

Minutes of the Board of Studies 2020 meeting

A Board of Studies meeting was held as Virtual mode in ZOOM platform on 1st July 2020 with the following agenda:

1. Welcome address, Opening remarks on the proposal to introduce REGULATION 2020 and the methodology adopted.
2. Comparative analysis of existing R 2015 and proposed R 2020 curriculum structure, R 2020 curriculum structure and Salient Features of Regulation 2020.
3. Detailed discussions on the proposed syllabus (from semester 1 to semester 4) and proposed Regulation 2020.
4. Any other matter with the permission of Chair.

At the onset, the Dean welcomed the members to the meeting of BOS and placed the agenda for deliberation of the members. The following deliberations were made as per the items of the agenda:

Dr. Devyani Gangopadhyay: explained the Retrospective outline of 2015 Regulations and scope for improvement. Then gave an overview about the concept for Regulation 2020 based on four focus areas being Energy conscious approach, Research Oriented, Flow of knowledge, User friendly and culturally responsive approach and how it is integrated with each semester was highlighted.

Followed by the Dean's initiation, the Syllabus Coordinator, Ar. Sheetal Amraotkar explained the following:

1. **Methodology** for framing the Syllabus which was based on inputs from the subject faculties, Students and the Professionals. The feedback consolidation from all were explained and this gave rise to the approach and requirements for broad changes in the curriculum. Further to this, comparative case study on five different syllabus was explained in brief, which enabled a cross verification with the current syllabus.
2. Ar. Sheetal Amraotkar then started explaining the subjects semester wise,
 - In Semester I:** Quantitative technique to be removed as it cannot be correlated without basic knowledge of Research methodologies instead it can be included in Semester 2 to quantify the research, Introduced new subject - SARA 5132 Building Energy & Environmental codes and standard, SARA 6131 Building Performance Analysis Studio I
 - SARA 8201 Research Methodologies in Built Environment to be included as a core subject in the first semester to form the foundation for research approach.
 - Semester II:** SMTA5241 Quantitative Technique is been included which will be used to validate the research component.
 - Elective component** is not offered in first two semesters Ar. Sheetal told, as we wanted to develop core competencies of the students in the initial semesters, to which Ar. Anupama completely agreed.
3. **In Semester III:** In regulation 2015, Design Studio III is been provided, now in regulation 2020 it is been removed and instead Dissertation is been introduced, to enhance the area of research and Elective I & Elective II was discussed


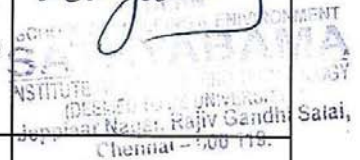






4. **In Semester IV:** EIA.Elective 3 and Thesis is been offered
5. Following Ar. Sheetal Amraotkar explanation, Ar.Anupama Mohanram appreciated the introduction of Building Performance Analysis Studio is great idea as it would keep the students up to date in new softwares,she also encouraged site visits for SARA 5133 Climate and Architecture in Tropics and EIA .
6. Followed by Ar,Anupama Mohanram', suggestion, Ar.Sheetal Amraotkar explained the Agenda II: The Conceptual Framework , Agenda III (A): Proposed changes to the curriculum in a nutshell & Agenda III (B):Semester wise discussion along with the credits
7. Ar, Anupama Mohanram enquired whether the Research Methodologies in Built Environment offered in Semester I is the basics of research, Ar Sheetal explained the various units in the subjects and it was accepted and appreciated by the expert.
8. ArAnupama Mohanram also appreciated the incorporation of Dissertation in Semester III as it would provoke the research interest among the students. She also insisted to be specific about the topic that needs to discussed in the built environment eg: Energy, water management etc.
9. Followed by ArAnupama Monhanram's Suggestions, Ar.Sanghavi explained the Subject SARA 5132 Building energy codes and Standards: where unit 1 & unit II covers the ECBC codes and unit III & unit IV discussed about SP14, which was also appreciated by the expert
10. Semester 1 subjects and studio were finalized by Ar. Anupama Mohanram
11. Followed by ArSanghavi' explanation ,Ar .Sheetal explained the Semester II subjects and the Studio in detail ,where she mentioned that the Design Studio would be divided into two projects, where the project 1: to be a medium sized project with all sustainable practices to be incorporated and Project 2: Retrofitting project
12. Followed by ArSheetal's explanation, Ar. Anupama suggested the project to be small, so the students can understand the various aspects of sustainability clearly and for the project 2: she said Retrofitting project was a good idea and can be picked anything within the campus. She said that the subjects and the studio's offered in semester II were fine.
13. Followed by Ar Anupamainputs, Ar Sheetal explained the Semester III Subjects, Electives, Training, Dissertation and Prethesis. ArAnupama asked to rethink of Elective: SARA 7333 Sustainable Building Practices as it looks generic and can be more focused and suggested to think of another elective or keep a case study itself as an elective, the students can identify the case study based on what aspect they wanted to do the study. This suggestion was cherished by the members in the meeting. Ar Sheetal suggested an open ended elective.
14. ArAnupama also suggested to have Green Building rating systems as core subject in Semester III instead of being offered as an Elective. The students can pick any rating system and address only the mandatory requirements to their particular project in Thesis, so that they learn sustainability in a holistic way. Ar. Sheetal conveyed that Green Building Rating Workshop was conducted in the semester where hands on calculations were given to students and they practiced simple calculations in the workshop. Ar. Anupama liked this concept.



