NIRMA UNIVERSITY

Institute of Architecture and Planning

Bachelor of Architecture

Institute Elective – Annexure-I

Annexure-I

Institute Elective Courses as per Annexure-I:

Code	Elective	Code	Elective
2ARE51	Introduction to Environmental Planning	2ARE61	Site & Project management
2ARE52	Real Estate Planning	2ARE62	Mass media studies
2ARE53	Valuation	2ARE63	Alternative construction techniques
2ARE54	Intelligent Buildings	2ARE64	Reuse of building material
2ARE55	Architectural Journalism	2ARE65	Barrier free design
2ARE56	Architectural Criticism	2ARE66	Advanced computer application in Design – I
2ARE57	Ecology and Bio-diversity	2ARE67	Introduction to GIS
2ARE58	Heritage Conservation	2ARE68	Design with Ferro-cement
2ARE59	Retrofitting of Buildings	2ARE69	Lightweight Structure
2ARE60	Conservation Techniques	2ARE70	Advanced Computer Application in Design – II (Digital Fabrication)
		2ARE71	Introduction to Infrastructure Planning

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE51**
Course Title	**Introduction to Environmental Planning**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

- Understand the new environmental problems including the Global and Local issues
- Learn environment as agent in the transformation of human settlement.
- Comprehend importance of sustainability & new approaches to tackle environmental issues.

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Concept of environmental planning	• Concepts of Environmental Planning, History of Environmental Planning, Development of habitat patterns, settlement structure and form in response to environmental challenges.	6 hours
2	Ecology and ecosystem	• Concepts of Ecology and Ecosystem • Resource analysis for various ecosystems and development imperatives (land, geology, soil, climate, water, vegetation) characteristics, exploitation, causative factors for degradation, analytical techniques. • Urban Ecosystem. • Environmental Zones (Hill, coastal, arid, characteristics, resources, settlements pattern, problems and potentials, regulating mechanisms for development.	13 hours
3	Legislative framework	Environmental Policies and initiatives including policies, strategies, protocols, treaties and agreements	12.5 hours
4	Case studies	Various assignment and case-study discussion	6 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Ian L. McHarg ,Design with Nature
- Prasad ,Environment, Development and Society in Contemporary India: An Introduction
- Starke, Barry ,Landscape Architecture: A Manual of Environmental Planning And Design;
- Dhameja S.K., "Environmental Studies"
- Roorda N. et.al, (2012). "Fundamentals of Sustainable Development", Routledge
- Wheeler A., Beatley T., "Sustainable Urban Development Reader", Routledge, 2014
- Dara, S.S., A Text Book on Environmental Chemistry and Pollution Control, S.Chand & Company, New Delhi, 2007
- Malcolm D, Climate Change & Sustainable Development, Routledge, New York, 2008
- Odum, E.P., Barrett, G.W., Brewer, R., Fundamentals of Ecology, Thomson Brooks,
- Westman W., John Wiley and Sons, Ecology, Impact Assessment and Environmental Planning,
- Integrated Environmental Planning, James K. Lein, Blackwell Publishing
- AITP Reading Material on Environmental Planning and Design, Prof A. K. Maitra , SPA Delhi
- Ecology and Equity - The Use and Abuse of Nature in Contemporary India, Gadgil, M. and Guha, R., Penguin, 1995
- Environment and Development : The Place of Human Ecology in South Asian Studies Programme, Rambo, T.
- Environment Crisis and Sustainable Development, Bahuguna, S., Natraj, Dehradun,
- Environmental Issues and Researches in India, Agarwal, S.K. and Garg, R.K (eds), Himanshu Publications
- Environmental Law and Policy in India - Cases Materials and Statutes, Divan, S. and Rosencranz A., Oxford
- Environmental Problems in Third World Cities, Hardoy, J.E., Mitlin, D., and Satterthwaite ,D., Earthscan
- Our Common Future: The World Commission on Environment and Development, Oxford University Press, Oxford, New York

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L	T	P	C
2	-	1.5	3

Course Code	**2ARE52**
Course Title	**Real Estate Planning**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

- Understand the importance of Real Estate.
- Comprehend legal terminologies used in the field of Real Estate.
- Develop critical understanding of property market

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	**Syllabus**: **Topic**	**Sub Topic**	**Teaching hours**:
1	Importance of Real estate	• Introduction to the Real Estate Business • Nature and Description of Real Estate • Effective ways to manage, administer and sell property owned by another party or entity	3 hours
2	Marketing and financial aspects	• Legal Aspects of Real Estate including Property Documentation • Real Estate Marketing, Sales & Brokerage • Planning, Zoning & Development • Case Studies	6 hours
3	Property Administration	• legal issues of real estate financing with an emphasis on commercial transactions. • Understand the rights and responsibilities of different stakeholders	4 hours
4	Classification of ownership, Tenant and occupancy	• Mortgage • Freehold property • Leasehold property • Easements • Case Studies	9 hours
5	Valuation	• Land valuation and market demand • Housing Finance, Property Valuation & Taxation • Transactions related to NRIs/PIOs • Case Studies	8 hours
6	Taxation in Real Estate	• Income Tax, Service Tex, Wealth Tax, Property Tax, Tax Implication for NRIs/PIOs.	7.5 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Roshan Namavati,
- Manohar N. Dange, 1973, Valuation of Immovable Properties, the University of Virginia
- Talamo, The Real Estate Dictionary, fourth edition.
- Girish C. Gupta, 2000,Valuation of Immovable Properties under Direct Taxes
- Rangwala, 2015,Valuation of Real Properties
- Brandon Turner, The Book on Rental Property Investing
- Spencer Strauss, The Unofficial Guide to Real Estate Investing

