Suggested Learning Resources:

Books

1) Roger H. Clark and Michael Pause, " Precedents in architecture", 1984, John Wiley &Sons.
2) Geoffrey H Baker , "Le Corbusier an analysis of form", 1996, Van Nostrand Reinhold.
3) Herman Hertzberger, "Lessons for students in architecture", 1991, Delft University.
4) Charles Correa , "A Place in shade", 2010, Penguin India
5) Rem Koolhaas, "Conversation with students", 1996, Princeton Architectural Press.

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
- https://www.youtube.com/watch?v=FfJ6j0NjfDo
- https://www.youtube.com/watch?v=TY_aB4TLsUA
- https://www.youtube.com/watch?v=dRKVZZ9Srcc
- https://www.youtube.com/watch?v=_AOzpFXocKI

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Activity 1: Case study and document a campus in a nearby place.

Activity 2: Research and document a building or a campus or a gated community which has implemented several sustainable passive design techniques and approaches (such as waste water, storm water, passive design, energy generation, materials, etc).

VI Semester

Materials and Methods in Building Construction -VI			
Course Code	**21ARC62**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:3	SEE Marks(VIVA)	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	-

Course objectives:

To acquaint the students with construction practices pertaining to structural glazing, Metal Cladding and roofing systems and to study constructional systems and detailing of alternative material doors, windows and partition. This course will also examine their thermal properties, passive cooling possibilities, capabilities for mitigating climate change related impacts (heat, humidity and precipitation) and circularity (recyclability) of each material studied.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. The subject teacher to link the studio work with on site work by arranging site visits in the nearby areas.
2. The Subject teacher to highlight the uses of various types of Glass in a building.

Module-1

1) **Glass as a building material:** Glass manufacturing in various types like plate, tinted, decorative, reinforced, laminated glass block, fibreglass, glass murals, partially coloured glass, etching of glass and its applications in building industry for both exteriors and interiors. Glass fabrication techniques, fibre reinforced composite materials and products. Qualitative and quantitative study of the material's contributions to increased building solar heat gain in the tropics, increased air conditioning load and hence artificial cooling energy needs, and inability to promote natural unassisted night-time cooling through spontaneous release of accumulated heat. Study the life cycle environmental impacts, carbon emissions and recyclability of Glass as a material used in building construction.

2) **Frameless glass doors and windows and partitions:** Fixing and fabrication details.

Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material applications in the form of a portfolio.

Module-2

3) **Structural Glazing and cladding:** Fixing and fabrication details.

4) Point supported glazing: Fixing and fabrication details**.**

5) **Introduction to metal cladding:** ACP, Aluminium louvers; Fixing and fabrication details.

Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material applications in the form of a portfolio.

Module-3

6) **Glass and Metal cladding of facades and building envelopes:** Fixing and fabrication details. Qualitatively and quantitatively study the material's contributions to increased building solar heat gain in the tropics, increased air conditioning load and hence artificial cooling energy needs, and inability to promote natural unassisted night-time cooling through spontaneous release of accumulated heat Study the life cycle environmental impact and recyclability of metal facades.

7) UPVC, PVC & FRP: Doors and windows and partitions (Detailing and study of joinery)**.**

8) **Wooden sliding and folding doors and partitions:** Principles and methods of construction and detailing.

Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material applications in the form of a portfolio.

Module-4

9) **Steel sliding and folding doors and partitions:** Principles and methods of construction and detailing.

10) **Aluminium sliding and folding doors and partitions:** Principles and methods of construction and detailing.

Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material applications in the form of a portfolio.

Module-5

11) **Skylight in steel and glass:** Principles and methods of construction and detailing.

12) **Alternative wall technologies:** Sandwich panel walls, PUF panels etc. Critical analysis and study of materials such as glass, aluminium and steel used in medium-high rises in terms of its environmental impact. Building a narrative of Climate stress and how Architecture can contribute to reducing it. Alternative sustainable and less energy intensive materials to be explored.

Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material applications in the form of a portfolio.

Course outcome (Course Skill Set)

1. The students will be able to understand the various application of glass as a building material.
2. The students will be able to adopt and use of Glass and other materials in building construction.

Assessment Details (both CIE and SEE)

(methods of CIE need to be define topic wise i.e.- Submission of construction drawing sheets, Journal of materials, Multiple Choice Question, Quizzes, Open book test, Seminar or micro project)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 50% marks individually both in CIE and 40 % marks in SEE to pass. Semester End Exam (SEE) is conducted for 100 marks (Viva-voce) and a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Based on this grading will be awarded.

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Continuous Internal Evaluation:

1. Methods suggested: Submission of Construction sheets, Journal of Materials, Test, Written Quiz, Seminar, report writing etc.
2. The class teacher has to decide the topics for the test, Written Quiz, and Seminar. In the beginning, only the teacher has to announce the methods of CIE for the subject.

Semester End Examination:

1. The student need to submit his/her works done throughout the semester, including rough sheets for Vivavoce examination, atleast one day prior to Viva voce examination to the course teacher/coordinator.

2. The work will be evaluated by an external teacher appointed by the University along with Course teacher or an internal examiner.

3. The SEE mark list generated is to be signed by both internal and external examiners and submitted to VTU in sealed cover through the Principal of the institution.

Suggested Learning Resources:

Books

1. Francis, D.K. (2008), "Building Construction Illustrated", Fourth Edition, Wiley India Pvt. Ltd.
2. Mackay, J.K. (2015) – Volume 1, "Building Construction", Fourth Edition, Pearson India
3. Roy Chudley (2015) – Volume 1, "Construction Technology" Second Edition, Pearson India
4. Barry R. (1999) – Volume 3 & 4, "The Construction of Buildings", Fourth Edition, East-West Press Pvt. Ltd., New Delhi.
5. Lyons Arthur (2014), "Materials for Architects and Builders", Fifth Edition, Routledge.
6. Varghese P.C. (2015), "Building Materials", Second Edition, PHI Learning Pvt. Ltd.

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
- https://www.youtube.com/watch?v=loCKY6kZM-U
- https://www.youtube.com/watch?v=BGPaywY1wvs
- https://www.youtube.com/watch?v=i_5XuGZPiog
- https://www.youtube.com/watch?v=2fMISF6lreM

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Activity 1- Site visit and study Glass facades in large Buildings through sketches, photos, make a report of the study.

Activity 2- Observe and understand technical construction methods and materials for Glass curtain walls, and document the same in a report.

Activity 3 – Site visit to a PUF insulated cold storage. Discuss with an expert and document the observations in a report.

VI Semester

Landscape Architecture			
Course Code	**21ARC63**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3

Course objectives:

1. *To introduce the students to the discipline of Landscape Architecture.*
2. *To advance analytical and planning skills for Architectural project sites.*
3. *To develop design skills for small landscape projects.*

Course Outline:

Introduction, design philosophies and contemporary approaches to landscape architecture and design are reviewed through various landscape design projects over time while modules on site analysis, site planning, elements of landscape architecture and landscape design process are supported with theoretical inputs.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

i. **Lecture component:** Various landscape design projects to explain the design philosophies, theoretical aspects of site analysis and site planning, element of landscape architecture and design process will be delivered as lecture component.
ii. **Literature study:** Exercise on 'relating architecture and landscape' may be undertaken as a literature study exercise.
iii. **Studio component:** Studio exercises in site analysis, site planning and a small landscape design project.