15. Ar Anupama highlighted about the Practical training, since the time frame given for Practical training is limited to 30 days, she suggested the students go to site and learn as they can compare the material or even do a post occupancy study during their training period.
16. Ar Anupama advised that the Practical Training and the Dissertation can be linked.
17. Followed by Anupama Mohanram's Suggestion, Dean requested for consultancy projects, as the department is equipped with good climatology lab and their projects can be validated. Followed by Dean's request, ArAnupama agreed to look into the area of consultancy
18. Followed by ArAnupama's approval, Ar Sheetal explained about Semester IV Subjects, elective and Thesis and Environmental Impact Assessment is mandatory subject and that the new syllabus now included site visit also which was appreciated by ArAnupama.
19. Ar Sheetal explained the Thesis subject, which is culmination of all the Subjects, and Studio. Where the students can continue the Dissertation for their thesis or less it can completely be a new topic.
20. Followed by Ar. Sheetal's explanation, Ar Anupama concluded that the curriculum was comprehensive and was pleased with the overall flow and subjects incorporated with just few corrections and appreciated the team for the process.
21. The meeting came to an end with Dean thanking note.

Minutes approved by:

External Members	Internal Members	Signature
Ar. ANUPAMA MOHANRAM, Co-founder & Head-Architecture - Green Evolution Chennai	Dr. DEYANI GANGOPADHYAY Dean & Head Department of Architecture School of Building & Environment	 
Signature 	Ar. ARULMALAR RAMRAJ Associate Professor	
	Ar. SHEETAL AMRAOTKAR Associate Professor	
	Ar. SANGHAVI Associate Professor	



SEMESTER III

SARA5331	SUSTAINABLE URBAN PLANNING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE:

- To emphasize the importance of sustainable design practices and strategies in urban planning and settlement design.
- To understand the sustainable approaches in traditional settlements and the impacts of post-Industrial settlements.
- To explore the emerging sustainable urban design concepts and strategies.

UNIT 1 PRE-HISTORIC SETTLEMENTS

9 Hrs.

Traditional design strategies of human habitats in India - Principles of urban planning, classifications of human settlements in pre industrial era and other parts of the world with special focus on resource management and built forms in response to harsh climatic conditions - Concepts and principles related to Eco-Village.

UNIT 2 POST INDUSTRIAL REVOLUTION SETTLEMENTS

12 Hrs.

Urban pollutants and their impact on air, water, land and micro climate - Impact of built form density, building footprint, urban form including height and geometry, orientation of streets, etc. on micro climate especially light, ventilation and temperature.

Suggestive Assignment – Evaluating the impact of urban form on climate responsiveness by reviewing journal papers

UNIT 3 URBAN DESIGN STRATEGIES

9 Hrs.

Study of national planning standards - UDPFI guidelines. Improving environmental quality, energy efficiency, efficient resource management (soil, water, waste and materials) through appropriate site selection, effective neighbourhood planning and Urban design strategies - Transport planning, land-use zoning strategies, landscape planning etc. - Study of zero discharge sites and communities.

UNIT 4 EMERGING IDEAS AND CONCEPTS

9 Hrs.

Concepts related to urban renewal namely inner-city regeneration, revitalization of the "townships" and informal settlement / slum upgrading - Integrating renewable energy at neighborhood scale, smart grids, concept of solar cities, smart cities, eco cities.

Suggestive Assignment – Critically analyze the upcoming smart city projects in India as a Group work.

UNIT 5 COMPREHENSIVE LEARNING

6 Hrs.

Investigating our campus in an urban perspective and submitting proposal to enhance the performance of the campus – air, water and microclimate

Max. 45 Hours**COURSE OUTCOME:**

- CO1 Understand the sustainability principles at urban scale in selected cities.
- CO2 Learn traditional sustainable principles at settlement level with case examples.
- CO3 Critically analyse and assess the impacts of the post-industrial urban built form on the environment
- CO4 Outline the sustainable urban design strategies with case examples.
- CO5 Comprehend the emerging sustainable urban design concepts and strategies.
- CO6 Evaluate the suitability, strength and weaknesses of sustainable urban design strategies and concepts in different contexts.

TEXT / REFERENCE BOOKS

1. Beatley, T. (2010). *Biophilic Cities: Integrating Nature into Urban Design and Planning*: Island Press.
2. CIRIA. (2007). *TheSuDs Manual*, CIRIA. London: CIRIA, C697.
3. Emmanuel.R. (2005). *An urban approach to climate sensitive design: strategies for the tropics*. London: Span Press, Taylor and Francis.
4. Farr, D. (2008). *Sustainable Urbanism: Urban Design with Nature*. New York, NY: John Wiley & Sons.
5. Register, R. (2006). *Ecocities, Rebuilding Cities in Balance with Nature*. Canada: New Society Publishers.