Real Estate Regulatory And Development Act – 2016 (RERA)

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Institute Elective – Annexure-I

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L	T	P	C
2	-	1.5	3

Course Code	**2ARE53**
Course Title	**Valuation**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

- Understand various approches to valuation
- Learn about various techniques used in the field of valuation
- Integrate the valuation techniques with architectural practice

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Introduction to Valuation	• Definition and its importance • Cost, Price and Value • Importance of valuation • Purpose of Valuation	4 hours
2	Approaches to value	• Cost approach • Sales comparison approach • Income approach Case study discussion and Assignment	7 hours
3	Value classification	• Assessed value • Book value • Salvage value • Scrape value • Replacement value • Earning value • Potential value • Distress value • Speculative value • Monopoly value • Sentimental value	7 hours
4	Method of Valuation	• Land and building method • Rent capitalization method • Profit capitalization method • Development potential method • Direct comparison method	16 hours
5	Classification of ownership	• Mortgage • Freehold property • Leasehold property	2 hours

6	Easements	• Dominant and servant owner • Characteristic of an easement	1.5 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Roshan Namavati,
- Manohar N. Dange, 1973, Valuation of Immovable Properties, the University of Virginia
- Ministry of finance government of india 2009 ,Incomtax Department,Guide lines for valuation of immovable properties
- Girish C. Gupta, 2000,Valuation of Immovable Properties under Direct Taxes
- Rangwala, 2015,Valuation of Real Properties

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L	T	P	C
2	-	1.5	3

Course Code	**2ARE54**
Course Title	**Intelligent Buildings**

Course Learning Outcomes (CLO):
At the end of the course, students will be able to -

- Understand the concept of intelligent buildings.
- Explore features of intellinget buildings and service systems.
- Develop the capacity of Experiencing Space in Time & Motion.

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours
1	Intelligent building characteristics:	- Features and benefits of intelligent buildings. - The anatomy of intelligent buildings. - Environmental aspect. - The marketplace and other driving forces behind the emergence of intelligent buildings.	7 hours
2	Building automation systems & controls	- Philosophy, system configuration, system modules, distributed systems, communication protocol and on-line measurements. - Fire protection, security and energy management. Control objectives. Sensors, controllers and actuators. Control system schematics system design. Microprocessor based controllers & digital controls. Examples of sub-systems such as: Digital - Addressable Lighting Interface (DALI)	10 hours
3	Modern intelligent vertical transportation systems:	-Sky lobby, double-deck lifts, twin lifts, advanced call registration systems, large scale monitoring systems, applications of artificial intelligence in supervisory control, energy saving measures related to lift systems/escalator systems, other modern vertical transportation systems such as: gondola systems, materials handling systems, etc.	7 hours
4	Communication and security systems:	-Voice communication systems, local area network, wireless LAN, - Digital TV, CCTV, digital CCTV, teleconferencing, cellular phone system, and CABD. SMATV. Data networking. Short- and long-hauL networks.	10 hours

		- -Wideband network. Office automations. Public address/sound Reinforcement systems. Digital public address system. Modern security systems	
5	Structured cabling systems:	Characteristics and benefits. Standards, configurations and physical media. EMI/EMC issues, grounding problems. System design. Different Categories of cables.	2 hours
6	Integrating infrastructure technologies and systems:	The impact of information technology on buildings and people. Shared tenant services. Interaction and integration between building structure, systems, services, management, control and information technology. Application & design software packages.	1.5 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Horne R., Grant T., Verghese K.: LIFE CYCLE ASSESSMENT – Principles, Practice and Prospects, CSIRO PUBLISHING, Horne, Grant and Verghese 2009, Collingwood VIC 3066, Australia
- Clements-Croome, Derek, Intelligent Buildings: An introduction, Routledge, 2014
- Shengwei Wang, Intelligent Buildings and Building Automation, Spon Press, 2010
- Jim Sinopoli, Smart Building Systems for Architectures, Owners and Builders,
- Elsevier, 2010
- P. Manolescue, Integrating Security into Intelligent Buildings, Cheltenharn, 2003
- A. Dobbelsteen, Smart Building in a Changing Climate, Techne Press, 2009
- D. Clements-Croome, Intelligent Buildings: An Introduction, Routledge, 2014
- A. Oliviero, Cabling [electronic resource]: The Complete Guide to Copper and Fiberooptic
- Networking, John Wiley & Sons, 2014
- W.T. Grondzik, & A.G. Kwok, Mechanical and Electrical Equipment for Buildings, Wiley, 2015

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L	T	P	C
2	-	1.5	3

Course Code	**2ARE55**
Course Title	**Architectural Journalism**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to

- Established the concept of journalism in the field of Architecture
- Apprise the role of architectural journalism in identifying and formulating relevant buildings
- Develop the capacity to write critics on selected projects

