proofing of underground reservoirs & swimming pools. Covering of expansion joints, water proofing techniques for roof gardens, etc.	6L + 9S
III	**Fire & Pest Resistance** MATERIALS: Important considerations in fire protection, Non-combustible and combustible materials. Properties of some common materials such as timber, stone, bricks, terracotta, steel, wrought iron, cast iron, Aluminum, glass, asbestos, cement, mortar etc. Classification of pests, effects of pests in buildings, pest control methods such as Biological, Environmental, Mechanical & Chemical. Laws & Regulations for pest control. CONSTRUCTION: General measures of fire safety in buildings such as smoke detectors, alarm systems, etc. Fire extinguishing arrangements, escape routes, etc. Pest control measures by design and constructional means for new and existing buildings. Design criteria internal & external anti-termite measures at foundation level & masonry level.	6L + 9S
IV	**Thermal Insulation** MATERIALS: Effects of heat transfer and thermal insulation behavior of the material and building components, General principles of thermal insulation, materials of heat insulation such as slab or block insulations, blanket insulations, loose fills, insulating boards, reflective sheet materials etc. CONSTRUCTION: Methods of heat insulation of roofs, exposed walls and exposed windows, doors and ventilators.	6L + 9S
V	**Protective & Decorative finishes and Machines & Equipment**: MATERIALS: Objectives of building finishes, characteristics and ingredients of a good paint. Paints: classification and types. Covering capacity of paints, preparation of paints. Varnishes & Varnishing; Objectives and characteristics of a good varnish, ingredients of varnish, types of varnishes, process of varnishing. Polishes & polishing. Distempers & distempering, properties of distempers. Miscellaneous finishes such as wall filling, papering, whitening, coal tarring, wax polishing, wood oiling, glazing etc. CONSTRUCTION: Application of paints on different surfaces such as wood, metal, plastered concrete surfaces etc. in detail. Application of varnishes, distempers in various building elements, components & furniture. Tools and equipment for various protective and decorative finishes.	6L + 6S
	TOTAL	**30 L+45 S**

REFERENCE BOOKS:

S. No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Handbook on Building Construction Practices, BIS, New Delhi	1997
2.	S.P. Arora, S.P. Bindra, Building Construction, Dhanpat Rai Publications.	2012
3.	Hegger, Auch-Schwelt, Fuchs, Rosenkranz, Construction Materials Manual; Brkhauser Boston	2006
4.	Francis D.K. Ching; Building Construction Illustrated, John Wiley & Sons	2001
5.	Barry R; Construction of Building, Vol.2; Affiliated East West Press Pvt. Ltd.	1999

5AR6: INTERIOR DESIGN

B.ARCH.: 5th Semester **Max. Marks: 100**

3S

UNIT	CONTENTS	CONTACT HOURS
I	The profession of Interior Design; Role of an Interior designer– past & present. **Interior Space**: Space as raw material; quantitative and qualitative study such as types of spaces; size of a space; organization of spaces, etc. Light as an animator of space, direct & indirect lighting. **Interior Elements:** Floor; Floor finishes, their functional and aesthetical criteria; floor coverings, etc. Wall; Wall finishes and their functional and aesthetical criteria; wall coverings, Ceiling; types; finishes and their functional & aesthetical criteria. Openings; such as Doors and Windows; their types and treatments. Inclined elements such as stairs; ramps; their types and finishes.	6
II	**Perception of Interiors:** Surface & Visual characteristics of Interior elements and their effect on the perception of space. Principal of Visual composition, Principle on where and how to perceive shapes & forms, the primary six principles such as figure-ground, closure, symmetry, proximity, similarity and continuance. Study of proxemics, behavioral settings.	6
III	**Furniture & Accessories**: An overview of historical perspective of furniture and styles. Interior styles such as Italian, English, French, Japanese, etc. Modern trends and contemporary attitudes to Interior Design i.e. Modular furniture. Utilitarian, Incidental and Decorative accessories in public and private interiors.	6
IV	**Interior Environmental System**: Understanding thermal, visual, auditory and sanitary condition necessary for comfort and convenience of occupants. Coordination of heating and air conditioning system, water supply, sanitary drainage system, electrical & lighting system and acoustics with a building's structural system.	6
V	**Design**: Interior Design process, Interior design concepts, Interior space planning & human dimensions. Two interior schemes of different functional types; Residential/ Commercial/ Institutional etc. at different scales will form the major design assignments. The course may be integrated with the concurrent architecture design.	21
	TOTAL	**45**

REFERENCE BOOKS:

S. No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Elizabeth Wilhide, The Interior Design Directory, Quadrille London	2009
2.	Francis D.K. Ching, Interior Design Illustrated, NY Van Nastrand Reinhold	1987
3.	Time Saver Standards for Interior Design & Space Planning, McGraw Hill	1992
4.	The Fundamentals of Interior Design, AVA Academic, Switzerland	2009
5.	Karla J. Nielson, David A. Taylor, Interiors an introduction, McGraw Hill	2002

5AR7: ELECTIVE-I (FURNITURE DESIGN)

B.ARCH.: 5th Semester **Max. Marks: 100**

3S

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction:** Furniture design and its types based on; function (sit, surface, storage etc.), state (movable, built-in, modular, stack etc.) and forms. Role of furniture design in interiors.	3
II	**Historical & Cultural Context of Furniture Design:** Industrial Revolution, Great Reform Movements: 1850-1914, Modernism to Pre-World War: 1900-1945, Post World War: 1945-1970s, Post Modernism: 1970-2000, Emerging design trends: 21st century.	9
III	**Materials:** types of materials, market forms, construction or assembly techniques such as bending, molding, casting etc. Joinery details, fabrication, tools and machinery involved.	9
IV	**Design & Production:** Concept generation methods and design, Developing design and drawing techniques, skills (analog and digital), Technical drawings (design and details) and Model on scale.	9
V	**Design:** The subject may be integrated with the concurrent course of Interior Design. At the term of the course, the students will formulate, develop and resolve design solutions for furniture and present it in a form of a portfolio made in appropriate scale. The portfolio must present all drawings and details with respect to ergonomics, aesthetics, materials and construction, on an appropriate scale.	15
	TOTAL	**45**

REFERENCE BOOKS:

S. No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Juli Capella & Quim Larrea, Designed by Architects in the 1980's, Mitchell London	1988
2.	Karla J. Nielson, David A. Taylor, Interiors an Introduction 3d Edition, McGraw Hill New York	2002
3.	Joint & Connection: Ideas in Furniture Design and their background, Birkhauser Verlag Basel.Boston.Berlin	1992
4.	Charles D. Gandy & Susan Z. Stidham, Contemporary Classics, furniture of the masters, McGraw Hill Book Company	1981
5.	Francis D.K. Ching, Interior Design Illustrated, NY Van Nastrand Reinhold	1987

5AR7: ELECTIVE-I (PRODUCT DESIGN)

B.ARCH.: 5th Semester **Max. Marks: 100**

3S

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction:** Product design and its types and need. Role of a product designer, product design process- research, development, production and marketing. Difference between Industrial and Product Design.	3
II	**Historical & Cultural Context of Product Design:** Industrial Revolution, Great Reform Movements: 1850-1914, Modernism to Pre-World War: 1900-1945, Post World War: 1945-1970s, Post Modernism: 1970-2000, Emerging design trends of 21st century.	9
III	**Common Materials and their application.** Hard Materials: Stone, Wood & Metals.	9
IV	**Design and production:** Concept generation methods and design, Developing design via sketching, on scale drawing techniques, skills (analog and digital), Technical drawings (design and detail) and Model on scale. Emphasis on ergonomics, material and aesthetics and user experience.	9
V	**Design:** The subject may be integrated with the concurrent course of Interior Design. A portfolio comprising of design for a product, presented in an appropriate scale. The design must fulfill the requirements such as ergonomics, aesthetics and construction technique.	15
	TOTAL	**45**

REFERENCE BOOKS:

S. No.	NAME OF AUTHORS/ BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Juli Capella & Quim Larrea, Designed by Architects in the 1980's, Mitchell London	1988
2.	Roland Knauer, Transformation: Basic Principles & Methodology of Design, Birkhauser Basel.Boston.Berlin	2008
3.	European Masters/ 3 vol. 10 Industrial Design, EDICIONES ATRIUM S.A.	1991
4.	Drawing for 3-Dimensional Design, Concept. Illustration. Presentation, Thames & Hudson.	1990
5.	Robert W. Gill; Rendering with pen & ink; Thames & Hudson	2003

5AR7: ELECTIVE-I (DIGITAL DESIGN)