WEBSITES

1. http://www.nmun.org/ny_archives/ny13_downloads/BGGU13UNHABITAT.pdf
2. <http://Planning%20Sustainable%20Cities%20UN-HABITAT%20Practices%20and%20Perspectives.pdf>
3. <http://www.newurbanism.org>

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100

PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks

PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks

Exam Duration: 3 Hrs.

: 08 x 05 = 40 Marks

: 04 x 15 = 60 Marks



SARA5332	SUSTAINABLE WASTE MANAGEMENT	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- To expose the students to the need, importance, types and management of solid waste.
- To understand the laws/ rules governing waste management and the strategies adopted in India and other countries
- To comprehend the innovative practices of utilizing waste in as resources in construction industry.

UNIT 1 INTRODUCTION TO WASTE MANAGEMENT 9 Hrs.

Introduction to waste management - Wastes generated by human habitat: solid, liquid and gaseous - Types of wastes: municipal, industrial, post-consumer, agricultural, toxic, bio-medical, hazardous, electronic, radioactive etc. - Overview of laws /rules governing waste management in India - Importance of community participation in waste management - Impact on health and sanitation.

UNIT 2 SOLID WASTE MANAGEMENT IN INDIA 12 Hrs.

Cradle to Cradle cycle of municipal waste – Segregation at source, storage, transportation, disposal and processing - Waste management in India- Current scenario, challenges, responses and pitfalls - Waste management in difficult terrains: hilly areas, high rain-fall areas, water fronts, etc.

UNIT 3 SOLID WASTE MANAGEMENT IN OTHER COUNTRIES 9 Hrs.

Overview of waste management from other parts of the world - Contemporary technologies and infrastructure for waste management - Designing infrastructure for efficient and effective solid waste management from generation point to final disposal: waste bins, cold rooms, transport mechanisms, landfill sites, incinerators, composting, etc. Grey water recycling in Singapore city regions. Designing collection system for waste in different types of building structure - Financial models for waste management - Role of NGOs in effective waste management, sanitation and health.

UNIT 4 WASTE AS A RESOURCE 9 Hrs.

Recycling industrial, agricultural and municipal waste - Recycling waste as alternative material for buildings, landscape and other products - Study of innovative practices for use of recycled material, specifications and construction methods for using recycled waste - Demonstrative architecture and landscape using waste, vermi-composting, biological and thermal energy options - Energy from sanitary landfills, refuse derived fuel and other options.

UNIT 5 COMPREHENSIVE LEARNING 6 Hrs.

Waste management in buildings – reducing waste disposal to the system – Sustainable approach - net zero waste buildings.

Max. 45 Hours**COURSE OUTCOMES:**

- CO1 Comprehend the various types of wastes generated in human habitats.
 CO2 Construct an overview and critically analyze rules governing waste management in India and other countries.
 CO3 Understand the challenges of waste management in environmentally sensitive areas in specific and diverse contexts.
 CO4 Outline of contemporary technologies and infrastructure adopted for waste management.
 CO5 Appreciate the ways through which the wastes are addressed as resources in various domains.
 CO6 Acquire the challenges in utilizing recycled materials in construction field.

TEXT / REFERENCE BOOKS

1. ERM.UK. (August,1995). *Municipal Solid waste Management, Study for the MMA-Vol-1 Interim Report*. UK.
2. William McDonough, M. B. (2002). *Cradle to Cradle: Remaking the way we make things.* -: North Point Press.

WEBSITES

1. http://roing.nic.in/NHPC_Docs/EMP/EMPDOCS/C12_SWM.pdf2
2. http://www.indiawaterportal.org/sites/indiawaterportal.org/files/Manual%20on%20municipal%20solid%20waste%20management_%20MoUD_GOI_2000.pdf
3. http://www.tn.gov.in/dtp/publications/SWM/SWM_161to184.pdf
4. <http://www.environment.tn.nic.in/SoE/images/WasteManagement.pdf>
5. http://planningcommission.nic.in/reports/publications/pub95_hghpwr.pdf

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****Exam Duration: 3 Hrs.****: 08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

SARA5333	GREEN BUILDING RATING SYSTEMS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- To get a complete overview of various kinds of green building rating systems and application in the industry.
- To understand the purpose, benefits and application of green building rating system.
- To enable students to evaluate the type of green rating system most suitable for a particular project

UNIT 1	INTRODUCTION TO GREEN RATING SYSTEMS	9 Hrs.
	History of green Rating systems- LEED, GRIHA, BREEAM, IGBC- Need and use of green rating systems - Structure of the rating systems- Design parameters that affect Green building ,Market response to various rating systems	
UNIT 2	GREEN RATING SYSTEMS IN INDIA	12 Hrs.
	In-depth study of the requirements of IGBC, LEED and GRIHA rating systems - Cross comparisons between the various requirements, their intents and ability of a project to meet the requirements - Other rating systems such as Eco House, Green Mark, Pearl, Living Building Challenge, Selection of the appropriate rating system for project.	
UNIT 3	APPLICATION OF RATING SYSTEM REQUIREMENTS	9 Hrs.
	Applying the Green rating systems in a project – Calculations involved in rating system, Role of Green building consultant- Determining the various green points- Green Accreditation examination and the procedure to apply	
UNIT 4	THE FUTURE OF RATING SYSTEMS	9 Hrs.
	Upcoming rating systems- Auditing after rating, Material certifications and stewardships, Audit - Green Audit, Energy modeling and energy auditing in green building ratings - Consultancy scope and services for green rating systems.	
UNIT 5	COMPREHENSIVE LEARNING	6 Hrs.
	Exploring and documenting case studies on Green Buildings highlighting various techniques and strategies adopted to achieve credits for LEED and GRIHA rated buildings. Preparing document for evaluating important credits that can be adopted to achieve	