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Introduction To Journalism	Concept of Journalism, Definition, History	9 Hours
3	Fundamentals of Journalism	Advantages of Journalism, concept of Ethical journalism, Journalism in design field	12.5 hours
4	Role of Journalism in general & in design field	Case Studies –Global & Local, Short Project	16 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Al-Asad, M., & Musa, M. (2006). Architectural criticism and journalism: global perspectives: proceedings of an international seminar organised by the Aga Khan Award for Architecture in association with the Kuwait Society of Engineers, 6-7 December 2005, Kuwait. Turin, Italy: Umberto Allemandi & C. for Aga Khan Award for Architecture.
- Allan, S. (2010). The Routledge companion to news and journalism. New York, NY: Routledge.
- Booth, G. G. (1918). The spirit of journalism and architecture. Place of publication not identified.
- Franklin, B. (2005). Key concepts in journalism studies. London: SAGE.
- Harcup, T. (2004). Who, what, where, when, why and how?: an introduction to journalism. London: Sage.
- Willis, J. (1990). Journalism: state of the art. New York: Praeger.

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L	T	P	C
2	-	1.5	3

Course Code	**2ARE56**
Course Title	**Architectural Criticism**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

- Explore relationship between design philosophies
- Examine theoretical concepts and its application in design
- Analyze and develop critical viewpoint on built works and present day practices

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Essay writing	• Book Review • Relation to design philosophy	9 Hours
2	Critical Reading	• Critical assessment of articles/readings on different design philosophies	6 Hours
3	Design statement	• Individual approach and philosophy of design and role of design in creating better built environment. • Design ideology that closely corresponds to one's own philosophy about design.	9 Hours
4	Integrative Studio	• Descriptive writing • Analysis of studio projects • Visual components of design • Representation of design project in terms of writing and communication	13.5 Hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Le Corbusier. (1986). Towards a New Architecture. Mineola: Dover Publications
- Aldo Rossi. The Architecture of the City
- K. Michael Hays. (2000). Architecture Theory Since 1968. New York:Columbia Books of Architecture
- Stephen A. Kliment. (1998). Writing: For Design Professionals. New York City: W. W. Norton & Company
- Venturi, R., & Museum of Modern Art (New York, N.Y.). (1966). Complexity and contradiction in architecture. New York: Museum of Modern Art.

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L	T	P	C
2	-	1.5	3

Course Code	**2ARE57**
Course Title	**Ecology and Bio diversity**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

- Understand major ecological issues related to human settlement.
- Learn about major ideas of natural selection, ecology, community, biodiversity, climate change and sustainability
- Formulate ecological basis of architectural design

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Introduction to Ecology	• Discussion and discourse on assessing the Value of Ecosystem and Ecosystem Services	4 Hours
2	Interaction in Ecological community	• Time problem – Based on population and prediction of change over time – assess the prediction based on based on their ecological logic and feasibility.	4 Hours
3	Ecological cycle	• Inter-relationships between ecological cycles • Discuss how ecological flows are inter-related and compare and contrast different ways of representing information on a concept map.	4 Hours
4	Biodiversity	• Explore the connection between the biodiversity of different ecosystems, various ecosystem services, and measures of human well-being.	10 Hours
5	Understanding Climate Change, Urban ecology and sustainability	• Identify the major human activities that contribute to climate change; List and categorize different ways that we might reduce the contribution of human activities to climate change. • Assessing the sustainability of our city and developing a perspective on becoming ecologically sustainable	7 Hours
6	Impact of Architectural Design on sustainability	• Exploring Building Life Cycle Assessment though digital and physical models	8.5 Hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Sharma P. D., (2009), Ecology And Environment, Rastogi Publications.
- Saligram Bhatt, (2004), Environment Protection and Sustainable Development, APH Publishing.
- Francisco A. Comín, (2010), Ecological Restoration: A Global Challenge, Cambridge University Press.
- D. D. Khanna, (1997), Sustainable development: environmental security, disarmament, and development interface in South Asia, Macmillan India.
- Tony Fry, (2009), Design Futuring: Sustainability, Ethics and New Practice, Berg, - Architecture.
- Marina Alberti, (2007) Advances in Urban Ecology: Integrating Humans and Ecological Processes in Urban Ecosystems, Springer.
- John M. Marzluff, (2008), Urban Ecology: An International Perspective on the Interaction Between Humans and Nature, Springer.
- P.K. Gupta, (2011), Methods in Environmental Analysis, Agro bios.

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE58**
Course Title	**Heritage Conservation**

Course Learning Outcomes (CLO):
At the end of the course, students will be able to -

- Student will develop sensitivity towards built heritage
- Student will develop capacity of Critical appraisal of the status of buildings

Syllabus: **16 weeks (2.5 hours/week)** **Total Teaching hours**: **37.5 Hr**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Introduction to Architectural conservation	heritage, Conservation, etc… terms associated with subject for initial study	4 hour
2	Causes of Decay	• Climatic causes • Biological causes • Manmade causes Case study presentation to explain the same	4 hour
3	Conservation procedures and framework	• Inventory preparation, listing and grading of heritage building • Documentation • Degrees of Intervention • Prevention, Preservation, Consolidation, restoration • Rehabilitation, Reuse, Reproduction, Reconstruction etc…	9 hour
4	Legislation, Policy and guidance	• Role of UNESCE • Role of National Level Bodies: INTACH, ASI, State Govt. Dept. of Archaeology • Role of local bodies	5 hour
5	Conservation of materials	• Earthen structures • Timber, Stone, Thatch • Structural metal, Finishes, Glass, etc…	5 hour

