

- Indigenous building technologies, Post Independence Housing: Otto Koenigsberger.
- 4) Studying housing projects in India [Laurie Baker, BV Doshi, Charles Correa, MN AshishGanju, Raj Rewal, Shilpa Sindoor, Revathi Kamath] and other contemporary housing projects from around the world

Assignment-3: PROJECTS

One major project (from formal (apartment) settlements be taken as design project) (Activity) and one minor/time (looking at an informal settlement or vernacular parts of the city or rural setting for settlement/community study and design) assignment to be tackled in the semester. Project work could be done in the following four stages of activity interspersed with seminars.

1. Introduction to the initial design parameters which include choice of:

- a. Geography/situation (context),
- b. Understanding the dwellers, their lifestyle, and social context, and the materials used locally
- c. Exploring ways in which dwellers come together to live in a small community.
- d. Sustainable design principles and sustainable services (eg. storm water harvesting, waste water reuse, solar power, etc.) integration.

2. Explore issues of community, public and private realms, edge conditions, communication and connectedness.

3. Enquire into individual and family/user group needs and aspirations.

4. The emphasis in the studio has to be on **inclusion** and **integration** of differences in age, gender, mobility, health, economic status. In today's world, there is a need to make buildings equitable to all at the outset, and we should begin with our dwellings.

5. Suggested plot size: From 1500 - 3000 sqm

Teaching-Learning Process	
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Course outcome (Course Skill Set)

the student will be able to:

- Get an introduction into the field of Architectural Design viz. a viz. the duality & the tension that exists between the form and function of a space.
- Make responsible choices for design development
- Get a perspective on design of spaces in formal and informal settlements.

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:

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.
3. 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**

- I. Amos Rapoport , "House Form and Culture", Prentice-Hall, 1969
- II. Christopher Alexander, "Pattern Language", Oxford University Press, 1977
- III. Christopher Alexander, "A Timeless Way of Building", Oxford Uni. Press , 1979
- IV. Gautam Bhatia, "Laurie Baker, Life, Work, Writings", Viking , 1991
- V. Dick Van Gameren & Rohan Verma, "Designs for Housing: Charles Correa", 2018
- VI. Atul Deulgaonkar, "Laurie Baker, Truth in Architecture", Jyotsna Prakashan , 2015
- VII. Otto Koenigsberger, "Manual of Tropical Housing and Building", 1975
- VIII. Geoffrey Bawa, The Complete Works, 2002

Web links and Video Lectures (e-Resources):

- <https://ndl.iitkgp.ac.in>
- <https://www.youtube.com/watch?v=ly8orBNiNQM>
- <https://www.youtube.com/watch?v=k4dVgbuxBAw>

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

the class be divided into two groups, one takes the formal housing (apartment for Middle-income groups) and the other takes the Informal settlement (rehabilitation/redesign/retrofitting for low-income groups - affordable housing)

IV Semester

Materials and Methods in Building Construction -IV			
Course Code	21ARC42	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	-
<p>Course objectives: <i>To acquaint the students with construction practices pertaining to RCC framing systems, and other building elements such as metal doors and windows(In Steel and Aluminium)</i></p>			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.</p> <p style="text-align: center;">Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material application in the form of portfolio.</p>			
Module-1			
<ol style="list-style-type: none"> 1. Introduction to Advanced RCC roofs: Moment framed, Flat slab and Flat plate, Filler slabs, Waffle slab. 2. RCC Moment framed: Principles and methods of construction including detailing of Reinforcement. 3. RCC Flat Plate & Slab: Principles and methods of construction including detailing of Reinforcement. 			
Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material application in the form of portfolio.		
Module-2			
<ol style="list-style-type: none"> 4. RCC filler slabs: Principles and methods of construction. Introduction to different filler materials, Mangalore tiles, Burnt Clay Bricks, Hollow Concrete blocks, Stabilized Hollow Mud blocks, Clay pots, Coconut shells etc. 5. RCC Waffle slabs: Principles and methods of construction 			
Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material application in the form of portfolio.		
Module-3			
<ol style="list-style-type: none"> 6. Structural steel as a building material: Types, properties, uses, manufacturing methods. Life cycle and environmental impact of steel 7. Steel construction: Steel columns/Stanchions/beam construction; Principles and methods of construction. (Reuse and repurpose of steel construction and demolition waste). 			

Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material application in the form of portfolio.
Module-4	
<p>8. Steel doors and windows: Study of joinery details.</p> <p>9. Steel doors for garages and workshops: uses and manufacturing methods.</p> <p>10. Collapsible gate and rolling shutters: uses and manufacturing methods.</p>	
Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material application in the form of portfolio.
Module-5	
<p>11. Aluminium as a building material: Types, properties, uses, manufacturing methods and Life cycle environmental impact of aluminium (including its thermal properties, energy needs during construction phase). Detailing of aluminium partitions.</p> <p>12. Aluminium doors and windows: Casement, Pivot, Sliding type: Study of joinery details. (Reuse and repurpose of Aluminium construction and demolition waste).</p>	
Teaching-Learning Process	Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material application in the form of portfolio.
<p>Course outcome (Course Skill Set)</p> <ol style="list-style-type: none"> 1. The students will be able to understand the critical aspects of structural systems in RCC. 2. The student will be able to relate architectural drawings to structural consultant's drawings. 2. The students will be able to appreciate and use of other materials like steel, Aluminium for buildings. 	

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 50 marks (Viva-voce). Based on this grading will be awarded.

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 Viva-voce 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) Chudley , Construction Technology, ELBS, 1993
- 2) Barry, Construction of Buildings, East West Press, 1999

Web links and Video Lectures (e-Resources):

- <https://ndl.iitkgp.ac.in>
- <https://www.youtube.com/watch?v=kjmPv1d1ohM>
- <https://www.youtube.com/watch?v=JMtlkNkzbnk>
- <https://www.youtube.com/watch?v=VdhOO3N2E00>
- <https://www.youtube.com/watch?v=XL2KXnui0Q>
- <https://www.youtube.com/watch?v=hCEvmTSBj4Y>

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

Activity 1- Site visit to observe flat slab, filler slab and other type of roofs

Activity 2- Observe and understand technical construction methods and materials (as studied in this module) and document the same in a report.

Activity 3 – Visit to local workshop or a construction site to observe the steel and Aluminium components are made and document the same in a report.

IV Semester

History of Architecture -IV			
Course Code	21ARC43	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: <i>To study the evaluation of Greek, Roman, Byzantine, Medieval and Gothic architecture through critical analysis of appropriate examples.</i>			
Teaching-Learning Process (General Instructions) These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none">1. Use of theory, activities, sketches, drawings, assignment and tutorial for teaching.2. Evaluation by quiz, tests, classroom activities.			
Module-1			
1. Classical Greek Architecture 1: Critical appreciation of works and synoptic study of architectural characteristic features from the Greek early periods. 2. Classical Greek Architecture 2: Critical appreciation of works and synoptic study of architectural characteristic features from the Greek later periods, Doric, ionic and Corinthian orders and optical correction. 3. Greek architecture Typologies: Study of principles of design of Greek buildings through study of three kinds of Architecture: a) Monumental (Built to impress and Last) ex. Parthenon, Theatre at Epidauros. b) Domestic (Built to inhabit): House of Colline, House of Masks, etc. and c) Civic space: The Agora and Acropolis.			
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. Introduction to Roman Architecture: Critical appreciation of works and synoptic study of architectural characteristic features from the Roman periods. Study of Tuscan and composite orders. 5. Roman architecture Typologies 1: Study of principles of design of Roman buildings through study of proportion, composition, visual effects etc. in Monumental (Built to impress and last) Pantheon, Colosseum, Thermae of Caracalla, Pont du Gard, Nimes, Basilica of Trajan.			
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			
6. Roman architecture Typologies 2: Study of principles of design of Roman buildings through study of Domestic (Built to inhabit)-House, villa and apartments. 7. Roman architecture Typologies 3: Study of principles of design of Roman buildings through study of Civic space with elements like triumphal arch, Column of Trajan(Septimius Severus), Roman Forum. 8. Early Christian: Evolution of architecture parallel to the evolution of religious practices. Study of principles of design of buildings through study of three kinds of Architecture: a) Monumental b) Domestic (Built to inhabit) and c) Civic space.			