Max.45 Hours**COURSE OUTCOME:**

- CO1 Understanding of the various green rating systems and practices across the globe and Indian Context
- CO2 Critically inquire the merits and demerits of Green rating Systems, Material Certification & stewardship, and their necessity
- CO3 Understanding Green Rating Systems application in projects and analytical knowledge of various green points required for projects towards achieving Green Rating
- CO4 Appraising the role of a green building consultant and the process of Green accreditation examination.
- CO5 Analyzing and evaluating the basics of energy modelling and auditing.
- CO6 Outlining the consultancy scope and services for green rating systems.

TEXT / REFERENCE BOOKS

1. Micheal Bauer, Peter Mosle, Micheal Schwarz (2010), Green building guide book for Sustainable Architecture, Springer
2. Sam Kubba, (2012). Handbook of Green building design and construction, Elsevier Inc
3. Reeder, L. (2010). *Guide to Green Building Rating Systems: Understanding LEED, Green Globes, Energy Star, the National Green Building Standard, and More.* (Wiley Series in Sustainable Design).
4. Yudelson, J. (2007) *The Green Building Revolution.* Island Press

WEBSITES

1. www.usgbc.org
2. www.igbc.org
3. www.grihaIndia.org
4. living-future.org/lbc

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****Exam Duration: 3 Hrs.****: 08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

S89APT	PROFESSIONAL TRAINING	L	T	P	Credits	Total Marks
		0	0	0	3	300
Continuous Assessment		University Viva			Min Pass Marks	
50		50			50	

COURSE OBJECTIVES:

- To undergo professional training in a firm to get experience of handling various environmental design practice, Sustainable developments and learn latest software trending in the market.
- To utilize the forum to discuss key issues in the projects, keep track of the different sustainable approaches, communicate with the stakeholders and get an overall view of the contract administration.
- The final project report will comprise of an in-depth research and analysis of activities in the form of drawings & relevant details, schematic charts & reports, photographs, documentation of the project, comments, suggestions, etc to appraise the efficiency in progress of work.

PROCEDURE

1. The candidate has to join an Architectural or Environmental design practice or organization and work on the design/ documentation of projects related to Sustainable Architecture and or Environmental site planning projects for a minimum of 30 working days during their summer vacation.
2. Weekly report has to be sent to the concerned Year Coordinator by the student duly signed by the head of the firm, which needs to be compiled in the comprehensive report later.
3. This comprehensive report shall be submitted at the end of the summer internship along with the Joining letter and experience letter.
4. The evaluation of report and viva voce examination shall be conducted as per norms for the Institution Semester examination.

COURSE OUTCOME:

- CO1** Accumulate concepts or skills with access to leading experts with specialized knowledge and experience.
- CO2** Obtain enhanced knowledge, develop communication skills and learn practical application aspects in the field.
- CO3** Manage projects using proven, effective performance measurement techniques.
- CO4** Analyze and recommend project decisions concerning scope, design, cost and other project parameters faster, effectively and confidently.
- CO5** Ability to prepare a portfolio of the academic and professional design work.
- CO6** Develop knowledge of the new software, materials, costing and documentation prevalent in Sustainable Architecture projects.

S89APROJ1	DISSERTATION			L	T	P	Credits	Total Marks
				0	2	10	6	300
Continuous Assessment		University Viva			Min Pass Marks			
200		100			150			

COURSE OBJECTIVES:

- To give students a broad and challenging experience that will formulate their thought process by in-depth investigation, analysis and critical review of relevant materials.
- To enable their understanding, cognitive and communicative skills, critic the existing practices in Sustainable Architecture based on the current practices, new trends and technologies.
- To provide students an opportunity to cultivate specialization in the areas of their own interest and undertake academic research or develop specific sustainable design independently.

COURSE CONTENT

Research Content: The Dissertation is an individual research project that is a major piece of work undertaken by the students. At the beginning of the third semester the students are required to be associated with a firm (Architects, engineers, project managers) for a period 30 working days within which they are expected to identify the topic of interest.

The aim is to prepare state of art report on the chosen topic and develop hypothesis to be tested through the research methodology designed for the purpose. Students are required to test their outcome proposals through various methods, including questionnaire surveys or case studies or prototype models. It is encouraged that students identify topics for the Dissertation work which can be further developed into a Thesis Project. Alternatively, this Dissertation Project can be an independent research topic or developed into a detailed design. Students must create an innovative insight on the specific issues.