6	Conservation of Historic buildings	Case Studies: • Hagia Sophia, Istanbul, Turkey • Roman Theatre and the "Triumphal Arch" of orange, France • Temple of Ramses II at Abu Simbel, Egypt • Temple of Angkor Wat and Ta-Prohm, Cambodia • Taj Mahal, Agra • Qutub Minar, Delhi • Monuments of Champaner, Vadodara • Humayun's Tomb, Delhi	5 hours
7	Test and other Assignment discussion in class	Various assignment and case-study discussion will be conducted during sessions	5.5 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- N. L. Batra, Heritage conservation: preservation and restoration of monuments, Aryan Books International, 1996
- Robert A. Young, Historic Preservation Technology (New York, John Wiley & Sons, 2008
- Robert E. Stipe, ed. A Richer Heritage: Historic Preservation in the Twenty-First Century, Chapel Hill: University of North Carolina Press, 2003.
- Owen Hopkins. Reading Architecture: A Visual Lexicon, London: Laurence King Publishing, 2012.
- Sir Bernard Fieldon ,A Technical Manual
- Jukka Jokilehto, A History of Architectural Conservation
- Sir John Marshall, Conservation Manual
- All Charters by UNESCO
- Tilley, Chris, Handbook of Material Culture (2006)
- Dan Hicks, Mary C. Beaudry, The Oxford Handbook of Material Culture Studies (2010)
- Henry H. Glassie, Material culture, (1999)
- Aldo Rossi ,Architecture of the city
- John Ruskin Seven Lamps of Architecture
- Robert Ventury, Complexities and contradiction in architecture
- John Summerson, Classical Language of Architecture
- Hanno-Walter ,A History of Architectural Theory – From Vitruvius to present day
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties by ICOMOS
- Handbook on sesmic retrofit of Buildings by CPWD, Chennai
- Between two earthquakes – cultural property in sesmic zones by Bernald Fieldon

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE59**
Course Title	**Retrofitting of buildings**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

- Survey and assess structural condition of buildings.
- Learn about various retrofitting techniques
- Plan and execute the processes of retrofitting to have a strucurally stable buildings.

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Fundamentals of retrofitting	• Introduction to retrofitting • Terminology, definition and methods	3.5 hours
2	Retrofitting techniques	• Discussion of different retrofitting techniques Case study and presentation to explain the same	7.5 hours
3	Establish scope of safety / risks	• Identify hazards at the worksite, assess risks and implement control measures. • Use information from safety data sheets and organisational safe work method.	6 hours
4	Plan and prepare for retrofitting of structures	• Plan the retrofitting activity in accordance with all current legislative, regulatory and organizational requirements. • Identify the work to be undertaken • Explain government initiatives applicable to the retrofitting to the owner/occupier. • Complete risk assessments and follow safe work practices and emergency procedures. • Identify appropriate materials • Clean the work area and recycle or dispose of all waste materials.	20.5 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Central public works department & Indian building congress (2007). *Handbook on seismic retrofit of buildings.* Madras, India: Indian Institute of Technology.
- Paquette, J., Bruneau, M., and Brzev, S. (2004). Seismic Testing of Repaired Unreinforced Masonry Building Having Flexible Diaphragm, Journal of Structural Engineering, ASCE, Vol. 130, No. 10, October 2004, pp. 1487-1496.
- S. Syngellakis. (2013). *Retrofitting of Heritage Structures: Design and evaluation of strengthening techniques.* UK:WIT Press.

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE60**
Course Title	**Conservation techniques**

Course Learning Outcomes (CLO):
At the end of the course, students will be able to -

- Learn about importance of heritage buildings and its conservation.
- Explore different materials and techniques of conservation.
- Execute projects that needs to be restored or conserved using appropreate techniques.

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Introduction	History and modes of architectural conservation • Definition • Importance & need of conservation. • Various aspects of conservation of natural and manmade environment. • Classification of conservation — cultural, historical, urban areas.	3 hours
2	Process of Conservation	Listing and documentation, its importance and methods. • Measures of conservation i.e. protection, maintenance, restoration, reconstruction, • Adoption and adaptation. • Various methods applied for conservation of architectural buildings with examples.	10 hours
3	Structural Conservation	Case study discussion and illustrations using various examples • Various methods adopted for conservation of heritage structures in India and Abroad. • Theories of identification and conservation of heritage structures.	4.5 hours
4	Conservation	• Understanding of conservation processes and its	10 hours

	processes and Current Treatments	practical use and assessment and treatments of it. • Different types of treatments for conservation and its importance of it	
5	Conservation management	Methodologies to be adopted for conservation management. • Case studies in conservation related to adoptive reuse, building in context, preservation, urban conservation.	5 hours
7	Conservation Legislations	• Study of various charters, Acts relation to conservation of heritage structures. • Role of INTACH, UNESCO, ICOMOS, ASI, and other organizations. • Various methods/legislations adopted for encouraging conservation.	5 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- "Introduction: Choosing an appropriate treatment". Secretary of Interior's Standards for the Treatment of Historic Properties. U.S. National Park Service. Retrieved April 5, 2011.
- "Art conservation and restoration". Encyclopædia Britannica Online. Retrieved 29 April 2010.
- Rebano-Edwards, Susan. "Conservation of Stone Buildings - Simple Preservation Techniques for Ancient Buildings." Suite101.com. 20 January 2010.