Module-1

Introduction to the discipline of landscape architecture

a. Landscape as a broad terminology, Natural and Man-modified landscapes.
b. Brief history and the growth of landscape architecture as a design and planning profession from gardens to regional landscapes.
c. Scope and nature of professional work in contemporary landscape architecture, changing priorities of disciplinary approach: ecology, biodiversity and sustainability.

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss the style of Landscape design. 2) The students need to sketch and document elements of landscape architecture. 3) Quizzes, models, seminars from students can be encouraged.

Module-2

Relating Architecture and Landscape, Site analysis and Site planning

a. Study of architectural response to landscapes and understanding the relation between architecture and landscape through case examples.
b. The idea of site as part of whole/larger landscape, Site inventory and analysis: physical, biological, social contextual studies and layers of site analysis, site suitability analysis, inferences and response for architectural interventions.
c. Design considerations and approaches to site planning, site program, siting of buildings and open spaces, introduction to grading and land modifications, working with sloping sites.

Demonstration of understanding of site analysis and site planning through studio exercise.

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss the relation between Landscape and Architecture. 2) The students need to sketch and document Architectural interventions in landscape architecture. 3) Quizzes, models, seminars from students can be encouraged.

Module-3

Elements of landscape architecture and their application in landscape design

a. Primary landscape elements: Landform, water and vegetation, Design considerations and their role in articulating outdoor spatial design.
b. Secondary landscape elements: Street furniture, landscape walls, paving, inert ground covers, trellis, outdoor shading structures, embellishments, etc. Design considerations and their role in spatial design. Hard and soft landscapes (Activity 1)

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss Landscape elements. 2) The students need to sketch and document landscape elements. 3) Quizzes, models, seminars from students can be encouraged.

Module-4

Works of noted landscape architects and landscape projects

a. Eastern landscape philosophies: Chinese and Japanese gardens, Asian landscapes: Mughal and Persian gardens, Western landscape designs: Italian and French gardens, English romantic gardens and American parks, Examples in modern landscape: works of Garret Eckbo, Lawrence Halprin and Peter Latz.
b. Examples of contemporary landscape projects: works of Martha Schwartz , Maya lin, Peter Walker & Partners, Hargreaves Associates, Sasaaki, SWA, Michael Van Valkenburgh, Andropogon Associates, Field Operations, Turenscape etc. Landscape projects in India: works of Ravindra Bhan, Shaheer Associates etc.

Examples should cover various categories of landscape design such as residential, commercial, institutional, public plaza, water/riverfront and other categories. The content of this module should emphasis on design philosophies, the changing styles and changing priorities of the profession over time.

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss the Landscape Projects and works of famous Landscape Architects. 2) The students need to sketch and document Landscape Projects and works of famous Landscape Architects. 3) Quizzes, models, seminars from students can be encouraged.

Module-5

Landscape Design project

Demonstration of an understanding of landscape design through simple and small design exercise as studio project. Clarity in design process, detail development and representation of the landscape design scheme is to be emphasized.

One more minor analysis activity can be included as a project: Study the design of a current or recently proposed landscape project such as riverfront development, lake projects, religious corridors, tourism projects and analyze and assess the design, identify the loopholes and its impact on the environment and inhabiting population

NOTE: Studio exercises should be introduced after relevant theoretical inputs are delivered utilizing the contact periods.

Teaching-Learning Process	1) The teacher to give an assignment of an open space in the city/locality or an academic project of an earlier semester to design with all details. 2) The students need complete the assignment with details and proper presentation.

Course outcome (Course Skill Set)

1) The students will be able to learn and compare various styles of Landscape Architecture.
2) The students will be able to design small landscape architecture.
3) The students will be able to appreciate the importance of Landscape in Architecture.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks (25 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 40% (20 Marks out of 50)in the semester-end examination(SEE), and a minimum of 50% (50 marks out of 100) in the CIE (Continuous Internal Evaluation) and a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Based on this grading will be awarded.

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

19. First test at the end of 5th week of the semester
20. Second test at the end of the 10th week of the semester
21. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

22. First assignment at the end of 4th week of the semester
23. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

24. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

11. The question paper will have ten questions. Each question is set for 20 marks.
12. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module.

Theory paper will be out of 100 marks and will be **scaled down to 50 marks.**

Suggested Learning Resources:

Books

1. **Laurie, M**. *An introduction to landscape architecture*, Elsevier. 1975.
2. **Motloch, J**. *Introduction to landscape design*, John Wiley & Sons, 2001.
3. **Holden, R &Liversedge, J**. *Landscape Architecture: An Introduction*, Laurence King publishing ltd. 2014.
4. **Girot, C**. *The course of landscape architecture: A history of our designs on our natural world*, Thames & Hudson. 2016.
5. **Simonds, J O**. *Landscape Architecture: A manual of site planning and design*, McGraw- Hill, 1997.
6. **LaGro, J**. *Site Analysis: Sustainable site planning and design*, John Wiley & Sons. 2013.
7. **Birksted, J**. *Relating architecture to landscape*, E&FN Spon. 2004.

8. **Shaheer, M &Dua, G.** Landscape Architecture in India: A reader, LA, Journal of landscape architecture. 2010.

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
- https://www.youtube.com/watch?v=7TXJV-v_Wa4&list=PLxHgc0UFNU4vfMkxqBl9ABrZCgwr_Bjby
- https://www.youtube.com/watch?v=ettKgxoK3Tg
- https://www.youtube.com/watch?v=JBa4NUBgDNY

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Activity 1 - Critical Study of a public project: Study of an already developed landscape project, primarily a public realm such as riverfront, lake redevelopment in terms of the existing and shifted contours and levels, impact on the watershed inclusive of the site, existing and proposed biodiversity, soft and hard landscape and its impact on ground water and soil and affected communities while development of this public project

VI Semester

Contemporary Architecture			
Course Code	**21ARC64**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3

Course objectives:

To do a critical survey of contemporary architecture from the 1960s to the present, and to provide an understanding and appreciation of contemporary issues and trends in Indian and western architecture in terms of ideas and directions.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Use of theory, activities, sketches, drawings, assignment and tutorial for teaching.
2. Evaluation by quiz, tests, classroom activities.

Module-1

1. **Architecture in India (Pre independence):** The Architecture of the Princely States of Jaipur, Bikaner and Mysore: Their city examples – clock towers, railway stations, public offices, assembly halls, water systems, public hospitals, etc. Developing an environmental and vernacular expression connection in Pre-independence architecture.

2. **Modern Architecture in India-1**: Architecture in India(Post-Independence): Works of public nature in Chandigarh and Ahmadabad (Legislative Assembly Complex including High Court, Legislative assembly and Secretariat, Chandigarh and Mill Owners "Building, Ahmadabad), IIM, Ahmadabad and its significance.
3. **Modern Architecture in India-2:**Ideas and works of BV Doshi (Institute of

Indology Ahmadabad, IIM-Bangalore and Hussain-Doshi Gufa, Ahmadabad) and Charles Correa: (Vidhan Bhavan Bhopal, Jawahar Kala Kendra Jaipur, Kanchen - Junga Apartments, Mumbai and Kala Academy Panaji, Goa).

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss the buildings, style of architecture. 2) The students need to sketch the buildings for its unique qualities. 3) Quizzes, models, seminars from students can be encouraged.