Research Process: Dissertation work includes processes such as: Research area identification; hypothesis of research topic; literature sourcing and search; aim and objective definition; formulation of methodology; field study planning; survey data collection, analysis and result presentation; literature study; conceptual an empirical : compilation and inference drawing; research study validation through case studies, field application and simulation models; discussion of research findings; study conclusion and recommendation formulations.

The progress of the Dissertation work will be presented and discussed by the student periodically in the classroom environment and the progress will be monitored continuously. This work will develop the communication and presentation skills of the students. The students will be provided guidance from the faculty to channelize their thoughts.

Area of Research: Some of the area for Dissertation are Sustainable Architecture design, land use and planning, sustainable water management, sustainable urban planning, environmental issues, energy efficiency and conservation in buildings, building envelope design, renewable energy technologies, Eco cities, HVAC and IAQ design in buildings, healthy buildings, indoor and outdoor thermal comfort, vernacular approach to building design.

Presentation and paper: The final presentation is in the form of state of art report and poster size display sheets. At the final stage all students are encouraged to produce a publishable paper based on their research.

COURSE OUTCOMES:

- CO1 Pursue an idea of research with depth of inquiry, criticality and logic and carry out an in-depth investigation of an area of building services or management that he/she is interested
- CO2 Be able to demonstrate a high level of technical understanding of the design of buildings and associated construction processes and solutions.
- CO3 Understand and reflect a broad range of Sustainable Architecture theories and the technical knowledge gained from the entire course which may include the simulations
- CO4 Enable students to integrate such knowledge and skills, together with qualities of co-operative enquiry and reflective thought, in developing design solutions
- CO5 Develop an ability to research, analyze, evaluate and discuss a wide range of environmental tools, technologies and climatic strategies applicable to the practice of Sustainable architecture.
- CO6 Propose alternative updated strategies to improve energy efficiency of buildings and reduce carbon footprint

TEXT / REFERENCE BOOKS

1. Iain Borden, Katerina Ruedi, (2000) *The Dissertation: An Architecture Student's Handbook*, MA: Architectural Press.
2. David Bergman, (2013) *Sustainable Design: A Critical Guide (Architecture Briefs) 1st Edition*: Princeton Architectural Press
3. Kainth, G. S. (2011). *Climate Change, Sustainable Development and India*. New Delhi: LAP Lambert Academic Publishing.
4. Robertson, M. (2014). *Sustainability Principles and Practice*. London: Routledge.
5. John W. Creswell (2014), *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, Sage
6. Ali Sayigh. (2013) *Sustainability, Energy and Architecture: Case Studies in Realizing Green Buildings*, Academic Press

S89APROJ2	PRE-THESIS			L	T	P	Credits	Total Marks
				0	0	6	3	200
Continuous Assessment		University Viva			Min Pass Marks			
100		100			50			

COURSE OBJECTIVES

- To identify an area of research and design interest related to sustainable architecture and develop a thesis synopsis
- To facilitate the independent research skills of students
- To acquire a fresh approach in formulating an effective methodology that will help in the flow of the research

COURSE CONTENT**Research Content:**

The intent of pre thesis is to initiate the selection of thesis topic in the beginning of the third semester itself. The students shall work three alternative topics by studying and analysing the published research papers of their interest area and give justification for the selection of the topics which will be assigned to him / her to proceed to the next phase.

The subject for special study shall be conceptual or practical but pertaining to sustainable building and environment design practices.

Research Process:

Each student will prepare the Pre-Thesis with regular reviews by the faculty of the department. The Thesis will be presented in the accepted form of a Pre-thesis report duly supported by copious references, sketches, graphs, proposed statistical data, proposed details of survey, tools and techniques and methodology to be adopted and detailed account of experimental analytical procedures to be adopted.

The Pre Thesis will be presented in the accepted form of a Pre-thesis report duly supported by copious references, sketches, graphs, proposed statistical data, proposed details of survey, tools and techniques and methodology to be adopted and detailed account of experimental analytical procedures to be adopted.

Each student is required to defend his/her Pre Thesis at a Viva Voce Examination by jury. The Pre Thesis shall consist of literature, survey on the topic chosen in the relevant field, theoretical and or experimental work based on the literature and discussion.

Area of Research:

The subject for special study may pertain to sustainable building design, sustainable environment, climate change, carbon footprint, green technology, land use and planning, sustainable policy development, energy efficiency in buildings and more related to sustainable development.

Presentation:

The final presentation is to be in the form of state of art report and drawings.

COURSE OUTCOME:

- CO1 Identify area of research and design interest and synthesize related theories of sustainability into a comprehensive research and design project
- CO2 Ability to collect, organize and interpret pertinent data, analyse and evaluate relevant information independently
- CO3 Acquire knowledge about various methods to research and perform qualitative and quantitative analysis.
- CO4 Understanding of professional commitment to quality, timeliness, and continuous improvement
- CO5 Demonstrate good communication skills, ability to prepare and publish research papers.

TEXT / REFERENCE BOOKS

1. Ranjith Kumar (2005.) *Research Methodology- A step by step guide for beginners*, California : Sage Publications.
2. John W Creswell, (2002). *Research design: Qualitative, Quantitative and Mixed method approaches*. California : Sage Publications,.
3. Kate Turabian. (2018) *A Manual for Writers of Research Papers, Theses, and Dissertations*. Chicago:Chicago Guides to Writing, Editing, and Publishing.
4. Paola Sass(2006) *Strategies for Sustainable Architecture: Taylor& Francis*
5. Carl Stein (2010) *Greening Modernism: Preservation, Sustainability, and the Modern Movement*, New York . W.W. Norton & Co.