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	
<p>9. Byzantine: Study of principles of design of buildings through study of its Architecture: a) Monumental; Hagia Sophia b) Domestic (Built to inhabit) and c) Civic space-St.Marks Venice.</p> <p>10. Medieval: Study of principles of design of buildings through study of its Architecture: a) Monumental; Pisa Cathedral, the Campanile and Baptistery, Angouleme Cathedral b) Domestic (Built to inhabit) and c) Civic space; Pisa.</p>	
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	
<p>11. Gothic: Study of principles of design of buildings through study of its Architecture: a) Monumental; Notre Dame, Paris. b) Domestic (Built to inhabit) and c) Civic space;</p> <p>12. Gothic: Study of Gothic Architecture, typical characteristics including the pointed arch, the ribbed vault and the flying buttress, aesthetic elements with examples like Chartres Cathedral: French High Gothic style</p> <p>NOTE: Progressive marks to include Submission of sketch book, study models relating to structure, aesthetics and building typology resulting from different functions.</p>	
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.
<p>Course outcome (Course Skill Set)</p> 1) The students will be able to learn and compare various styles of Architecture. 2) The students will be able to appreciate the scale of 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 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 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. Bannister Fletcher , "History of Architecture", CBS Publishers, 1992
2. Henri Stierlin, "Architecture of the world - Greece", Herron Books 1994
3. Henri Stierlin, "Architecture of the world - The Roman Empire", Taschen Pub., 1997 .
4. Henri Stierlin , "Architecture of the world - Romanesque", Taschen Pub., 2008.
5. James Stevens Curl," Classical Architecture", W. W. Norton & Company; Reissue edition, 2003.
Robert Adam, " Classical Architecture", Harry N. Abrams; 1st edition, 1991

Web links and Video Lectures (e-Resources):

- <https://ndl.iitkgp.ac.in>
- <https://www.youtube.com/watch?v=6bDrYTXQLu8>
- <https://www.youtube.com/watch?v=yGPevxwITBE>
- <https://www.youtube.com/watch?v=M8adUsbspfw>

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

- 1) Sketching of the historical buildings from a Book
- 2) Group or Individual seminar on a building
- 3) Quizzes, debates on a selected topic

IV Semester

Building Services -II (Electrical Services and Illumination)			
Course Code	21ARC44	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
<p>Course objectives:</p> <p><i>: To introduce students to electrical services and illumination and to sensitize them with respect to their integration into Architectural Design.</i></p> <p><i>To introduce students to the green building councils of India and codes (BEE, GRIHA, IGBC).</i></p> <p><i>To sensitize students about the energy consumption and carbon emissions of different electrical equipment, technologies and lighting.</i></p> <p><i>To address energy requirements in different socio-economic sections of the society.</i></p> <p><i>Introduction and study of renewable energy systems.</i></p>			
<p>Teaching-Learning Process (General Instructions)</p> <p>These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> 1. Use of theory, activities, sketches, drawings, assignment and tutorial for teaching. 2. Evaluation by quiz, tests, classroom activities. 			
Module-1			
Electrical Services - Electricity Generation; Transmission and Distribution			
<ol style="list-style-type: none"> 1. Introduction to Electrical Services: Introduction to commonly used terminology – Voltage, Current, Power, Connected Load, Max. Demand, Load Factors, Diversity Factor Etc.; Importance of Electrical Services and Its implications on building design; Introduction to Codes and Standards like National Building Code, National Electric Code (including Renewable/Clean energy/ Green Building codes), IS Codes, State Electricity Board and Chief Electrical Inspectorate Guidelines 2. Supply and distribution of electricity to buildings: Brief introduction to various Sources for Electricity generation. Introduction to Transmission and Distribution system (from generation to Building’s main) - Cables–HT/LT, Voltage Levels, Sub-Stations, Ring Main Units, Metering Panels, HT Panel, Transformers. 3. Green Power Generation and minimising ecological imbalance through sustainable Green technologies for the safety of people. 			
Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss Electrical services in a buildings,.		