B.ARCH.: 5th Semester **Max. Marks: 100**

3S

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction:** Digital design and its practices. Digital or computational Designs such as Parametric, Isomorphic, Metamorphic etc. and their techniques. Inter-relationships of geometric and architectural parameters.	3
II	**History & Evolution of Digital Architecture:** Works of Gehry Partners, Zaha Hadid, Morphosis, SOM, KPF, Foster & Partners, Greg Lynn, etc. with respect to computational designs and contemporary practices.	6
III	**Computational Design Thinking & Fundamentals of Software:** Basic concept formulation, computational thinking and lexicon, visualization. Rhino+ Grasshopper (exploring new NURB systems, using generative algorithms and 3D modeling tools and required plug-ins).	9
IV	**Digital fabrication & Scaled Models :** Creation of shop drawings (drawing issued for fabrication or production) Coordination of Autodesk software with Rhino, Grasshopper and similar files formats. Introduction to 3D printing, laser cutting and fabrication techniques.	12
V	**Design Portfolio:** At the end of the term, a portfolio will be made containing process documentation (sketches, diagrams both 2D and 3D)by setting up a layout or a scheme (composition of information on paper), using Adobe Illustration & In-design.	15
	TOTAL	**45**

REFERENCE BOOKS:

S. No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Jane Burry+ Mark Burry; The New Mathematics of Architecture, Thames & Hudson	2010
2.	Helmut Pottman, Andrea Asperl, Michael Hofer & Axel Kilian; Architectural Geometry, 1st Edition, Bentley Institute Press, Eton Pennsylvania USA	2007
3.	Roland Knauer,Transformation: Basic Principles & Methodology of Design, Birkhauser Basel.Boston.Berlin	2008
4.		
5.		

6AR1: BUILDING ELECTRICAL SERVICES

B.ARCH.: 6th Semester **Max. Marks: 100**

2L Exam Hours: 3

UNIT	CONTENTS	CONTACT HOURS
I	**Building Energy** Significance, Scope, Building Energy Sources-Conventional – Hydro, Fossil Fuels, Nuclear, etc. & Non-Conventional - Bio-Gas, Photo Voltaic, Wind, Wave Energy, etc. Building Energy Scenario - Trends in Consumption, Impact of user behavior and Energy Conservation. Terminology used – Electric Charge, Current, Voltage, Power, Resistance, AC & DC etc. Basics of electrical circuit- Ohm's Law & Kirchoff's Law- Series and Parallel Circuits.	4
II	**Electrical Transmission & Distribution** Transmission of electricity - Transmission Voltages, Power Factor and Power Loses. Electrical Distribution Systems- Demand, Tariff Legislation and Code of practice. Rules- National Electrical Code. Single Phase and Three Phase Supply Electrical Sub-Station – Transformer, Metering & Monitoring, HT & LT Panels, Switch Gears, Power Backup & Emergency Supply.	6
III	**Electrical Wiring and Installations** Types of wiring systems, Methods of Wiring, Joint and Loop-In. Types of electrical Wires and their choice in planning electrical wiring in Building Switch boards, Distribution boards, Sockets, junction boxes, control equipment, and other fittings and fixtures. Protection against overload, short circuit, earth faults, lightening Conductors and other safety measures. Special systems- Bus Way, Bus Bar Trunk, Race Way, lighting Tracks	8
IV	**Building Automation and Control Systems** Building Automations, Significance and Scope. Electronic and Communication Systems- Telecom, Intercom, Computer Systems and Data Networking- Wired & Wireless. Electronic Security System- Security and Surveillance Systems. Automatic Control Systems- Elementary Local Loop and complete control systems	4
V	**Electrical Layout Design** Single Line Diagram & Electrical layouts. Calculation of load for small project like Shop, Showroom, Office, Residence etc. Designing Basic Electrical layout to be integrated with concurrent Design Studio.	8
	TOTAL	**30**

REFERENCE BOOKS:

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	S.L. Uppal- G.C. Garg; Electrical Wiring Estimation and Costing; Khanna Publication	2010 – Sixth Edition
2.	Fred Hall & Rager Greeno; Building Services Handbook; Butterworth-Heinmann	2011 – Sixth Edition
3.	Raina K.B. & Bhattacharya S.K.; Electrical Design, Estimation and Costing; New Age International Publishers, New Delhi	2007
4.	Steve Doty & Wayne C. Turner; Energy Management Handbook; The Fourmount Press, USA	2009 – Seventh Edition
5.	B. Mazumdaar; Textbook of Energy Technology; APH Publishing Corporation	2005