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L	T	P	C
2	-	1.5	3

Course Code	**2ARE61**
Course Title	**Site & Project Management**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

- Understand roles & responsibility of site manager
- Learn about the methods of project monitoring and controlling
- Deploy methodology on construction site and implement it in practice

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Concept of Site Management	History, Background, Scope & Limitation	7 Hours
2	Project Monitoring & Control	Timescale, Budget, quality control, health & safety check, client-consultant communication, risk-factor	24.5 Hours
3	Case studies	Site management models around the world, Local case-studies	24.5 Hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- McCarthy, J. F. (2010). Construction project management: a managerial approach. Westchester, IL: Pareto -- Building Improvement.
- Andersson, C. (1996). Site management. Geneva: International Labour Office.
- Holroyd, T. M. (1999). Site management for engineers. London: T. Telford. Jha, K. N. (2011). Construction project management

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L	T	P	C
2	-	1.5	3

Course Code	**2ARE62**
Course Title	**Mass media studies**

Course Learning Outcomes (CLO):

- Students will become aware and understand five principal mass media - Film, TV, Print, Radio and Internet.
- Students will understand how the content of mass media shapes our thoughts, vision, ethics and action.
- Students will understand creativity and process behind Advertising, filmmaking, television production, newsprint, radio and the internet.

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	**Syllabus**: **Topic**	**Sub Topic**	**Teaching hours**:
1	Introduction mass media	• Brief history of mass media • Impact of mass media on society at large	4 Hours
2	Understanding what is fiction / non fiction	• What is Fiction / What is nonfiction • Story as a content – subject, plot, soace, character etc. • Types of stories – news, article, feature, interview, myth, legend, short stories etc.	10.5 Hours
3	Role of Advertising	• Principles of advertising and its impact on the the society	8 Hours
4	Process of idea to product	• Films and television: Pre shooting stage / Shooting stage / Post shooting stage • Processes like writing, Editing, Designing, recording, planning etc.	15 Hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Ang, I. (1996). Living Room Wars: Rethinking Media Audiences for a Postmodern World. London & New York: Routledge.
- Ewen, S. & Ewen, E. (1992). Channels of Desire: Mass Images and the Shaping ofAmerican Consciousness. Minneapolis: University of Minnesota Press.
- Gokulsing, K. M. & Dissanayake, W. (1998). Indian Popular Cinema: A Narrative of Cultural Change. London: Trentham Books.
- Parks, L. & Kumar, S. (eds). (2003). Planet TV: A Global Television Reader. New York & London: New York University Press.
- Askew, K. & Wilk, R. (ed). (2002). The Anthropology of Media: A Reader. Oxford: Blackwell Publishers.

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L	T	P	C
2	-	1.5	3

Course Code	**2ARE63**
Course Title	**Alternative construction techniques**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

- Learn about various aspects of alternative construction techniques.
- Apply the knowledge of construction techniques in building design.
- Design prototypes of buildings using non-conventional building methods and compare with conventional methods.

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Overview	• Importance of Alternative construction technique • Pros and cons of Alternative construction technique	3 hours
2	Approaches to different techniques	• Techniques • Material • Processes Case study and presentation to explain the same	3 hours
3	Alternative technique of load bearing construction	• Different material i.e. Brick, Stone, Mud and its construction techniques Case study and presentation to explain the same	9 hours
4	Alternative technique of frame construction	• Study of different Alternative technique of frame construction i.e. light steel frame construction, long span construction, etc. Case study and presentation to explain the same	5 hours
5	Alternative technique of composite construction	• Study of different Alternative technique of combination of load bearing & frame construction i.e. Vernacular buildings Case study and presentation to explain the same	11 hours
6	Non-conventional material	• Study of non-conventional material as building material Case study and presentation to explain the same	3.5 hours
7	Comparing conventional and alternative construction	• Cost compression • Durability • Maintenance • Easy of construction	3 hours

	techniques		

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Elizabeth Lynne and Adams Cassandra. (2000). *Alternative Construction Systems: Contemporary Natural Building Methods.* New York, NY: John Wiley & Sons.
- Johan van Lengen. (2008). *The Barefoot Architect: A Handbook for Green Building.* Bolinas, CA, 94924 USA: Shelter Publications.
- Levy Matthys and Salvadori Mario. (2002). *Why Buildings Fall Down: How Structures Fail.* New York: W.W. Norton

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE64**
Course Title	**Reuse of building materials**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

- Apprise waste material as resource for building construction
- Understand methods of reuse of materials
- Design and construct using recycled building materials

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Introduction	• Meaning of reduce, reuse & recycle • Importance of reuse of material	5.5 hours
2	Waste Prevention	• Concept of waste prevention • Resource Efficiency & Resource Efficient BuildingMaterials Case study and presentation to explain the same	5.5 hours
3	Construction and Demolition Recycling	• Construction and Demolition Materials Recovery & Debris Analysis • Recycling Economics • Architectural Reuse i.e. Architectural Reuse, Design for Reuse Case study and presentation to explain the same	5.5 hours
4	Design from used materials	• Prepare design drawings & models from used materials • Large scaled model of design • Prepare installation	21 hours