	<p>2) The students can visit an electrical substation to understand electrical distribution in an area with details.</p> <p>3) Quizzes, models, seminars from students can be encouraged.</p>
Module-2	
<p style="text-align: center;">Electrical Services - Internal Electrical distribution systems and Renewable Energy Systems</p> <p>4. Residential Building internal electrical distribution system & Commercial Building internal electrical distribution system: Power Requirement, Incoming Power Source Voltage, RMU, Transformers, HT Metering & Sub Metering Panels, LT Panels, Rising Mains, Sub-Mains, Circuit-Mains, Generators, UPS requirements, Server power requirements, Point Wiring, Point Matrix, Utility Loads, Wiring Systems, Wiring Installation systems, sustainable (solar/wind powered) electrical generation and distribution systems in high rise buildings (Activity 1, 2 and 3)</p> <p>5. Introduction to Renewable Energy Systems (On-Site and Off-Site): Understanding the primary importance of thermal load reduction (i.e. reducing artificial cooling and heating energy needs in buildings) as a prerequisite for Net Zero Energy Building Design. Solar, Wind, Bio-Mass, Achieving Net Zero Building Design through utilization of above natural resources; Energy Conservation techniques in Electrical systems. (Activity 4)</p>	
Teaching-Learning Process	<p>1) The teacher can use PPTs, Videos to discuss Electrical services in a building.</p> <p>2) The students need to draw an electrical layout of a building with details.</p> <p>3) Quizzes, models, seminars from students can be encouraged.</p>
Module-3	
<p style="text-align: center;">Electrical Services - Protection Systems</p> <p>6. Switchgear & Protection Devices - Fuses, Breakers: Miniature Circuit Breakers; Earth</p> <p>Leakage Circuit Breakers; Moulded Case Circuit Breakers & Air Circuit Breakers and Protection Relays.</p> <p>7. Earthing& Lightning Protection System: Definition, Purpose; Types of Earthing Systems, Factors affecting selection and system specification - Type of Soil, water table, soil resistivity etc. Brief about new advances in earthing systems; Lightning system design - Factors affecting the system specification, basic rules as per NBC and other relevant codes.</p>	

Teaching-Learning Process	<p>1) The teacher can use PPTs, Videos to discuss Electrical systems in buildings.</p> <p>2) The students to sketch the protection systems employed in a building.</p> <p>3) Quizzes, models, seminars from students can be encouraged.</p>
Module-4	
ILLUMINATION	
<p>8. Fundamentals: Quality & Quantity of Lighting; Recommended Lux Levels; Type of Lamps – Incandescent, Discharge Lamps, Fluorescent, CFL, LED and OLED. Integration of Day lighting with Artificial Lighting, Control Systems, Laws of illumination, high energy and low energy (sustainable) lighting.</p> <p>9. Techniques, Principles and Applications: Lighting Methods - Ambient, Task & Accent lighting; Systems of Luminaries - Up-Lighting, Down-Lighting, Spot Lighting etc.; Street Lighting, Façade Lighting, Landscape Lighting, Architectural Typologies; Preparation of Lighting Layout.</p>	
Teaching-Learning Process	<p>1) The teacher can use PPTs, Videos to discuss Illumination services in buildings.</p> <p>2) The students to sketch the illumination systems employed in a building.</p> <p>3) Quizzes, models, seminars from students can be encouraged.</p>
Module-5	
EXTRA LOW VOLTAGE SYSTEMS AND LOAD ESTIMATION	
<p>10. Extra Low Voltage systems: Telephone; Data & Cable TV Networking; Service provider requirements; Point matrix for Individual residential / Apartment.</p> <p>11. Electrical Layout Design and Load Estimation: Residential Electrical Layout Design (using symbols as per IS codes), Compliance to local building codes; and Electrical Load Calculations.</p>	
Teaching-Learning Process	<p>Case studies: Typical Layouts & Layout Generation for Lighting, Transformers Yards, Generator Rooms, Lighting layouts for shops/clinic.</p> <p>Site Visits: Sub-Stations, Transformer Yards, Generator Yards and Panel Rooms etc. of Multi- storied Residential Buildings/Campus, Hotels, Hospital & IT Buildings etc. (Activity 5)</p>