6AR2: HISTORY OF ARCHITECTURE-IV

B.ARCH.: 6th Semester **Max. Marks: 100**

2L **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**MODERN ARCHITECTURE: The Great Masters** Factors contributing to the development of the style. The life, Philosophy and contribution of the Great Masters to Architecture Luis Sullivan: The Chicago School Of Architects, Auditorium Building, Wainwright and Guaranty Building, Carson Pirie Scott Store. Frank Llyod Wright: Prarie School Houses such as Winslow, Ward Willits and Robie House. Early Public buildings such as Larkin & Unity Temple. Usonian Homes such as Hanna House. The culmination of the idea of the Organic Architecture- Falling Waters. Later Public buildings such as Johnson Wax and Guggenheim Museum. Walter Gropius: Fagus Shoe factory & Bauhaus School. Mies Van der Rohe: Weissenhoff Housing Estate, German Pavilion at Barcelona, Farnsworth House, Illinois; Lake Shore Drive Apartments, Chicago; Crown Hall and Seagram Building, New York. Le Corbusier: Towards a new Architecture- the Five Points. Villa Savoye, Swiss Pavilion, Unite d'Habitation, Notre Dame du Haut. City Planning and Design of buildings of Capitol Complex at Chandigarh. Sanskar Kendra, Mill Owner's Association, Shodhan and Sarabhai houses at Ahmedabad.	6
II	**MODERN ARCHITECTURE: After The Masters** Life, Philosophy and Contribution of Modern Period Architects after the great masters. Alvar Aalto: Paimio Sanitorium, Viipuri Library, Villa Mairea, Saynatsalo Town Hall Louis Isadore Kahn: Salk Institute, California; Kimbell Art Museum, Texas; IIM Ahmedabad; Bangladesh National Assembly, Dhaka Eero Saarinen: TWA Terminal J.F. Kennedy Airport, New York; Dulles International Airport ; Kresge Auditorium and Chapel at MIT Kenzo Tange: Hiroshima Peace Memorial, Yoyogi Olympic Gymnasiums, Tokyo; Tokyo City Hall. John Utzon: Sydney Opera House, Kuwait National Assembly, Bagsverd Church, Denmark.	6
III	**POST MODERN ARCHITECTURE: Classicism & High-Tech** Post Modern architecture as a counter proposal to Modern architecture. Different Trends and Meanings of Post Modern Architecture. The Life, Philosophy and Contribution of Post Modern Architects. Robert Venturi: Vanna Venturi House and Guild House, Philadelphia and Sainsbury Wing National Gallery London. Philip Johnson: The Glass House, Connecticut; AT&T Building, Manhattan; National Centre for Performing Arts, Mumbai. Micheal Graves: Public Service and Humana Corporation Buildings, Walt Disney World Swan & Dolphin Resort Richard Rogers: Georges Centre Pompidou, Llyods Building, Millennium Dome. Renzo Piano: Tjibaou Cultural Centre, California Academy of Sciences. Norman Foster: HSBC Hong Kong, Sainsbury Centre for Visual Arts, Swiss Re Tower, Santiago Calatrava: Lyon Airport Railway Station, The Turning Torso.	6

IV	**POST MODERN ARCHITECTURE: Deconstructivism & Regionalism** The other flavors of Post Modern Architecture in the Developed and Developing World. Peter Eisenman: House VI, Wexner Centre for Visual Art, Bio Centrum Frank Owen Gehry: Walt Disney Concert Hall, Nationale Nederlander, Prague; Guggenheim Museum, Bilbao. Daniel Libeskind: Jewish Museum, Berlin; Imperial War Museum, Manchester ; Denver Art Museum Extension & Residences, Colorado. Zaha Hadid: Vitra Fire Station, Weil Am Rhein Germany; Phaeno Science Centre, Wolfsburg ; London Aquatics Centre. Hassan Fathy: Mosque, New Gourna; Ministerli House, Cairo; Hassan Rashad House, Ibiar Tanta, Egypt. Geoffrey Bawa: Parliamentary Complex, Sri Jayawardenapura; University of Ruhunu, Matara ; Kandalama Hotel, Dambulla; Sri Lanka. Laurie Baker: Loyola Graduate Women's Hostel, Centre for Development Studies, Indian Coffee House, Trivandrum.	6
V	**INDIAN ARCHITECTURE – Post Independence** Post Independence Indian Architects after Le Corbusier and Louis Kahn. Achyut P. Kanvinde: Campus Architecture, IIT Kanpur ; Dudhsagar dairy Complex, Mehsana ; National Insurance Academy, Pune; Nehru Science Centre, Mumbai. Joseph A. Stein: India International Centre ; Triveni Kala Sangam and India Habitat Centre, Delhi B. V. Doshi : Gandhi Labour Institute, CEPT, Institute of Indology, Ahmedabad ; Aranya Township, Indore; Vidyadhar Nagar, Jaipur; IIM Bangalore. Anant D. Raje : Indian Statistical Institute, Delhi ; Indian Institute of Forest Management, Bhopal; Farmers Training Institute, Palampur. Charles Correa: Gandhi Samarak Sangrahalaya, Ahmedabad; Kala Academy, Panjim; Jawahar Kala Kendra, Jaipur; British Council Headquarters, Delhi; Artist's Village, Belapur ; Chamapulimaud Centre for Unknown, Lisbon. Raj Rewal : Asiad Games Village, National Institute of Immunology and Scope Office Building, Delhi. Uttam C. Jain : Jodhpur University Campus Extension ; Indira Gandhi Institute of Development Research, Mumbai ; Nagar Nigam, Jaipur.	6
	TOTAL	**30**