SEMESTER IV

SARA5431	ENVIRONMENTAL IMPACT ASSESSMENT TECHNIQUES	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- To introduce the various aspects of environmental impact assessment.
- To understand the components and impacts of EIA and socio-economic systems.
- To give an insight to sectoral EIA in diverse contexts.

UNIT 1 INTRODUCTION**9 Hrs.**

Historical development of environmental impact assessment (EIA) - EIA in project cycle, legal and regulatory aspects in India – Types and limitations of EIA – Cross sectoral issues and terms of reference in EIA – Public Participation in EIA - EIA process, screening, scoping, setting, analysis, mitigation.

UNIT 2 COMPONENTS AND METHODS**10 Hrs.**

Matrices – Networks – Checklists – Connections and combinations of processes - Cost benefit analysis – Analysis of alternatives – Software packages for EIA – Expert systems in EIA – Prediction tools for EIA – Mathematical modelling for impact prediction – Assessment of impacts: air, water, soil, noise, biological — Cumulative Impact Assessment – Documentation of EIA findings, planning, organization of information and visual display materials – Report preparation - EIA methods in other countries.

UNIT 3 IMPACT ON SOCIO-ECONOMIC SYSTEMS**10 Hrs.**

Definition of social impact assessment - Social impact assessment model and the planning process - Rationale and measurement for SIA variables - Relationship between social impacts and change in community and institutional arrangements - Individual and family level impacts - Communities in transition - Neighborhood and community impacts, selecting, testing and understanding significant social impacts - Mitigation and enhancement in social assessment - Environmental costing of projects.

UNIT 4 SECTORAL EIA**10 Hrs.**

Ethical and Quality aspects of environmental impact assessment, sectoral EIA -EIA related to the following sectors – Infrastructure, construction and housing, mining, industrial, thermal power, river valley and hydroelectric, coastal projects- Nuclear Power, hill area development and CRZ -EIA for coastal projects.

UNIT 5 COMPREHENSIVE LEARNING**6 Hrs.**

To make a report on the role of government and government agencies in emphasizing the adoption of CIA

Max 45 Hours**COURSE OUTCOME:**

- CO1** Explore about the legal and regulatory aspects overview of EIA in India.
CO2 Understanding of the components, methods, tools and documentation involved in EIA.
CO3 Analyse the impact of socio-economic systems and an insight to EIA methods in other countries.
CO4 Acquire knowledge about the various parameters in social impact assessment with examples.
CO5 Categorizing the ethical and quality aspects of CIA.
CO6 Identify the aspects and issues related to various sectoral EIA ranging from micro to macro level.

TEXT / REFERENCE BOOKS

1. book, E. A. (1998). *Guidelines for environmental assessment of energy and industry projects*, Vol. III: World Bank.
2. D.P., L. (2003). *Environmental Impact Assessment – Practical solutions to recurrent problems*, New Jersey: Wiley-Interscience.
3. J, P. (1999). *Handbook of Environmental Impact Assessment*, London: Blackwell Science - Vol., I and II.
4. L.W. C. (1996). *Environmental impact Assessment*, New York: McGraw Hill.
5. Nick Harvey, B. C. (2012). *Environmental Impact Assessment: Procedures and Practices*, USA: Oxford University Press.

WEBSITES

1. <https://www.cbd.int/doc/nbsap/EIA/India.pdf>
2. <http://coe.mse.ac.in/Guidelines.asp>
3. http://www.planning.nsw.gov.au/rdaguidelines/documents/emp_guideline_publication_october.pdf
4. http://www.gpcb.gov.in/pdf/Nuclear_Power_Corpo_of_India_Exe_Summ_Eng.pdf
5. http://www.inpcb.gov.in/pdf/EIA_Perambalur_%20SEZ%20Enq.pdf
6. https://www.env.go.jp/earth/coop/ccop/document/10_eiae/10_eiae_2.pdf

END SEMESTER EXAM QUESTION PAPER PATTERN**Max. Marks : 100****PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks****PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks****Exam Duration: 3 Hrs.****: 08 x 05 = 40 Marks****: 04 x 15 = 60 Marks**

S89APROJ2	THESIS	L	T	P	Credits	Total Marks
		0	0	24	12	600
Continuous Assessment		University Viva			Min Pass Marks	
400		200			300	

COURSE OBJECTIVES:

- To channelize the knowledge constructed on 'sustainable principles in architecture' and successful integration in the identified typology
- The project provides students an opportunity for academic research to cultivate specialization in the areas of their own interest under the overall guidance of the faculty.
- The objective of the seminar work is to train the students to prepare state of art report by assimilation of concepts / ideas on a chosen topic in the area of Sustainable Architecture.