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Suggested Readings:

- Wann David. (1996). *Deep Design: Pathways to a Livable Future.* Washington: Island Press.
- Sim Van der Ryn and Stuart Cowen. (1996). *Ecological Design.* Washington: Island Press

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE65**
Course Title	**Barrier free design**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

- Understand concept of barrier free design in social contentext
- Explore Various alternatives of barrier free design
- Integrate barrier elements in design of buildings

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Principles	Introduction of Barrier free design and its basic principles.	3 hours
2	Importance of Barrier free concept	Barrier free concept and ways of implementation of it. Different examples to make a building barrier free.	5.5 hours
3	Standards, Learning from Case studies	Design standards of Barrier free designs Finding out the issues in the buildings, which are not designed as barrier free through case studies.	5 hours
4	Design Proposal	Design development to integrate the barrier free elements through, case studies Design for all, its understanding, as per the nation building code and examples to execute such design	24 hours

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Suggested Readings:

- Rhoads, M. A. (2010). The ADA companion guide: understanding the Americans With Disabilities Act Accessibility Guidelines (ADAAG) and the Architectural Barriers Act (ABA). Hoboken, NJ: John Wiley.
- 2015 International Building Code 1st Edition by International Code Council (Author)

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE66**
Course Title	**Advanced Computer Application in Design-I**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to

- Understand domain & scope of Computer Aided Design
- Applications of digital fabrication in architecture design
- Generate digital model of buildings & convert it to actual physical model

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Introduction	Overview of advanced computer application	5 Hours
2	Application of CAD software in design development	Domain & scope of Computer Aided Design, Design Scripts - Python, grasshopper, rhino etc.	15 Hours
3	Digital model to physical model	Digital Fabrication, 3d printing, laser cut, assembling of pieces etc.	17.5 Hours

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Suggested Readings:

- Braumann, J., Brell-Cǫkcan, S., Willette, A., McGee, W., & León, M. P. (2014). Robotic fabrication in architecture, art and design 2014. Berlin: Springer.
- Adriaenssens, S. (2016). Advances in architectural geometry 2016. Zürich: Vdf Hochschulverlag AG an der ETH Zürich.
- Beorkrem, C. (2013). Material strategies in digital fabrication. New York: Routledge, Taylor & Francis Group.
- Gramazio, F., Kohler, M., Picon, A., Roche, F., & Verebes, T. (2014). Made by robots: challenging architecture at a larger scale. London: John Wiley & Sons.
- Gramazio, F., & Kohler, M. (2014). Fabricate: Negotiating Design and Making. Zürich: Gta Verlag / Eth Zürich.
- Naboni, R., & Paoletti, I. (2015). Advanced customization in architectural design and construction. Cham: Springer.
- Pell, B. (2010). The articulate surface: ornament and technology in contemporary architecture. Basel: Birkhäuser.

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE67**
Course Title	**Introduction to GIS**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

- Understand basics of GIS
- Learn about of GIS as an advanced socio-economic planning and management tool
- Application of GIS in the spatial analysis and design process

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Introduction TO GIS	Concept of GIS, Definition, History, Components of GIS, Advantages of GIS	3.5 hours
2	Fundamentals of GIS	Function of GIS, Basic database: visual and numerical, software applications for GIS: ArcGIS & ArcView	14 hours
3	GIS applications in planning and design	Tools and techniques for analysis in GIS, presentation. Socio-economic and demographic analysis, Settlement planning: regional and urban planning. Natural resource management, other management applications	20 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Davis, B. E. (2001). GIS: a visual approach. Albany, NY: Delmar Thomson Learning.
- Grinderud, K. (2009). GIS: the geographic language of our age. Trondheim: Tapir Academic Press.
- Hanna, K. C., & Culpepper, R. B. (1998). GIS and site design: new tools for design professionals. New York: Wiley.
- Korte, G. (2001). The GIS book. Australia: Onword Press.

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE68**
Course Title	**Design with Ferro-cement**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

- Explore behavior and structural property of ferro-cement
- Learn about the ferro-cement structures from concept to actual construction
- Apply knowledge to design the ferro-cement structures