Module-2

4. **Modern Architecture in India-3:**Ideas and works of Raj Rewal and Uttam Jain (Pragati Maidan, New Delhi and Asian Games Village, New Delhi), Achyut Kanvinde(IIT, Kanpur and Nehru Science Centre, Mumbai), Uttam Jain(Lecture Theatres, Jodhpur and Engineering College, Kota).

5. **Modern Architecture in India-4:** Enrichment of Indian experience- Cost effectiveness and local influences. Lauire Baker and Anant Raje (Centre for Development Studies, Thiruvananthapuram and St. John Cathedral at Tiruvalla) and Anant Raje(IIFM, Bhopal and Management Development Centre, IIM-A). Bimal Patel (Sabarmati River front development at Ahmadabad Kashi Vishwanath Corridor Varanasi) Sanjay Mohe (Karunashraya, NIFT Chennai, Anji Reddi Memorial Hyderabad)

6. **Parallel trends in Indian architecture:** a) Revivalist- monumental, Religious b) Experimental-Pondicherry, Belgium embassy, IITB, Sriram Centre New Delhi c) Vernacular influence-Cost effective concepts

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss the buildings, style of architecture. 2) The students need to sketch the buildings for its unique qualities. 3) Quizzes, models, seminars from students can be encouraged.

Module-3

7. **Last phase of Modern Architecture: Ideas and works of Richard Meier** (Smith House, Connecticut and Getty Centre, Brent Wood, Los Angeles) and Charles Moore (Architect's Own House at Orinda and Piazza d'Italia, New Orleans), Bernard Tschumi (Kyoto Railway Station Project and Parc de la Villete, Paris).

8. **Ideas and works of Frank Gehry**(AeroSpace Museum, Santa Monica and Guggenheim Museum, Bilbao).

9. **High-tech architecture or Structural Expressionism-1:** An architectural style that emerged in the 1970s: The High-tech architecture practitioners include British architects Sir Norman Foster(Hong Kong Shanghai Bank and Renault Distribution Centre, Swindon, England), Sir Richard Rogers, Sir Michael Hopkins.

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss the buildings, style of architecture. 2) The students need to sketch the buildings for its unique qualities. 3) Quizzes, models, seminars from students can be encouraged.

Module-4

10. **High-tech architecture or Structural Expressionism-2:** The High-tech architecture practitioners include Italian architect Renzo Piano (Pompidou Centre, Paris and Menil Museum, Houston) and Spanish architect Santiago Calatrava (Lyon-Satolas Railway Station and Olympic Stadium at Athens).
11. **Postmodern Architecture**: Development of Postmodernism with its origins in the alleged failure of Modern architecture from 1950s, and spreading in the 1970s and its continuous influence on present-day architecture. Ideas and works of Michael Graves, James Stirling, Robert Venturi etc.

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss the buildings, style of architecture. 2) The students need to sketch the buildings for its unique qualities. 3) Quizzes, models, seminars from students can be encouraged.

Module-5

12. **Hyper theories of Architecture-1:** Development of postmodern architecture in 1980s is the ideas of Deconstructivism including, Frank Gehry (AeroSpace Museum, Santa Monica and Guggenheim Museum, Bilbao), Daniel Leibskind (Jewish Museum, Berlin and World Trade Centre, New York), Rem Koolhas(Dance Theatre, The Hague and Netherlands Sports Museum).

13. **Hyper theories of Architecture-2:** Ideas of Deconstructivism including, Peter Eisenman, ZahaHadid (The Peak Club, Hong Kong and IBA Housing Block 2, West Berlin), Coop Himmelb(l)au, and Bernard Tschumi.

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss the buildings, style of architecture. 2) The students need to sketch the buildings for its unique qualities. 3) Quizzes, models, seminars from students can be encouraged.

Course outcome (Course Skill Set)

1) The students will be able to learn and compare various styles of Modern Architecture.
2) The students will be able to appreciate and learn from various phases of Contemporary Architecture and pioneers.
3) The students will be able to link the modern movement in different times.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks (25 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 40% (20 Marks out of 50)in the semester-end examination(SEE), and a minimum of 50% (50 marks out of 100) in the CIE (Continuous Internal Evaluation) and a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Based on this grading will be awarded.

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

- At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module.

Theory paper will be out of 100 marks and will be **scaled down to 50 marks.**

Suggested Learning Resources:

Books

1) Morgan, Ann Lee & Taylor Colin , "Contemporary Architecture".
2) Bahga, Bahga and Bahga , "Modern Architecture in India", 1993, Galgotia Pub. Co.

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
- https://www.youtube.com/watch?v=Ym2CGp69oBQ
- https://www.youtube.com/watch?v=QkVcUJauY0Y
- https://www.youtube.com/watch?v=BfhHYPaIVwo
- https://www.youtube.com/watch?v=KQEhDJljun8
-

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1) Sketching of the contemporary buildings from a Book/ Internet.
2) Group or Individual seminar on a building.
3) Quizzes, debates on a selected topic.

VI Semester

Building Services -IV (Acoustics & Noise Control)			
Course Code	**21ARC65**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3

Course objectives:

To explore the role and capacity of sound in all its variations and to enhance aural experience in built environment- within and without.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Use of theory, activities, sketches, drawings, assignment and tutorial for teaching.
2. Evaluation by quiz, tests, classroom activities.

Module-1

Introduction to Sound and Room Acoustics

1) **Introduction to Sound:** Origin and nature of sound, its characteristics and measurement– Amplitude, frequency, period, wavelength, velocity of sound, sound pressure, sound intensity, decibel scale, sound and distance – inverse square law. human hearing, auditory range for humans (Frequency and Intensity – threshold of audibility and pain), pitch (association with frequency), tone, loudness (association with amplitude and intensity), Phon.

2) **Room Acoustics**: Reflection - Nature of reflection from plane, convex and concave surfaces, diffraction, Absorption, Echoes, focusing of sound, dead spots, flutter echo. Room resonances, Reverberation - reverberation time (RT) calculation using Sabine's and Eyring's formulae. Effect of RT on speech and music.

Teaching-Learning Process	1) The subject teacher can use PPTs & Videos to teach basics of sound and Acoustics. 2) The students need to work on the assignments given by the teacher. 3) Quizzes, models, seminars from students can be encouraged.

Module-2

Acoustical Tools, Measurements and Materials

3) **Acoustical Tools and Measurements:** Use of SLM (Sound Level Meter), AI (Articulation Index), STI (Speech-Transmission Index), Speech Intelligibility. Sound Attenuation. Absorption coefficients of acoustical materials, NRC value, NC Curves for various spaces.

4) **Acoustical Materials:** Vernacular methods of sound insulation, Porous materials, panel absorbers, membrane absorbers, acoustical plasters, diffusers, cavity or Helmholtz resonators. Role of functional absorbers, Adjustable acoustics and variable sound absorbers. Acoustical correction and retrofits to existing spaces.

Teaching-Learning Process	1) The subject teacher can use PPTs & Videos to teach Acoustics tools & Materials. 2) The students need to work on the assignments given by the teacher. 3) Site visit for the material study and applications.

Module-3

Acoustical Design

5) **Acoustical Design of Auditoriums - Multipurpose Halls:** History of Greek, Roman theatres. Use of IS code 2526 - 1963 for design and detailing of Auditoriums - Cinema Halls - Multi- purpose Halls - Halls for speech and music.

6) **Acoustical Design and Detailing of Other Spaces** – Open air theatres, Halls for Indoor Sports, home theatres, recording studios, open plan offices, etc. Need and use of sound reinforcement systems, sound masking systems and speech privacy.