Research Content: The Thesis is an individual research project that is a major piece of work undertaken by the students. It is a continuation of the Pre Thesis of the previous semester. They are expected to select a topic on a live problem in the industry or a macro-issue pertaining to Sustainability in field of Architecture. The topic should be researchable and involve scientific design of a study, collection and analysis. The aim is to prepare state of art report and drawings on the chosen topic and develop hypothesis to be tested through the research methodology designed for the purpose.

The thesis proposal should include an overview of the proposed plan of work, including the general scope of your project, your basic research questions, research methodology, and the overall significance of your study. In short, the proposal should explain what to study, how to study this topic, why this topic needs to be studied.

Thesis proposals are designed to

- Justify and plan (or contract for) a research project.
- Show how your project contributes to existing research.
- Demonstrate to your advisor and committee that you understand how to conduct discipline specific research within an acceptable time-frame.
- Recommend future study areas for research.

Research Process: Students are required to test their outcome proposals through various methods, including questionnaire surveys, case studies and simulations. Students must create an innovative insight on the specific issues.

Thesis work includes processes such as: Research area identification; hypothesis of research topic; literature sourcing and search, aim and objective definition, formulation of methodology, field study planning, survey data collection, analysis and result presentation; literature study; conceptual an empirical :compilation and inference drawing; research study validation through case studies, field application and simulation models; discussion of findings of research findings; study conclusion and recommendation formulations. The progress of the Thesis work is presented and discussed by the student periodically in the classroom environment and progress monitored continuously. This work develops the comprehension and presentation skills of the students. The students are provided guidance from the faculty to channelize their thoughts.

Area of Research: The subject for special study may be may pertain to sustainable building design, sustainable environment, climate change, disaster management, green technology, land use and planning, sustainable policy development, energy efficiency in buildings , waste and water management in projects, sustainable townships, application of green building rating system to projects, and more related to sustainable development.

Presentation: The final presentation is in the form of state of art report and poster size display sheets.

COURSE OUTCOME:

- CO1 To explore the sustainable principles relevant to the design typology and the context.
- CO2 To develop a hypothesis to be tested through the research methodology designed for the purpose with innovative insight on specific issues thereby undertaking academic research independently.
- CO3 To Perform an extensive literature study and data collection from the field and presentation in the form of drawings, relevant details/codes, schematic charts, reports and photographs.
- CO4 To analyse the incorporated sustainable ideals in the emergent outcome through various software tools.
- CO5 To critically analyse, evaluate and make informed judgment on the working of sustainable design strategies and substantiating the results with building model simulations, proposals and recommendation formulations
- CO6 To create an environment for students to explore and appreciate the impact of past, present and future technologies on the economy, society, and the environment with due consideration climate change and carbon foot prints.

(Devaraj)

ELECTIVES

SARA7331	SUSTAINABLE LANDSCAPE PLANNING AND DESIGN	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- To familiarize the fundamentals of landscape ecology, planning and management.
- To understand the various parameters involved in sustainable landscape planning.
- To develop skills to Use landscape strategies to enhance green building performance
- To give an insight into energy efficient landscape design

UNIT 1 LANDSCAPE ECOLOGY

9 Hrs.

Introduction to landscape ecology –Landforms and landscape process – Pattern and structure of landscapes– Concepts of patch, corridor and matrix - Landscape dynamics and function – Topological and chorological process within landscape - Concept of landscape metrics – Understanding dynamic interaction between landscape structure and function – Ecological services of landscape - History and Ecology.

UNIT 2 LANDSCAPE PLANNING AND MANAGEMENT

12 Hrs.

Principles of landscape planning- Reclamation and restoration of derelict landscapes - Conservation and preservation of ecological fragile areas such as wetlands, creeks etc., Relationship between man and nature – Analytical aspects of landscape - Evolution of landscape planning – Concepts and projects of McHarg, Carl Steinitz, Warren Manning, Ervin Zube and famous landscape planners. Case studies on landscape planning - Policies and Landscape management practices with emphasis on urban forest, urban ecology, river front development green belt - Regional open spaces, national parks, reserved forests, wet lands, coastal areas, channel networks and drainage basins.

UNIT 3 ENERGY EFFICIENT SITE PLANNING WITH LANDSCAPE

9 Hrs.

Relationship between site features and design requirements. Site selection, siting & orientation for energy conservation. Selection & use of landscape elements for microclimatic modification, Radiation, Wind, Temperature, humidity & precipitation modification. Design of sustainable landscape features such as bioswales, bio retention ponds etc. Contemporary concepts and concerns: "Green" Architecture and energy-saving site planning and Landscape Architecture practices.

UNIT 4 PLANTS AND SUSTAINABILITY

9 Hrs.

The role of plant material in environmental improvement such as soil conservation, slope stabilization and modification of microclimate. Planting for shelter, windbreaks and shelter belts. Understanding of plant characteristics, like texture, growth rate, form etc., Plants and sustainability, Criteria for plant selection. Planting design for various habitats such as grasslands, woodlands, sloping areas, marshes, bogs, wetlands, waterside, aquatic planting etc. Planting design and ecological considerations.

UNIT 5 COMPREHENSIVE LEARNING

6 Hrs.

Assignment will be in the form of individual study related to landscape planning projects, to identify project that has approached environmental issues through landscape planning principles which will be presented by the student in the form of an audio-visual presentation and a report on the same.