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Process of building structure	Structure and Structure form What is Structure and its importance in Architecture? Structural form - solid, Surface, skeleton, Membrane, hybrid Structural form - in Nature Structural form - man made Structural material strength, stiffness, shape	11.5 hours
2	Broad categorization of structural system	Structure types Membrane - Cable/membrane surface, cable nets, pneumatics Hybrids - Tension-assisted structures	6.5 hours
3	States of stresses	Vertical, Horizontal, Rational settlement and earthquake behavior	6.5 hours
4	Basic requirements of structure	Structural Element behavior Tensile, compressive, shear, torsion, bending Model testing and discussion discussion on why it fails?	6.5 hours
5	Types of loads & supports	Load on Structure Permanent – Temporary dead load, imposed load, thermal load, Dynamic load	6.5 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- Gargiani, R., & Bologna, A. (2016). The rhetoric of Pier Luigi Nervi. Forms in reinforced concrete and ferro-cement. Andover: Routledge Ltd.
- Ferro-cement: illustrated construction manual. (1971). Long Beach, CA: Romack Marine.
- Nervi, P. L. (1956). Ferro-cement: it's characteristics and potentialities. London: Cement and Concrete Association.
- Yates, C. (1970). Ferro cement. Sydney.
- Sandaker, Bjorn N. (2011) Structural Basis of Architecture, UK, Taylor & Francis
- Charleson, Andrew., (2015) Structure as architecture : Source book for architects and structural engineers, London, Taylor & Francis
- Schodek, Daniel L., (2014) Structures, New Delhi, PHI Learning Private Limited
- Seward, Derek, (2014) Understanding structures: analysis materials design, London, Palgrave
- Levy, Matthys, (2002) Why Buildings Fall Down: How Structures Fail, New York, W. W. Norton and Co.
- Salvadori, Mario. Structure in Architecture. Englewood Cliffs, NJ: Prentice-Hall, (1963)
- Deplazes, and Söffker. (2013) Constructing Architecture: Materials, Processes, Structures. Basel: Birkhäuser Verlag
- Hunt, Tony. (2003) Tony Hunt's Structures Notebook. Oxford: Architectural
- Muttoni, A. (2011) The Art of Structures: Introduction to the Functioning of Structures in Architecture. Abingdon, Oxford, UK: EPFL/Routledge
- Salvadori, Mario, Saralinda Hooker, and Christopher Ragus. (1980) Why Buildings Stand Up: The Strength of Architecture. New York: Norton
- Gordon, J. E. (1984) The New Science of Strong Materials, Or, Why You Don't Fall through the Floor. Princeton, NJ: Princeton UP

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE69**
Course Title	**Lightweight Structures**

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –

- Understand behavior of material and structural property in lightweight structure
- Learnd about lightweight structure from concept to actual construction process
- Apply knowledge to design and build lightweight structures

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Process of building structure	Structure and Structure form What is Structure and its importance in Architecture? Structural form - solid, Surface, skeleton, Membrane, hybrid Structural form - in Nature Structural form - man made Structural material strength, stiffness, shape	11.5 hours
2	Broad categorization of structural system	Structure types Membrane - Cable/membrane tents, cable nets, pneumatics Hybrids - Tension-assisted structures	6.5 hours
3	States of stresses	Vertical, Horizontal, Rational settlement and earthquake behavior	6.5 hours
4	Basic requirements of structure	Structural Elements Strut, tie, beam, slab/plate, panel Structural Element behavior Tensile, compressive, shear, torsion, bending Model testing and discussion Discussion on why it fails?	6.5 hours
5	Types of loads & supports	Load on Structure Permanent – Temporary Dead load, Imposed load, Thermal load, Dynamic load	6.5 hours

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- James Ambrose, (2012) Building Structure, Canada Wiley
- Millias, Malcolm, (2005) Building structures from concept to design, London, Spon Press
- Biggs, John M., (2014) Introduction to Structural Dynamics, New Delhi, McGraw Hill Education India Pvt Ltd
- Onouye, Barry S., (2015) Statics And Strength Of Materials For Architecture And Building Construction, Chennai, Pearson India Education Services Pvt Ltd.
- Sandaker, Bjorn N. (2011) Structural Basis of Architecture, UK, Taylor & Francis
- Charleson, Andrew., (2015) Structure as architecture : Source book for architects and structural engineers, London, Taylor & Francis
- Schodek, Daniel L., (2014) Structures, New Delhi, PHI Learning Private Limited
- Levy, Matthys, (2002) Why Buildings Fall Down: How Structures Fail, New York, W. W. Norton and Co.
- Salvadori, Mario. Structure in Architecture. Englewood Cliffs, NJ: Prentice-Hall, (1963)
- Deplazes, and Söffker. (2013) Constructing Architecture: Materials, Processes, Structures. Basel: Birkhäuser Verlag
- Hunt, Tony. (2003) Tony Hunt's Structures Notebook. Oxford: Architectural
- Muttoni, A. (2011) The Art of Structures: Introduction to the Functioning of Structures in Architecture. Abingdon, Oxford, UK: EPFL/Routledge
- Salvadori, Mario, Saralinda Hooker, and Christopher Ragus. (1980) Why Buildings Stand Up: The Strength of Architecture. New York: Norton

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Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE70**
Course Title	**Advanced Computer Application in Design – II (Digital Fabrication)**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to

- Understand the domain and scope of Computer Aided Design.
- Explore the software to design parametric forms and evaluate and analyze the form on various parameters.
- Generate physical models of the designed form using digital fabrication process

Syllabus: 15 weeks (2.5 hours/week) **Total Teaching hours: 37.5 Hrs.**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours:
1	Application of CAD software in design development	Exploring grasshopper as a tool to generate parametric forms and evaluate it using environmental analysis plugins. Plugins to be explored : Octopus Kangaroo Parakeet Weaverbird Pufferfish Anemone Ladgybug Rabbit CFD analysis Rhino Vault	22.5 hours
2	Physical models using digital fabrication	Constructing a physical model of the parametrically design form using digital fabrication process of Laser cutting, 3d printing or CNC cutting	15 hours

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Suggested Readings:

- Braumann, J., Brell-Cǫkcan, S., Willette, A., McGee, W., & León, M. P. (2014). Robotic fabrication in architecture, art and design 2014. Berlin: Springer.
- Adriaenssens, S. (2016). Advances in architectural geometry 2016. Zürich: Vdf Hochschulverlag AG an der ETH Zürich.
- Beorkrem, C. (2013). Material strategies in digital fabrication. New York: Routledge, Taylor & Francis Group.
- Gramazio, F., Kohler, M., Picon, A., Roche, F., & Verebes, T. (2014). Made by robots: challenging architecture at a larger scale. London: John Wiley & Sons.
- Gramazio, F., & Kohler, M. (2014). Fabricate: Negotiating Design and Making. Zürich: Gta Verlag / Eth Zürich.
- Naboni, R., & Paoletti, I. (2015). Advanced customization in architectural design and construction. Cham: Springer.
- Pell, B. (2010). The articulate surface: ornament and technology in contemporary architecture. Basel: Birkhäuser.

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Bachelor of Architecture

Institute Elective – Annexure-I

L	T	P	C
2	-	1.5	3

Course Code	**2ARE71**
Course Title	**Introduction to Infrastructure Planning**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

- Understand the basic concepts related to lifeline infrastructure and their significance to human settlements, environment, public health and hygiene
- Inculcate knowledge about storm water drainage system, water supply system, waste water drainage system, solid waste management and other services
- Apply the standards and relate to the concept of demand, supply, and management

Syllabus: **15 weeks (3 hours/week)** **Total Teaching hours**: **45Hr**

Unit No.	Syllabus: Topic	Sub Topic	Teaching hours: (Weeks)
1	Introduction to Basic Concepts	Role of the planner in planning of utilities and services Implications of utilities and services planning on public health and environmental protection Familiarizing with different manuals, codes and standards	2 weeks
2	Water Supply Systems	Water and health Surface and ground water sources, quality and quantity, location of sources and water intakes, area requirements of the components of water intakes Water requirement for different land uses, factors affecting water demand, per capita requirement and variations Water treatment system, location and space requirements Components of water distribution systems, Planning for Various uses, Storage and supply network Policy for urban and rural water supply	2 weeks
3	Storm Water Drainage System	Definition of Hydrology Classification, hydrological cycle, urban water cycle Types precipitation and measurement, rain fall analysis, surface water runoff, measurements of runoff, watershed Flood frequencies, and flood protection measures in urban areas, layout and design of storm water system, rain water harvesting systems	2 weeks
4	Sanitation and Sewerage Systems	Sanitation and public health Off-site and on-site sanitation and technology	2 weeks

		Low cost appropriate technologies for sanitation Disposal systems: Conventional and Alternate Standards for Indian cities: Sanitary sewer system network and layout planning, Sewage disposal methods, location criteria and capacity Financing and cost recovery for sewer system Social stigma associated with sanitation: use and disposal Public toilets National urban Sanitation Policy (City Sanitation Plans)	
5	Solid Waste Management	Solid waste management for Indian cities, quantity of solid waste and its character Methods of solid waste management, collection, transportation and disposal Land filling and composting, and other methods of pre and post treatment, location and cost aspects of different methods of solid waste disposal systems Community participation and involvement of NGOs in efficient solid waste management	2 weeks
6	Other Services	Telecommunication Services- Locational criteria for mobile phone towers Gas and oil pipelines Electric substations requirements, capacity, location and space requirement	2 weeks
7	Service Delivery and Management	Organizations- jurisdictions and financing PPP arrangements and government's role Distribution, companies and regulatory processes Case study on good practice, innovative methods for technology, service delivery, financing and regulation in all the above cases	3 weeks

L= Lecture, T= Tutorial, P= Practical, C= Credit

Suggested Readings:

- CPHEEO (2013) "Manual on Sewerage and Sewage Treatment" to be retrieved from http://cpheeo.nic.in/Sewerage.aspx
- Garg, S K (2010) "Water Supply Engineering" Khanna Publishers
- IDFC-Government of India (2011) "India Infrastructure Report: Water: Policy and Performance for Sustainable Development" to be retrieved from https://www.idfc.com/pdf/report/IIR-2011.pdf
- IDFC-Government of India (2007) "India Infrastructure Report: Rural Infrastructure" to be retrieved from https://www.idfc.com/pdf/report/IIR-2007.pdf
- IDFC-Government of India (2006) "India Infrastructure Report: Urban Infrastructure" to be retrieved from https://www.idfc.com/pdf/report/IIR-2006.pdf
- Morgan, Charles S (2010) "Regulation and the Management of Public Utilities" UK: Gale
- Peavy, Howard S., Rowe, Donald R. & Tchobanoglous, George (2013) "Environmental Engineering" Tata McGraw Hill
- Town and Country Planning Organisation (2015) "Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines" Ministry of Urban Development, Government of India; to be retrieved from http://moud.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf
- Kundu, Amitabh (1991) "Micro Environment in Urban Planning-Access of Poor to Water Supply and Sanitation" EPW, September, 14
- Mohan, Rakesh (2003) "Infrastructure Development in India: Emerging Challenges" Paper presented at Annual Bank Conference on Development Economics, Bangalore
- Shreyaskar, Pankaj K P (2016) "Drawing on the Right to Live with Human Dignity: Contours of Access to Water and Sanitation in India" EPW, December