REFERENCE BOOKS:

S.No	NAME OF BOOK / AUTHOR/ PUBLISHER	YEAR OF PUBLICATION
1.	Marian Moffett, Michael Fazio, Lawrence Wodehouse; Buildings Across Time; McGraw Hill	2004
2.	Francis D. K. Ching, Mark M. Jarzombek, Vikramaditya Prakash; A Global History of Architecture, John Wiley & Sons	2007
3.	David Watkin, A History of Western Architecture, Laurence King Publishing, London	2005
4.	William J. R. Curtis, Modern Architecture since 1900, Phaidon Press ltd.	1996
5.	Vikram Bhatt & Peter Scriver; Contemporary Indian Architecture, After the Masters;Mapin Publishing Pvt. Ltd.	1990

6AR3: ARCHITECTURAL STRUCTURE - VI

B.ARCH.: 6th Semester **Max. Marks: 100**

2L **Exam Hours: 3**

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction** Introduction to steel members, Uses of steel over RCC, Introduction to Rivet connections, Introduction to bolted connections, Introduction to welded connections	4
II	**Design of Tension members** Introduction to tension plates, Introduction to tie members in trusses, Designing of tension plates, Designing of tie members	6
III	**Design of Compression members** Introduction to steel columns and struts, Designing of steel columns, Designing of steel struts and uses of steel columns	6
IV	**Design of Beams** Introduction to steel beams, Designing of laterally supported beams, Designing of laterally unsupported beams, Uses of built up sections and steel beams.	6
V	**Design of Foundations** Introduction of grillage foundation, Theory of column bases, Designing of grillage foundation and Designing of column bases	8
	TOTAL	**30**

REFERENCE BOOKS:

S.No.	NAME OF BOOK / AUTHOR/ PUBLISHER	YEAR OF PUBLICATION
1.	Prof. R. Chandra, Design of Steel Structure (Vol.I); "Standard Publisher & Distributors"	2005
2.	Negi,Design of Steel Structure; "Tata McGraw Hills Publishing Co. Ltd."	2004
3.	S. Subramaniam, Design of Steel Structure; "Oxford university press"	2008
4.	B.C.Punmia& A K Jain, Design of Steel Structure; "Laxmi publication"	2006
5.	S.K.Duggal, Design of Steel Structure;"Tata McGraw Hills Publishing Co. Ltd."	2004

6AR4: ARCHITECTURAL DESIGN-V

B.ARCH.: 6th Semester **Max. Marks: 250**

9S

UNIT	CONTENTS	CONTACT HOURS
I	**Theme:** Understanding the integration of Building services in the design of built spaces. Introduction to various Building services as functional enhancer of space.	5
II	**Parameters:** Environmental concerns in design such as light, ventilation, water, waste and Energy. Integration of structural, constructional and spatial systems with Building Services systems.	5
III	**Expected Skills:** To develop ability to study and analyze natural and man-made, ancient and Modern Building services systems. Co-relation between structural, constructional, spatial and Building plumbing and Electrical systems. Requirement of services as per Building codes, Basic layout and Design of Plumbing and Electrical services in Buildings.	10
IV	**Design Outline:** Integration of services with structure, construction and function in the design of Multifunctional Simple Programmatic Building Project at community level in Urban or Rural context ideally on a Building site for a built-up area of 1001-2500 sq.m. Course to be integrated with Plumbing and Electrical services and landscape Design courses.	5
V	**Projects:** 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: Community Hostel, Youth, Hostel, etc. Educational: Higher Secondary School, Special school, etc. Health: Community Health Centre, Hospital, etc. Hospitality: Hostels, Motels, Resorts, etc. Commercial: Community shopping centre, commercial complex, offices, etc. Industrial: Industry, Laboratories etc.	110
	TOTAL	**135**

REFERENCE BOOKS:

S.No.	NAME OF BOOK / AUTHOR/ PUBLISHER	YEAR OF PUBLICATION
1.	Smith Lee; Plumbing Technology- Design & Installation; Delman Publishers Inc.	2007
2.	Fred Hall & Rager Greeno; Building Services Handbook; Butterworth-Heinmann	2011 - Sixth Edition
3.	Ralph Hammann, " Creative Engineering, Architecture, and Technology; DOM publishers	2010
4.	Pierre Loze, "Art & Build" Images Publishing	2009
5.	Joseph De Chiara, Micheal J. Crosbie; Time Saver Standards for Building Types; McGraw Hill	2001 – Fourth Edition

6AR5: BUILDING MATERIALS & CONSTRUCTION-VI

B.ARCH.: 6th Semester **Max. Marks: 200**

2L, 3S

UNIT	CONTENTS	CONTACT HOURS
I	**Pre-cast, Prefabricated & Pre-stressed Construction:** MATERIALS: Pre-stressing, prefabrication and precast and their present scenario in country. Standardization & modular coordination, jointing, tolerances, mass production storage and handling of materials. Types of pre-stressing techniques such as pre-tensioning & post tensioning. Advantage & disadvantages of Pre-stressing, Post-tensioning systems such as Freyssinet system, Gifford-Udall-cct system etc. CONSTRUCTION: Prefabrication technology – column & beam system, panel system, box system, Prefabrication techniques and various building components, Comparison between RCC and Pre-stressed concrete.	6L + 9S
II	**Long span structures**: MATERIALS: Structural, Design & constructional issues of long span structures, long span structure system such as *one way systems*: Beams in timber, steel & concrete; Trusses in timber & Steel; Arches in timber, steel and concrete; Cable Structures in Steel. Plate structures in timber & concrete; shell structures in wood & concrete. *Two way systems*: Plate structures in steel & concrete; shell structures in steel & concrete. Principles of pneumatic structures. Machines and equipments for long span structures. CONSTRUCTION: Constructional details of various structures in steel, concrete – portal frames, folded plate, domes, space frame, tensile structure etc.. Foundations for long span structures.	6L + 9S
III	**High Rise Structures:** MATERIALS**:** Different types of forces on high rise structures, Types of High Rise structures – Exterior structures such as Braced Frames, tube structures, tube in tube structure, Diagrid structures, trussed tubes, bundled tubes, space truss etc. Interior structures such as Rigid frame structures, Braced frame cores, shear wall cores etc. Machines &equipments for high rise construction. CONSTRUCTION: Deep foundations such as piles, caissons, diaphragm walls. Foundations under special conditions etc.	6L + 9S
IV	**Appropriate Construction Technology:** MATERIALS**:** Appropriate construction technologies used as an alternative for conventional practices. Selection Criteria and objectives for using such technologies. Application of Building Materials processed from Agricultural and Industrial waste. Introduction about agencies involved in promotion of such materials and technologies like BMTPC, CBRI, etc. Appropriate construction techniques, spanning systems, building components and Building Materials. Ferrocement its constituents & characteristics, comparison with RCC, various applications of Ferrocement. CONSTRUCTION: Appropriate construction techniques such as precast channel unit, RCC plant & joist, waffle unit, concrete L panel, Doubly curved shell, Ferrocement roofing channels, spanning systems such as corbelling, arch etc.	6L + 9S
V	**Advance Materials & Construction Technologies:** MATERIALS: Introduction and brief history of smart materials, classification such as smart, Intelligent, Repurposed, Transformational, nano etc. Innovation in materials such as Translucent concrete, LED tiles, ECO glass, Electroluminescent fabric, Reaction glass etc. Processing and conversion of materials. New technologies of construction. CONSTRUCTION: Lift slab construction, slip form construction.	6L + 9S
	TOTAL	**30L + 45S**

REFERENCE BOOKS:

S.No.	NAME OF BOOK / AUTHOR/ PUBLISHER	YEAR OF PUBLICATION
1.	Francis D.k. Ching, Barry S. Onoye, Douglas Zuberbuhler; Building Structures Illustrated; John Wiley & Sons	2009
2.	Michael Barnes, Michae Dickson, Thomas Telford; Widespan Roof Structures	2000
3.	Johann Eisele, Ellen Kloft, High Rise Manual; Birkhauser Boston	2003
4.	M.J. Tomlison; Foundation, Design & Construction; Longman Group Ltd.	1995
5.	Barry R.; Construction of Buildings, Volume 1, Foundation and on-site Concrete Walls, Floors and Roofs; Affiliated East West Press	1996