Max. 45 Hours

COURSE OUTCOME:

- CO1 Acquire knowledge on the landscape ecology process, structure and function.
- CO2 Explore the various concepts and phases involved in landscape planning and management
- CO3 Ability to incorporate the various strategies explored through case studies in design.
- CO4 Understand the diverse dimensions to be addressed in identifying preferences and suitability in design.
- CO5 Evaluate the building performance by variation in the vegetation density and typology.
- CO6 Illustrate an understanding of the landscape planning and design to achieve a sustainable design

TEXT / REFERENCE BOOKS

1. Ervin H. Zube, R. O. (1975). *Landscape assessment –values, perceptions*. New York: Dowden, Hutchinson & Ross.
2. Godron, R. T. (1986). *Landscape Ecology*. University of Minnesota: John Wiley & Sons.
3. Jr., G. T. (2004). *Living in the Environment: Principles, Connections, and Solutions*. -: Brooks /Cole publisher's co.
4. Marsh, W. M. (1997). *Landscape planning – Environmental Application, 5th Edition*. New Jersey: John Wiley and sons
5. Thomas W.Cook, A. M. (2011). *Sustainable Landscape Management*. New Jersey: John Wiley & Sons.
6. Turner, T. (1998). *Landscape Planning and Environmental Impact Design*. London: UCL Press.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100

PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks

PART B : 1 question each from unit 1 to unit 4 with an internal choice, each carrying 15 marks

Exam Duration: 3 Hrs.

: 08 x 05 = 40 Marks

: 04 x 15 = 60 Marks

SARA7433	ADAPTIVE REUSE AND RETROFIT	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES:

- To give a comprehensive overview on how existing buildings can be adapted and retrofitted to function sustainably.
- To analyze the technologies which can be adopted for improving the energy efficiency of existing buildings
- To understand the various strategies adopted to conserve heritage buildings.

UNIT 1 SUSTAINABLE RETROFIT FOR EXISTING BUILDING 9 Hrs.
Retrofitting options for existing buildings: structural retrofit, facade, services, interior retrofit - Performance analysis of existing buildings - Physical audits - Building Simulation - Metering and tracking options - Analysis the building's current performance- Decision influencers for retrofit- economic, social and environmental issues.

UNIT 2 ADAPTIVE REUSE OF OLD BUILDING 10 Hrs.
Need for adaptive reuse - Issues to be explored in building adaption- Economic, social, environmental, and assessment models for adaptive reuse - Case studies of buildings with adaptive reuse.

UNIT 3 TECHNOLOGIES FOR ENERGY EFFICIENCY IN EXISTING BUILDINGS 10 Hrs.
Improving energy efficiency in existing buildings- Facade improvements, HVAC improvements, Indoor Environment Improvements - Monitoring the performance of retrofits - Case studies on energy efficiency improvements in existing buildings.

UNIT 4 SUSTAINABLE CONSERVATION OF HERITAGE STRUCTURES 10 Hrs.
Conservation of heritage structures - Sustainability in heritage structures - Adaptive reuse of heritage structures - Issues in adapting a heritage structure - Use of sustainable conservation techniques - Improving the energy performance of heritage structures - Case studies of sustainable conservation in heritage structures.

UNIT 5 COMPREHENSIVE LEARNING 6 Hrs.
Select a historic building (more than 100 years old) / abandoned modern building (less than 50 yearsold). Study the current state and performance of the building in terms of environment, social & economic aspects. Based on the results of the study, provide a suitable solution to improve the structure, façade, function of the building, which in turn will reflect on the three pillars of sustainability.

Max.45 Hours

COURSE OUTCOME:

- C01** Understanding the various types and methods of validating existing building for retrofitting.
C02 Comprehending the ways to enhance the performance of existing building for retrofitting through audits, metering and simulation.
C03 Interpreting the strategies adopted from various 'adaptive reuse' case studies
C04 Critically analyzing the approaches adopted in improving the energy efficiency in different contexts.
C05 Ability to integrate energy efficient technologies to augment the performance of existing buildings.
C06 Exploring the issues involved in sustainable conservation of heritage structures.

TEXT / REFERENCE BOOKS

1. Sara J. Wilkinson, Hilde Remoy, Craig Langston, Sustainable Building Adaptation: Innovations in Decision-making, John Wiley and sons, 2014
2. John Krigger, Residential Energy: Cost Savings and Comfort for Existing Buildings, Prentice Hall, 2009
3. William H. Clark, Retrofitting for Energy Conservation, McGraw Hill Professional, 1997
4. Paul Apple, Sustainable Retrofit and Facilities Management, Routledge, 2013
5. Zeynep Aygen, International Heritage and Historic Building Conservation: Saving the World's Past, Routledge, 2013

WEBSITES

1. http://www.wbdg.org/resources/retro_sustperf.php
2. <http://www.intach.org/about-charter-guidelines.php>
3. <http://cpwd.gov.in/Publication/ConservationHeritBuildings.pdf>
4. <http://www.sciencedirect.com/science/article/pii/S0378778812004227>

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100

PART A : 2 questions each from unit 1 to unit 4, each carrying 5 marks

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