Teaching-Learning Process	1) The subject teacher can use PPTs & Videos to teach Historical developments, IS Codes, designing and detailing of auditorium. 2) The students need to work on the assignments given by the teacher. 3) Site visit to understand acoustical designing and detailing of various types of spaces.

Module-4

Noise reduction and Control

7) **Introduction to environmental noise control:** Noise, its sources and its classification - outdoor and indoor, airborne and structure borne, impact noise, noise from ventilation system, community and industrial noise. Noise transmission, Mass law and transmission loss. Maximum acceptable noise levels. Design Principles – reduction at source, reduction near source, etc.

8) **Constructional measures of noise control and sound insulation -**Enclosures, Barriers, Sound insulation (AC Ducts and plants), Vibration isolation – control of mechanical noise, floor, wall, ceiling treatment. Sound Isolation. Construction details of composite walls, double walls, floating floors, wood-joist floors, plenum barriers, sound locks, etc. STC (Sound Transmission Class) ratings.

Teaching-Learning Process	1) The subject teacher can use PPTs & Videos to teach problems associated with noise and measures for the same. 2) The students need to work on the assignments given by the teacher. 3) Students interaction with acoustical experts for practical solutions.

Module-5

Noise reduction and Control-II

9) **Industrial noise: Sources of industrial noise -** impact, friction, reciprocation, air turbulence and other noise. Methods of reduction by enclosures and barriers.

10) **Introduction to Urban Soundscape –** Introduction to Urban noise, Noise sources - Air traffic, Rail traffic, Road traffic, Seashore and inland. Traffic planning against outdoor noise. Noise reduction and control by Site planning, Town planning and Regional Planning consideration. Role of Architects / Urban Planners in shaping the urban soundscape. Sustainable design strategies in building acoustics.

Teaching-Learning Process	1) The subject teacher could arrange for visits to acoustically designed and treated multipurpose halls - general purpose halls used for both speech and music, cinema theatres, Industrial Buildings, etc. 2) Case study reports could be submitted as group assignments. 3) Design of a multipurpose hall - rooms for speech and music for optimum acoustics - drawings and construction details of acoustical treatment.

Course outcome (Course Skill Set)

1) The students will be able to learn and appreciate acoustics as a discipline of study.
2) The students will be able to analyse acoustical problems in an enclosed space.
3) The students will be able to coordinate with acoustical experts while designing auditorium and allied spaces.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks (25 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 40% (20 Marks out of 50)in the semester-end examination(SEE), and a minimum of 50% (50 marks out of 100) in the CIE (Continuous Internal Evaluation) and a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Based on this grading will be awarded.

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)`

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

- At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module..

Theory paper will be out of 100 marks and will be **scaled down to 50 marks.**

Suggested Learning Resources:

Books

1) M.DavidEgan , "Architectural Acoustics".
2) Leslie L. Doelle , "Environmental Acoustics".
3) Vern O.Knudsen and Cyril M.Harris , "Acoustical Designing in Architecture".
4) Peter H. Parkins and H. R. Humphreys , "Acoustics, noise and buildings".
5) F.Alton Everest and Ken C. Pohlmann , "Master Handbook of Acoustics".
6) A.B. Wood, "A Text book of Sound".
7) T.M. Yarwood, "Acoustics".
8) Duncan Templeton, "Acoustics in the Built Environment".
9) J E Moore, "Design for good Acoustics and noise control".
10) T. E. Vigran , "Building Acoustics".
11) W.J. Cavanaugh, C.T. Gregory and J.A. Wikes, "Architectural Acoustics: Principles and Practices" 2nd Edition, Codes and standards–
    - National Building Code of India (NBC) 2016; Part 8 Section 4

- IS 1950: 1962 Code of practice for sound insulation of non-industrial buildings
- IS 3483: 1965 Code of practice for noise reduction in industrial buildings
- IS 4954: 1968 Recommendations for noise abatement in town planning
- IS 11050 (Part 1) 1984: Rating of sound insulation in buildings and of building elements: Part 1 Airborne sound insulation in buildings and of interior building elements
- IS 11050 (Part 2)1984: Rating of sound insulation in buildings and of building elements: Part 2 Impact sound insulation
- IS code 2526: 1963Code of practice for acoustical design of auditoriums and conference halls
-

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
- https://www.youtube.com/watch?v=IftFGdH52Lc
- https://www.youtube.com/watch?v=JPYt10zrclQ
- https://www.youtube.com/watch?v=akiWq97dSBA
- https://www.youtube.com/watch?v=B9u7k2V4YPw
- https://www.youtube.com/watch?v=lrNBrl9qMLw

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1) Sketching and drawings of acoustical treatment in an auditorium building from site visit.
2) Group or Individual seminar on acoustical treatment in an auditorium building.
3) Quizzes, debates on a selected topic.

VI Semester

Building Structure -V			
Course Code	**21ENG66**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks(VIVA)	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	--

Course objectives:

Integration of structures with architectural objectives by developing an understanding of building structures and selection criteria for appropriate horizontal systems; conceptual design of long span structures for gravity and lateral wind and seismic loads.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1) The teacher can use PPTs, Videos to discuss Structural design in buildings.
2) The students need to practice Structural Design in a simple building.
3) Quizzes, models, seminars from students can be encouraged.

Module-1

1) **Introduction:** Horizontal or Long Span Structures
2) **Introduction to the Structural design Project:** Design for an Airport terminal building of dimension 75M X 300M using horizontal system. Selection of Horizontal structural systems including load calculation based on Building Codes

and Standards (indicative).

3) **Structural Analysis and Design to satisfy Building Codes and Standards:** Determine the general loads to be considered in the design of the structure, based on the type of occupancy specified for each area. a) Gravity loading: Dead and Live load calculation based on IS 875 (Part 1&2) b) Seismic loading: Seismic loading calculation based on IS 1893 Code Static Analysis Procedure c) Wind loading: Wind loading calculation based on Indian Standard I.S. 875 (Part3).

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss Structural design in buildings. 2) The students need to practice Structural Design with seismic loading in a simple building. 3) Quizzes, models, seminars from students can be encouraged.

Module-2

4) **Design of Portal frame Structure System:** Design of two-dimensional rigid frames that have a rigid joint between column and beam. General framing arrangement of Portal frame for 75M X 300M building, basic load path and total structural weight calculation.

5) **Design of Arch and Vault Structures:** Design of curved structural member spanning two points, of masonry, concrete or steel and used as the roofing systems of large span buildings. Design of Arch and Vault arrangement for spanning 75M X 300M building, and basic load path and total structural weight calculation.

6) **Design of Dome Structures:** Domes as polar arrays of curved structural systems in masonry, concrete, steel with glass cladding, their structural strength and properties as roofing systems of large column-free spans. Design of dome(s) for spanning 75M X 300M building, basic load path and total structural weight calculation.

1)

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss Portal frame, Arch and Dome structures. 2) Site visit to large span structure building to understand the system of construction. 3) Quizzes, models, seminars from students can be encouraged

Module-3

7) **Long Span Planar Truss Design:** Triangular structural system; assembly of simple triangular planar trusses. Planar trusses in roofs and bridges. General framing arrangement of Long Span Truss for 75M X 300M building, and basic load path and total structural weight calculation.

8) **Vierendeel truss design:** Truss design with rectangular or square assembly of members with rigid joints capable of resisting bending moments. General framing arrangement of Vierendeel truss for 75M X 300M building, and basic load path and total structural weight calculation.