6AR6: LANDSCAPE DESIGN

B.ARCH.: 6th Semester **Max. Marks: 100**

3S

UNIT	CONTENTS	CONTACT HOURS
I	**Introduction to Landscape Architecture** Definitions, Hierarchy and Scope in Architecture. Landscape Design in History – Persian, Spanish, Italian, French, Mughal, English and Japanese Gardens. Contemporary concepts and concerns in Landscape such as living green roof, terrace, wall, etc. and Modifying micro climate w.r.t. Temperature, humidity, precipitation and percolation.	6
II	**Elements of Landscape Architectural Design** **Landform**: Significance, Expression, types and uses of Landform. **Plant material**: Significance, Types Characteristics and uses of plant material. Planting Design process and Principles. Plant Material in local context. Botanical & Common names, Characteristics and uses. Selection of Plants. **Water***:* Characteristics and uses of water in Landscape, Materials & Design of water features such as fountains and pools. **Pavement:** Types, Characteristics &. Uses of pavements in Landscape. Basic Pavement, Materials and Design. **Site Structures**: Steps, Ramps, walls, fences, seating, etc., their materials & design.	9
III	**Site Studies, Planning & Development** Site survey to study site characteristics such as Access, Topography, Vegetation, Hydrology, Views and Context. Site planning issues. Such as sitting individual buildings and relating Buildings to a site. Building clusters and Types of spaces, Site circulation and zoning of Activities & spaces on site.	6
IV	**Landscape Architectural Design Process & Services:** Basic Design Process: Research, Analysis, Design & Construction Drawings such as Master Plan, Grading Plan, Section and Planting Plan. Drainage & Irrigation System Layout plan, Outdoor Lighting System layout plan.	6
V	**Landscape Architectural Design Project** Design and Presentation of landscape scheme for Building Projects from the previous or concurrent, Architectural Design Studio, Small exercise to test application through design of parks, play grounds, road layouts, parking etc.	18
	TOTAL	**45**

REFERENCE BOOKS:

S.No.	NAME OF BOOK / AUTHOR/ PUBLISHER	YEAR OF PUBLICATION
1.	Michael Laurie; An Introduction to Landscape Architecture; Elevier Publications	1986
2.	Sylvia Crowe; Garden Design;	1994
3.	Geoffrey & Susan Jellicoe, Landscape of Man	1975
4.	Kevin Lynch, Site Planning,	1984
5.	PradeepKrishan, Trees Of Delhi, Penguin India	2006

6AR7: ELECTIVE-II - HISTORY OF ARCHITECTURE OF RAJASTHAN

B.ARCH.: 6th Semester **Max. Marks: 100**

3S

UNIT	CONTENTS	CONTACT HOURS
1	**Background & Historical context** Context and Physical Characteristics; Forces responsible for architectural development of Rajasthan like social, political and economic factors, culture and building resources, building techniques & processes characteristic to Rajasthan.	4
2	**Development and Evolution of architecture** Earliest archeological evidences – Mauryan & Post Mauryan period, Gupta & Post Gupta period, Pratihara period, Rajput period, Rajput-Mughal period, Rajput-British period; Buildings for the expression of power like Hill Forts & Citadels - Amber, Mehrangarh, Kumbhalgarh, Jaisalmer and Chittorgarh and palaces like City Palace Jaipur and City Palace Udaipur.	8
3	**The organic and the planned cities** Settlement patterns- Common planning principles & articulation of built form and the factors influencing their spatial organization; cultural values that shaped the overall architectural language; Brief understanding of planning of early cities with an organic character like Jaisalmer, Shekhawati towns and of planned cities like Jaipur.	8
4	**History of building craft** Traditional treatise - Rajvallabh, Devtamurtiprakaran, Prasadmandana, Rupavatra, Rupamandana, Vastushastra; Visual records - Manuscripts, miniature paintings, Mughal paintings; Local traditions of artisanship – artisans, temple builders, sculptors, stone carvers, inlayers, etc.	6
5	**Building types and their uses** Havelis and houses, temples and other religious buildings, bazaars and public buildings, buildings for water and gardens - examples from cities like Jaipur, Jodhpur, Udaipur, Jaisalmer, etc.	4
	TOTAL	**30**

REFERENCE BOOKS:

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Bannister Fletcher, History of Architecture, Twentieth Edition, CBS Publishers, Delhi	1999
2.	Shikha Jain, Havelis: a living tradition of Rajasthan, Shubhi Publications	2004
3.	The Stone Crafts of Rajasthan, CDOS, Jaipur	2011
4.	G.H.R. Tillotson, The Rajput Palaces: the development of architectural style, Oxford University Press, New York	1999
5.	G.H.R.Tillotson, Paradigms of Indian Architecture, Routledge	1997
6.	Rima Hooja, History of Rajasthan, Rupa Co., New Delhi	2006