Course outcome (Course Skill Set)

- 1) The students will be able to learn the importance of electrical services in a building.
- 2) The students will be able to appreciate the importance of electrical services in buildings.
- 3) The students will be able to do the service drawings and coordinate with electrical consultant's services 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 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**)

5. The question paper will have ten questions. Each question is set for 20 marks.
6. 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. L.Uppal ; Electrical Wiring, Estimating & Costing.
2. Aly. S. Dadras (1995), Electrical Systems for Architects by N.G.A.R.B. McGraw-Hill.
3. Anwari ; Basic Electrical Engineering.
4. National electric Code, Indian Electricity Rules 1956, Energy Conservation and Building Code.
4. Handbook of Lighting Design by RuedigerGanslandt, Harald Hofmann; ERCO Edition
5. Fundamentals of Lighting by Susan M. Winchip.
6. National Building Code, 2016 – Part 8 (Section 1, 2, 6).

7. Code of Practice for Interior Illumination (IS 3646-1 (1992); Indian Standard - BIS.

Web links and Video Lectures (e-Resources):

- <https://ndl.iitkgp.ac.in>
- <https://www.youtube.com/watch?v=8DEap6exAB0>
- https://www.youtube.com/watch?v=qY_VzvksNa8
- <https://www.youtube.com/watch?v=ofWq03WPeK0>
- <https://www.youtube.com/watch?v=IebflvdLVvM>
- <https://www.youtube.com/watch?v=5cr71HISw6k>

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

Activity 1: Energy Audit of Own Shelter using electricity bill, Students will get an idea about the most energy intensive devices in their homes, and how they can reduce energy consumption from these devices.

Activity 2: Calculate the EPI (energy performance index) of college building. Students will be able to compare the energy performance of the college building with the EPI benchmark set by the Bureau of Energy Efficiency (BEE) for institutes.

Activity 3 - study and comparison of solar powered and fossil fuel powered residential and commercial building

Activity 4 - Study the current landscape and government programs and 2030 climate targets in the context of clean or renewable energy. Critically, analyze the effect of India's solar plans.

Activity 5 - Energy calculation of a residential complex vs. informal settlement vs. mall, draw comparisons and the narrative of inequitable energy consumption and climate injustice

IV Semester

Building Structure -III			
Course Code	21ENG 45	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	--
<p>Course objectives:</p> <ol style="list-style-type: none"> 1) <i>To understand the fundamental principles and structural behaviour of concrete buildings in withstanding gravity, lateral (seismic and wind), and other environmental forces.</i> 2) <i>To understand the mechanics of reinforced concrete, and the ability to design and proportion structural concrete members including slabs, beams, and columns.</i> 			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> 1) The teacher can use PPTs, Videos to discuss Reinforced Cement Concrete and its application in buildings. 2) The students need to sketch various RCC components in a simple on building 3) Quizzes, models, seminars from students can be encouraged. 			
Module-1			
<ol style="list-style-type: none"> 1) Introduction to Reinforced Cement Concrete. 2) Properties of materials - with emphasis on cement, fine aggregates, coarse aggregates, admixtures 			
Teaching-Learning Process	<ol style="list-style-type: none"> 1) The teacher can use PPTs, Videos to discuss Reinforced Cement Concrete and its application in buildings. 2) The students need to visit sites and Concrete lab to understand the properties of RCC mix design. 3) Quizzes, models, seminars from students can be encouraged. 		
Module-2			
<ol style="list-style-type: none"> 3) Mechanics of Reinforced Cement Concrete 4) Loads on the structure as per IS 875 5) Concrete structural system design 			
Teaching-Learning Process	<ol style="list-style-type: none"> 1) The teacher can use PPTs, Videos to discuss mechanics of Reinforced Cement Concrete. 2) The students need to visit sites and Concrete lab to understand the properties of RCC mix design. 3) Quizzes, models, seminars from students can be encouraged. 		
Module-3			