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss Long span planar and vierendeel truss design. 2) Site visit to Long span planar and vierendeel Truss building to understand the system of construction. 3) Quizzes, models, seminars from students can be encouraged

Module-4

9) **Cable and Suspension Structures:** Design for long-span systems using Cable and suspension systems. Design cable suspended roof to span 75M X 300M building, and basic load path and total structural weight calculation.

10) **Space Truss:** Design of three dimensional trusses, their structural properties and strength due to three dimensional triangulation. Design of Space Truss roof for spanning 75M X 300M building, and basic load path and total structural weight calculation.

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss cable and space truss design. 2) Site visit to cable and space truss structures to understand the system of construction. 3) Quizzes, models, seminars from students can be encouraged

Module-5

11) **Concrete Shell structure design:** Design of double curved surfaces formed from warped surface (e.g. hyperbolic parabolic); their properties and strength as light-weight construction for column free large spans. Design of Concrete shell roof to spanning 75M X 300M building, and basic load path and total structural weight calculation.

12) **Fabric Structure:** Design of membrane structures of thin flexible fabric covers that provide light-weight free-form roofing system. Design of Fabric roof to span 75M X 300M building, and basic load path and total structural weight calculation.

Note: a) Minimum one plate on each loading calculation and vertical structural system.
b) This course to be conducted jointly by Structures and Architecture Design Studio faculty.

Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss concrete shell and fabric structures. 2) Site visit to concrete shell and fabric structures to understand the system of construction. 3) Quizzes, models, seminars from students can be encouraged

Course outcome (Course Skill Set)

1) The students will be able to learn the structural designing of a small building.
2) The students will be able to analyse components in structural designing of a buildings.
3) The students will be able to appreciate the use of large span structure in buildings.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 50% marks individually both in CIE and 40 % marks in SEE to pass. Semester End Exam (SEE) is conducted for 50 marks (Viva-voce) and a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Based on this grading will be awarded

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

- At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

1. The student needs to submit his/her works done throughout the semester, including rough sheets for the Viva examination, at least one day prior to the Viva work examination to the course teacher/coordinator.
2. The Viva-voce will be evaluated by an external teacher appointed by the University along with Course teacher or an internal examiner.

The SEE marks list generated is to be signed by both internal and external examiners and submitted to VTU in the sealed cover through the Principal of the institution

Suggested Learning Resources:

Books

1) Martin Bechthold, Daniel L Schodek , "STRUCTURES"; PHI Learning Private limited
2) Works of Felix Candela
3) Works of Frei Otto
4) Works of Hassan Fathy
5) Works of P.L. Nervi
6) Works of Sir Buck minister Fuller

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
- https://www.youtube.com/watch?v=AJG1Jix8NDk
- https://www.youtube.com/watch?v=PaAHW8uFNmo
- https://www.youtube.com/watch?v=SUf5h2ulf2U
- https://www.youtube.com/watch?v=uDieRHcG3x8
- https://www.youtube.com/watch?v=8iIPEojHB1g
- https://www.youtube.com/watch?v=APc0EXTw2KQ
-

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1) Visit to a construction site to evaluate Various types of large span structures.
2) Seminar by students in groups on their learnings.

VI Semester

Working Drawing-I			
Course Code	21ARC67	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	0:0:4:0	SEE Marks	-
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	-

Course objectives:

Introduction of Working Drawings and Details; Coordination between Architectural, Structural, Services and other disciplines; Preparation of Architectural Working Drawings for a design project.

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.
1) The teacher can use PPTs, Videos, and a working drawing portfolio to demonstrate the preparation of working drawing for a building.
2) The students need to observe and practice the preparation of working drawing for a simple building.

Module-1

1. Introduction: Overview of Working Drawings; historical perspective; consultants involved in preparation of working drawings, their role and scope; reading, error checking, problems in working drawings.

Teaching-Learning Process	1) Students to practice working drawing in the studio. 2) Teachers need to critically exam the practice.

Module-2

2. Drafting Conventions: Representation of materials, graphic symbols, line type conventions, grid lines, lettering, colour codes, paper sizes, title blocks, office practices, standardization of details.

Teaching-Learning Process	1) Students to practice working drawing in the studio. 2) Teachers need to critically exam the practice.

Module-3

3. CAD Drawings: Working with layers, blocks, templates, assemblies, libraries, layouts, plot styles, error checking, editing.

Teaching-Learning Process	1) Students to practice working drawing in the studio. 2) Teachers need to critically exam the practice.

Module-4

4. Project work: Preparation of Architectural Working drawings and details for one of the design projects of medium rise-framed structure, from earlier semester, like Residence, Primary Health Center or School etc. Alternatively, the design of this project may be taken up at the beginning of the semester in a site measuring 30 m x 40 m or less and within B+G+3 floors.

Teaching-Learning Process	1) Students to practice working drawing in the studio. 2) Teachers need to critically exam the practice.

Module-5

5. Preparation of Submission Plan of the project assignment. Refer local guidelines and requirements for such building to get permission as per the byelaws. Sustainable systems like rainwater harvesting systems, solar power generation, waste management infrastructure, percolation tanks, soft landscape, trees, etc to be the fundamentals of building design, to be incorporated in the project.

PORTFOLIO:

Drawings to include Site Plan, Marking Plan, Plans at all levels, Terrace Plan; all Elevations; two Cross Sections passing through staircase & lift shaft; Profile Sections; Details to include Toilet, Kitchen, Staircase, Door, Window, Railing, Gate, Sky-light.

NOTE: **Same project may be continued for preparation of working drawings w.r.t. structures and services for Working Drawing-II.**

Teaching-Learning Process	1) Students to practice working drawing in the studio. 2) Teachers need to critically exam the practice.

Course outcome (Course Skill Set)

1) The students will be able to produce working drawings along with details for a small project.
2) The students will be able to work in groups and coordinate other consultants like Structural consultants, MEP consultants, Electrical consultants, Networking, fire and other consultants.

Assessment Details (CIE)

(methods of CIE need to be defined topic wise i.e.- Studio/ Class room/Tutorial discussions, Reviews, Time problems, test, Seminar or micro project)

The weightage of Continuous Internal Evaluation (CIE) is 100% and there is no Semester End Exam (SEE) .The student has to obtain a minimum of 50% marks in CIE and is conducted for 100 marks. Based on the CIE marks grading will be awarded.

Continuous Internal Evaluation:

Methods suggested:

1. Studio discussions, Reviews, Time problems, CIE tests, Seminar or micro project, Quiz, Portfolio preparation etc.
2. The class teacher has to decide the course of learning for the working drawing subject, in the beginning only. The teacher has to announce the methods of CIE for the subject in advance in writing.

Semester End Examination:

1. There is no Semester End Exam (SEE) The CIE marks list generated is to be signed by the internal examiners and submitted to VTU as per the procedure through the Principal of the institution.

Suggested Learning Resources:

Books

Time saver standards by Callender.
Time saver standards by E & OE
Time saver standards by Nuferts.

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
- https://www.youtube.com/watch?v=YDQqMFqjChY
- https://www.youtube.com/watch?v=FZiFAAvsJqc
- https://www.youtube.com/watch?v=Pyaw8ivOz6Q

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1) Individual/ Group work on Template preparation for working Drawing.
2) Individual/ Group work on typical details such as staircases, Lift well, Toilets, etc for working Drawing.