6AR7: ELECTIVE-II - VERNACULAR ARCHITECTURE OF RAJASTHAN

B.ARCH.: 6th Semester **Max. Marks: 100**

3S

UNIT	CONTENTS	CONTACT HOURS
1	**Vernacular architecture in Indian context** Definition(s) of vernacular architecture and related terminologies; Difference between vernacular architecture and traditional architecture; Relevance of vernacular architecture in present context; Typologies in different climatic regions of India.	4
2	**Regional context and corresponding built form in Rajasthan:** Factors influencing the development of vernacular architecture like climate, topography, availability of building materials, resources, building skills and techniques. Conception of space and evolution of a generic form.	4
3	**Settlements and dwelling patterns** Regional dwelling patterns like *'dhanis'* (hamlets), villages and their overall adaptation in the said context; Settlements and their vicinity to water resource(s) as places of worship and social activity; water related architecture and typical water resources like *kua, kohar, baoli/bavdi, jhalora, bera/beri.*	8
4	**Typical built typologies** Study of relative built typologies for residential, religious and public use of cities like Jaisalmer, Jaipur, Jodhpur, Bikaner and Udaipur in terms of context, physical characteristics and culture.	8
5	**Characteristic spaces and thematic elements** Spaces like courtyards, platforms, jharokhas (balconies) etc.; Embellishments & Architectural expressions– Symbolism and Ornamentation, compound walls, patterns on doors and windows, mirror work and motifs, flooring patterns, etc.	6
	TOTAL	**30**

REFERENCE BOOKS:

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Amos Rapoport; House Form & Culture; Prentice Hall	
2.	Dora P. Crouch & June G. Johnson, Traditions in Architecture – Africa, America, Asia and Oceania, Oxford University Press, Inc., USA, 1st edition	2001
3.	J. Tod, Annals and Antiquities of Rajasthan; Volume-II, KMN Publishers, New Delhi	1983
4.	MinakshiJain&Kulbhushan Jain; Architecture of the Indian Desert; AADI Centre, Ahmedabad, India	2000
5.	Minakshi Jain &Kulbhushan Jain; Indian City in the Arid West;AADI Centre, Paldi, Ahmedabad, India	

6AR7: ELECTIVE-II - ARTS AND CRAFTS OF RAJASTHAN

B.ARCH.: 6th Semester **Max. Marks: 100**

3S

UNIT	CONTENTS	CONTACT HOURS
1	**Background & regional formation of Rajasthan.** Traditional geographical, political and cultural divisions; Pre-and proto history of Rajasthan focusing on various prehistoric cultures; Inter-religious interactions- Aspects of arts and crafts, literature and cultural relations with neighboring states during respective historical eras.	4
2	**Classification of Arts & Crafts based on nature and material used** The *Chhatiskarkhana* of Jaipur; Crafts - Jewelry, metal, wood, lac-based crafts, textiles, paper crafts, miscellaneous arts – Miniature painting, frescoes, etc.; Tribal crafts; Influence of arts and crafts on built form	6
3	**Building stone craft tradition in Rajasthan** Rock formations in Rajasthan and stone types; Shaping the stone – quarrying, selection, dressing, finishing, carving and patterning; Stone craft clusters in Rajasthan; Stone Masonry (walls; dry and with lime mortar / cladding and finishes).	6
4	**Building elements in stone** Structural elements in stone (foundations, columns, beams, brackets and roofs – flat and domed); Architectural elements in stone (jharokhas, copings, railings, jaalis); Landscape elements in stone (fountains, water bodies, benches, signage, lamps); Interior elements/sculptures/artifacts of various sorts; Maintenance of Stone Buildings.	8
5	**Reinterpretation of stone craftsmanship** The new generation artisan; Innovations and adaptations to new tools and applications in stone; contemporary use of stone while studying works of Raj Rewal, Charles Correa, Ashok B Lall and Nimish Patel,	6
	TOTAL	**30**

REFERENCE BOOKS:

S.No.	NAME OF AUTHORS / BOOKS/ PUBLISHER	YEAR OF PUBLICATION
1.	Rima Hooja, History of Rajasthan, Rupa Co., New Delhi	2006
2.	The Stone Crafts of Rajasthan- A Manual, CDOS, Jaipur	2011
3.	V.S. Bhatnagar, Life and times of Sawai Jai Singh, Impex India, New Delhi	1979
4.	Rajasthan Sate Gazeteers, Volume – 2, History and culture, Directorate District Gazetteers, GoR& Volume-3, Economic Structure and Activities	
5.	Jadunath Sarkar, History of Rajasthan	