VI Semester

Elective-4			
Course Code	**21ARC68**	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	2:0:0:0	SEE Marks	--
Total Hours of Pedagogy	25	Total Marks	100
Credits	02	Exam Hours	-

Course objectives:

1) To gain experience in aspects of Architecture not offered in the regular curriculum.
2) To study particular areas of the curriculum in greater depth.
3) To explore career opportunities in the allied fields.

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.
1) The teacher may use conventional method or an innovative method to deal with the subject.
2) The students need to work with hands on experiences to gain an expertise of the chosen field.
3) The teacher needs to use performance assessments to develop real life skills in the students.

a) CULTURE AND BUILT ENVIRONMENT

Objective:

To sensitise students to culture and behavioural sciences and their influence on design and built
environment

Culture is a major attribute of humans with deep evolutionary roots. It has an important role in fostering economic, social and environmental dimensions of development. This elective course explores to gather insight into cultural identity, the nature of culture as it relates to the physical environments and how people shape environments, use them and interact with them.

The course needs to address two primary enquiries:

A. Understand the interrelationship between design and behavioural sciences
B. Understand the contributions to the design field that behavioural sciences have made and can make.

Architect Amos Rapport, well-renowned for his seminal contributions to the field of environmental behavioural studies, raises three questions regarding the relationship between culture and the built environment:

1) What biosocial, psychological, and cultural characteristics of human beings, as members of a species, as individuals, an as members of various groupings, influence (and, in design, should influence) what characteristics of the built environment?
2) What effects do what aspects of what environments have on groups of people, under what circumstances and why?
3) Given these two-way interactions between people and environments, what are the mechanisms that link them?

Guided by Rapport's questions, this course examines the role of culture in shaping built environment that varies with the type of environment, over time, for different groups, in different situations and contexts with the help of comparative studies of built environments across Indian subcontinent, South Asia and Latin America to understand the intersections of cultural practices and the built environment and their influence over one another.

References:

1. Rapoport, "A. *Culture, Architecture and Design"*, Locke Science publication, 2005.
Zube, E & Moore, G(Ed.), *"Advances in environment*, *behaviour and design*", Springer, 1991

b) GEOGRAPHICAL INFORMATION SYSTEM

Objective:

Geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.

The course is intended to provide students with a foundation for basic GIS techniques which are relevant to architectural analysis and Presentation. The elective is intended to establish a bridge between the conceptual realms - Architecture /Site -Terrain Analysis/ Landscape architecture/Urban planning. Output being digital, online and printed maps.

Outline:

1. **Introduction to GIS:**

   GIS as a Hardware/software/application? GIS data, Vector date, Raster data, attribute data, Data capture & methods, Coordinate reference systems

2. **Introduction to Google Earth**

   An overview of Google Earth & KML, Google Objects, Descriptive HTML in Place marks, Ground overlays, Screen overlays, Paths, manipulating a path Polygon, taking profiles of site, creating KML files and exporting to GIS format.

3. **Creating & analysing GIS data:**

   Capturing survey data through hand held GPS or mobile application. Traversing boundary of site , bringing routes and way point data into GIS.
   Spatial data, loading raster files, Mosaic raster, Geo referencing raster and vector files, Loading data from OGC web services, databases.
   Creating vector data layers, joining tabular data, Topology errors & tools, Analyzing raster data, Combining raster and vector data, Raster surface through interpolation, leveraging the power of Spatial database, Vector and raster analysis, Vector Spatial analysis (Buffers), Spatial analysis (interpolation).

4. **Terrain Analysis& scientific computing of Raster dataset:**

   Creating Digital elevation model (DEM) from point data, Hill shade, Slope, Aspect

   Creating great Maps: Composing maps: Vector styling, Labelling, Using adobe illustrator for composing multiple vector layers of maps, Designing print maps, Publishing GIS 2D maps on the web

5. **Create 3D maps:**
   3D maps in html format and navigate in the internet browser

References:

1) https://sites.duke.edu/envgis/tutorials/introduction-to-google-earth/
2) Anita Graser , "Learning QGIS" PAKT open source, 2016.
3) GISP Dr. John Van Hoesen, Dr. Luigi Pirelli, GISP Dr. Richard Smith Jr., GISP Kurt Menke, " A refreshing look at QGIS: Mastering QGIS", PACKT Pub., 2016.
4) Displaying and analysing 3D data in Surfer software.

Carson, Tom, **Baker**, Donna L., "Adobe® Acrobat® and PDF for Architecture, Engineering, and Construction", Springer publication, 2006, available as Google EBook.

c) DESIGN OF HIGH - RISE BUILDINGS

Objective:

The design and construction of skyscrapers involves creating safe, habitable spaces in very tall buildings. The buildings must support their weight, resist wind and earthquakes, and protect occupants from fire. Yet they must also be conveniently accessible, even on the upper floors, and provide utilities and a comfortable climate for the occupants. The problems posed in skyscraper design are considered among the most complex encountered given the balances required between economics, engineering, and construction management. The students may be given a snapshot of this very important typology that gives them an insight into complex world of various services that form the backbone of any skyscrapers. The students will also critically analyse the impact of tall buildings on environment and climate.

Outline:

1. Evolution of Skyscrapers
2. Basic design considerations
3. Loading and Vibrations
4. Structural systems for high rise buildings; Trussed tube & X bracing, Bundled tube, etc.
5. Economic rationale
6. Environmental Impact
7. Services in Skyscrapers
8. Fire safety in Skyscrapers
9. Skyscrapers in India

The faculty in-charge should organise inputs by inviting various consultants and visits to few high rise buildings in the area. Students may be given assignments on relevant topics. (Activity 1)

References:

1. Basem M.M., "Construction Technology for High Rise Buildings: Handbook", 2014, CreateSpace.
2. Basem M.M., " Mechanical and Electrical Services for High Rise Buildings: Handbook", 2014, CreateSpace.

3. Mark Sarkisian, " Designing Tall Buildings: Structure as Architecture" Routledge,

N

ew york, 2012.

4. Johann Eisele&Ellen Kloft, **"** High-rise Manual : Typology and Design, Construction, and Technology" Birkhäuser, 2003.

Nigel Clark and Bill Price, ″ Tall Buildings: A Strategic Design Guide", RIBA & BCO, 2016.

OPEN ELECTIVE:

The college has the discretion to offer an open elective in the areas/subject/fie other than already covered under the syllabus. The college can decide to offer need based electives depending on the availability of the expertise. However, the college will require to submit the title of such electives with the course outline stating learning objectives and mode of delivering the content to the Registrar/ Registrar (evaluation) within the 15 days of the commencement of the semester.

Teaching-Learning Process	1) The teacher may use conventional method or an innovative method to deal with the subject. 2) The students need to work with hands on experiences to gain an expertise of the chosen field. 3) The teacher needs to use performance assessments to develop real life skills in the students.

Course outcome (Course Skill Set)

1) To develop desired knowledge and skill in a particular domain of Architecture
2) To develop an understanding of the processes required for the particular subject.
3) To develop an expertise in the chosen field for career enhancement.

Assessment Details (CIE)

(methods of CIE need to be defined topic wise i.e.- Studio/ Class room/Tutorial discussions, Reviews, Time problems, test, Seminar or micro project)

The weightage of Continuous Internal Evaluation (CIE) is 100% and there is no Semester End Exam (SEE) .The student has to obtain a minimum of 50% marks in CIE and is conducted for 100 marks. Based on the CIE marks grading will be awarded.

Continuous Internal Evaluation:

Methods suggested:

1. Studio discussions, Reviews, Time problems, CIE tests, Seminar or micro project, Quiz, report writing etc.

2. The class teacher has to decide the course of learning for the Elective subject, in the beginning only. The teacher has to announce the methods of CIE for the subject in advance in writing.

Semester End Examination:

1. There is no Semester End Exam (SEE) The CIE marks list generated is to be signed by the internal examiners and submitted to VTU as per the procedure through the Principal of the institution.

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
- https://www.youtube.com/watch?v=OFRhyaIZ_ro
- https://www.youtube.com/watch?v=y_px2caS6JU
- https://www.youtube.com/watch?v=Z1eiKW8TwVw
- https://www.youtube.com/watch?v=vJAQHA5XQWI
- https://www.youtube.com/watch?v=-syqppgcoVE
- https://www.youtube.com/watch?v=2-t2c9eiFyQ
- https://www.youtube.com/watch?v=_ZS0Mz1UA40

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1) Students need to explore and meet an expert to understand the subject in a greater depth.
2) Students need to work with hands on experiences to develop desired skills in the field.

VI Semester

Study Tour			
Course Code	**21ARC69**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	--	SEE Marks	--
Total Hours of Pedagogy	--	Total Marks	50
Credits	--	Exam Hours	--

Course objectives:

1) To expose students to historical, vernacular and contemporary architecture.

2) To document the learnings from study tour.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1) A faculty member for strength of 20 to 25 students to accompany them.
2) Teacher need to programme the tour details much in advance with the help of student leaders.
3) Details of the site visit, sketches/ drawings/photographs to be done to be informed to the group in advance.
4) A report of the study tour in a group of 4-5 students to be submitted within 3 days after returning from the tour to the Principal.

OUTLINE:

A minimum of two Study tours are to be undertaken before the commencement of 6th semester B. Architecture classes. The study tour may include places of architectural interest in India or Abroad. The choice of places and buildings to be visited is left to the concerned department / college. The students have to submit a study tour report as group work (4 to 6 students per group) within 15 days after the end of the study tour. The two reports are to be assessed by the department / colleges for progressive marks. The department/ college may use its discretion about the choice of places for study tour and suitable time schedule.

Course outcome (Course Skill Set)

1) The students will be able to work and coordinate with the teams/groups
2) The students will be able to explore new places of architectural interest.

Assessment Details (CIE)

(methods of CIE need to be defined topic wise i.e.- Studio/ Class room/Tutorial discussions, Reviews, Time problems, test, Seminar or micro project)

The weightage of Continuous Internal Evaluation (CIE) is 100% and there is no Semester End Exam (SEE) .The student has to obtain a minimum of 50% marks in CIE and is conducted for 100 marks. Based on the CIE marks grading will be awarded.

Continuous Internal Evaluation:

Methods suggested:

1. Studio discussions, Reviews, Time problems, CIE tests, Seminar or micro project, Quiz, report writing etc.

2. The class teacher has to decide the course of learning for the subject, in the beginning only. The teacher has to announce the methods of CIE for the subject in advance in writing.

Semester End Examination:

1. There is no Semester End Exam (SEE) The CIE marks list generated is to be signed by the internal examiners and submitted to VTU as per the procedure through the Principal of the institution.

Suggested Learning Resources:

Books:

1) Around India in 80 trains by Monisha Rajesh

2) A passage to India by E M Forster

3) India published by Lonely Planet
Web links and Video Lectures (e-Resources):
• https://ndl.iitkgp.ac.in • https://www.youtube.com/watch?v=I8z0emBInNw • https://www.youtube.com/watch?v=uL8PCKK_1yo • https://www.youtube.com/watch?v=cbr6czX_WqY • https://www.youtube.com/watch?v=dZnEus8uz54
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning Activity 1 - The downside of the skyscrapers in its environmental impact and the skewed aspiration of skyscraper cities.

VI Semester

Physical Education(Sport &Athletics/Yoga & NSS)			
Course Code	**21PE69/21YO69/21NS69**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0-0-2-0	SEE Marks(VIVA)	50
Total Hours of Pedagogy	25	Total Marks	100
Credits	--	Exam Hours	--

Course objectives:

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

Module-1

Teaching-Learning Process	
Module-2	
Teaching-Learning Process	
Module-3	
Teaching-Learning Process	
Module-4	
Teaching-Learning Process	
Module-5	
•	
Teaching-Learning Process	

Course outcome (Course Skill Set)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

25. First test at the end of 5th week of the semester
26. Second test at the end of the 10th week of the semester
27. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

28. First assignment at the end of 4th week of the semester
29. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

30. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

13. The question paper will have ten questions. Each question is set for 20 marks.
14. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
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Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

VII Semester

Architectural Design-VII			
Course Code	**21ARC71**	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	0:0:0:8	SEE Marks(VIVA)	100
Total Hours of Pedagogy	95	Total Marks	200
Credits	8	Exam Hours	-

Course objectives:

1. *To understand the subject of Architecture as an integrated field which works in tandem with Technology, Design, Economy, Ecology, Geography and Sociology etc*
2. *To rethink architecture as a man-made ecosystem, which is self-contained and sustainable*
3. *To be able to identify and Augment the right set of knowledge kit (from the learnt courses and electives) that will steer the approach to the brief in a strong direction.*

INTRODUCTION/OVERVIEW:

Post six semesters of architectural training, from introduction to architecture: Design of public buildings, in concurrence with allied subjects, the student is expected to have developed a worldview with which he/she is able to analyze a given design brief. The objective of this semester is to activate that critical mind, with an underlying emphasis on performative/responsive (including low-energy and low-carbon performance attributes) architecture. The studio has two main themes, of which any one can be proposed for a studio.

OUTLINE:

Each of the two themes approach sustenance in different ways, one which looks at traditional wisdoms of sustainability and the other which address the same through technology, digital media and evaluating efficacy in design.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

Case study practices: David Adjaye architects, ke're' Architecture, Morphogenesis, CnT Architects, Small projects, Matharoo associates, Roger Anger houses, Popo Pingel architecture, Aga khan architecture

Case study concepts: Aqua ducts; Step wells; passive design elements like day lighting, natural ventilation, thermal mass, evaporation, nocturnal radiation, insulation; contemporary interpretation of vernacular elements like jaalis, jharokhas, shading, verandas; Wind towers, Solar chimneys, Water coolant systems, HVAC systems etc

1. **Meta Architecture**: The work in question will strongly root for itself. It will search meaning, solutions, and best practices from principles of regional/vernacular architecture and reincarnate itself as embodiment of contemporary expression instilled with traditional wisdom. The identity of the building will be an outcome of the interplay between the older principles and newer materials. Articulation of the building character through details will remain a primary motive of the studio. Although drawn from the traditional principles, the nature of the buildings remains current. An architectural vocabulary could be built by extending the exercise to service design, furniture design and facade development. The Program will utilize both active and passive energy efficient methods in its climatic design.

Program: Office/commercial complexes, Community centre, Institutions, Public Library etc

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes

Case study practices: Arup associates, Atelier Jean Nouvel, Heather wick Studio, SOM, Calatrava Architects, Toyo ito architects, Grimshaw architects, Thornton Tomasetti, Renzo Piano architects

Case study concepts: Responsive facades, dynamic facades, vernacular materials and passive design strategies technological innovation, exo skeletal structures, Kinetic structures, etc

2. Performative Architecture: It is the architecture, in which a building becomes a living, breathing, consuming, excreting organism. Its Facade i.e, skin of the building will simultaneously resolve the structural, aesthetic, climatic requirements of the building. Its architectural expression shall not be a static response to its context, but a dynamic one.

The engineering aspect of the building typically continues into its internal function. From foundation to form, performative architecture, rethinks the formulaic approach to building design. The program will ask the students to delve deeper into exploring diurnal patterns of solar geometry and thermal comfort conditions (daytime and night-time temperatures/humidity and wind flow patterns), and engineering vernacular materials into dynamic climate responsive skin of the building. The program will thus consider the forces of nature such as Sun, Wind, Water, and its absence as controlling parameters of its function. In order to extract maximum design mileage, the program shall be situated in regions with extreme weather conditions.

Program: Office/commercial complexes, Community centre, Institutions, Public Library etc

Course outcome (Course Skill Set)

I. In depth understanding of Green concepts, be it Vernacular, active energy efficient methods or projective models. Case study work should be presented as a knowledge sharing exercise, through models, 3d models and explanatory diagrams.

II. Building simulation models should be a mandatory output of the studio, to utilize

software technology as an effective analytical and design management tool.

III. Exploring the technology powered - engineering of vernacular materials and designing elements into contemporary expression

IV. The complexity of the project can be broken down into components and treated as one/two minor projects and one major component.

Note: The suggested directions can be altered and evolved to suit the expertise of the studio faculty, keeping in mind that the studio shifts to an explorative (concept driven) path from a program driven model.

Assessment Details (both CIE and SEE)

(methods of CIE need to be defined topic wise i.e.- Studio discussions, Reviews, Time problems, test, Seminar or micro project)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 50% marks individually both in CIE and 40 % marks in SEE to pass. Semester End Exam (SEE) is conducted for 100 marks (Viva-voce) and a minimum of 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Based on this grading will be awarded

Continuous Internal Evaluation:

Methods suggested:

1. Studio discussions, Reviews, Time problems, CIE tests, Seminar or micro project, Quiz, report writing etc.
2. The class teacher has to decide the topic for the Design and Seminars if any, in the beginning only. The teacher has to announce the methods of CIE for the subject in advance in writing.

Semester End Examination:

3. The student needs to submit his/her works done throughout the semester, including rough sheets for the Viva examination, at least one day prior to the Viva work examination to the course teacher/coordinator.
4. The Viva-voce will be evaluated by an external teacher appointed by the University along with Course teacher or an internal examiner.
5. The SEE marks list generated is to be signed by both internal and external examiners and

Suggested Learning Resources:

Books

1. Elizabeth M. Golden, "Building from Tradition: Local Materials and Methods in Contemporary Architecture", 2018, Routledge.
2. Paola Sassi, "Strategies for sustainable Architecture", 2006, Taylor and Francis Group.
3. Lisa Iwamoto, "Digital Fabrications: Architectural and Material Techniques", 2009, Princeton Architectural Press.
4. Jesse Reiser, " Atlas of Novel Tectonics", 2006, Princeton Architectural Press.
5. Russell Fortmeyer, Charles F. Linn, " Kinetic Architecture: Designs for Active Envelopes", 2014, The Images Publishing Group.
6. Michael Fox, " Interactive Architecture: Adaptive World", 2016, Princeton Architectural Press.

Web links and Video Lectures (e-Resources):

- https://ndl.iitkgp.ac.in
- https://www.youtube.com/watch?v=koMAXj9OpPM
- https://www.youtube.com/watch?v=0fuE2_Qg8_w
- https://www.youtube.com/watch?v=Lzn-7tcmiY4
- https://www.youtube.com/watch?v=kdxPj3bV2XU
- http://architectureinthemaking.se/projects/meta-urbanism
- https://www.youtube.com/watch?v=LWiU06imMks

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Activity 1: Case study of Green Buildings in nearby place.

Activity 2: write a Research Paper on Meta and Performative Architecture in a regional context.

Activity 3: Study of Responsive facades, dynamic facades, vernacular materials and passive design strategies technological innovation, etc based on performative architecture.

VII Semester

Materials and Methods in Building Construction -VII			
Course Code	**21ARC72**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:3	SEE Marks(VIVA)	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	-

Course objectives:

To familiarize students with construction techniques in interior spaces and to provide an introduction to prefabrication design, analysis and manufacture processes. This course will also bring in the aspect of environmental impact, energy intensiveness, carbon emissions and circularity (recyclability) of each material studied.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. The subject teacher to link the studio work with on site work by arranging site visits in the nearby areas.
2. The subject teacher to highlight the uses of various types of Manufactured Wood used in buildings.

Module-1

1. **Introduction to wood products as building material:** Plywood, block board, particle board, hard board, laminates, MDF, HDF, HDPE wood wool, etc
2. **Interior residential construction:** Detail of wardrobes and showcases in wood, Ferro cement and stone.

Teaching-Learning Process	1. The subject teacher to link the studio work with on site work by arranging site visits in the nearby areas. 2. The subject teacher to highlight the uses of various types of Manufactured Wood used in buildings.

Module-2

3. **Interior residential construction:** modular kitchens and cabinet shelves.
4. **Interior office construction:** book selves, file cabinets and workstations. Partition systems: wall and ceiling using plywood, PVC, marble, granite, aerated concrete blocks, gypsum board, glass etc.

Teaching-Learning Process	1. Visit to interior sites/ factories/showrooms for hands on experience with materials and methods of construction. 2. Document and write a report on uses of various types of Manufactured Wood used in buildings. 3. Minimum one plate on each construction topic. Study of material applications in the form of a portfolio.

Module-3

5. **False ceiling systems**: Fibre board, plaster of Paris, particle board, wood wool, metals, straw and any other materials introduced in the market including acoustic ceiling. Study of recyclability of above mentioned false ceiling materials
6. **Pre stressing and post tensioning**: Introduction to pre-stressing and post tensioning of building components especially floor slabs and beams.

Teaching-Learning Process	1. Visit to interior sites/ factories/showrooms for hands on experience with materials and methods of construction. 2. Document and write a report on site visit. 3. Minimum one plate on each construction topic. Study of material applications in the form of a portfolio.

Module-4

7. **Introduction to Advanced foundation:** Mat foundations, Pile foundations; different types of piles, precast piles, cast-in-situ piles in wood concrete and steel.
8. **Pile foundation construction:** method of driving piles, Sheet piling, pile caps, etc.
9. **Earth retaining structure:** Selection, Design, Construction of retaining structures including gravity, cantilever, sheet pile, and anchored earth and mechanically stabilized earth (reinforced earth) walls.

Teaching-Learning Process	1. Visit to construction sites for hands on experience with materials and methods of construction. 2. Document and write a report on site visit. 3. Minimum one plate on each construction topic. Study of material applications in the form of a portfolio.

Module-5

10. **Bamboo Construction:** detailing of walls, wall panels, doors, windows and roof in Bamboo. Qualitatively and quantitatively study the material's contributions to/resistance to increased building solar heat gain in the tropics, increase or reduction in air conditioning load and hence artificial cooling energy needs, and ability/inability to promote natural unassisted night-time cooling through spontaneous release of accumulated heat Study the life cycle environmental impacts, carbon emissions and circularity (recyclability) of bamboo as a material used in building construction.