	<p>6) Design of one way continuous slab - as per IS 456[using the BM coefficients given in IS 456]</p> <p>7) Design of singly reinforced continuous beam as per IS 456 (using the BM & SF coefficient given in IS 456).</p>
Teaching-Learning Process	<p>1) The teacher can use PPTs, Videos to discuss application of Reinforced Cement Concrete for slabs and Beams.</p> <p>2) The students to design slabs and Beams in class using IS 456 codes</p> <p>3) Quizzes, models, seminars from students can be encouraged.</p>
Module-4	
	<p>8) Design of Tee beam as per IS 456 - using limit state philosophy.</p> <p>9) Design of staircase as per IS 456 - using limit state philosophy.</p>
Teaching-Learning Process	<p>1) The teacher can use PPTs, Videos to discuss application of Reinforced Cement Concrete for slabs and Beams.</p> <p>2) The students to design Tee Beams and staircases in class using IS 456 codes</p> <p>3) Quizzes, models, seminars from students can be encouraged.</p>
Module-5	
	<p>10) Design of Axially loaded short columns.</p> <p>11) Design of isolated column footing.</p> <p>12) Data given drawing for different cases viz.</p> <ol style="list-style-type: none"> a. Singly reinforced beam b. Doubly reinforced beam c. One way slab d. Two way slab - for at least 2 cases e. Staircase detailing (dog legged staircase) f. Cantilever slab.
Teaching-Learning Process	<p>1) The teacher can use PPTs, Videos to discuss application of Reinforced Cement Concrete for columns and footings.</p> <p>2) The students to design Columns and footings in class using IS 456 codes</p> <p>3) Quizzes, models, seminars from students can be encouraged.</p>
Course outcome (Course Skill Set)	
<p>1) The students will be able to learn the importance of R C C in a building.</p> <p>2) The students will be able to analyse the forces acting in structural system in buildings.</p> <p>3) The students will be able to understand the IS Codes and expect the structural drawings for buildings are complied with the codes.</p>	

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:

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.

1. The Viva-voce will be evaluated by an external teacher appointed by the University along with Course teacher or an internal examiner.
2. 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) Dr. S. Ramamrutham, "Design of Reinforced Concrete Structures", Dhanpat Rai Publishing Co Pvt Ltd, January 2010.
- 2) Dr.H.J.Shah, "Reinforced Concrete Vol 1 (Elementary Reinforced Concrete)", Charotar Publishing House Pvt. Ltd.; 11th Edition edition (2016)
- 3) Dr.S.S. Bhavikatti, "Design Of R.C.C. Structural Elements", Volume1., New Age International, 2007
- 4) IS 456-2000 Plain and Reinforced Concrete - Code of Practice
- 5) SP 34 (1987): Handbook on Concrete Reinforcement and Detailing

Web links and Video Lectures (e-Resources):

- <https://ndl.iitkgp.ac.in>
- <https://www.youtube.com/watch?v=HLj5xhvAh1s>
- <https://www.youtube.com/watch?v=M7Q3Jaqqdt4>
- https://www.youtube.com/watch?v=tyHfmrOO_fk
-

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

- 1) Visit to a construction site to evaluate Various RCC components in a building.
- 2) Seminar by students in groups on their learnings.

IV Semester

Constitution of India & Professional Ethics			
Course Code	21ARC46/21CP39/49	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:1:0:0	SEE Marks	50
Total Hours of Pedagogy	25	Total Marks	100
Credits	01	Exam Hours	1
<p>Course objectives:</p> <ul style="list-style-type: none"> • To know the fundamental political structure & codes, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens. • To understand engineering ethics and their responsibilities, identify their individual roles and ethical responsibilities towards society. 			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.</p> <p>Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.</p> <p>(i) Direct instructional method (Low /Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques,</p> <p>1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can enhance the students in theoretical applied and practical skills in teaching of 21CIP39/49 in general.</p>			
Module-1			
<p>Introduction to Indian Constitution: Definition of Constitution, Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly. Preamble of Indian Constitution & Key concepts of the Preamble. Salient features of India Constitution.</p>			
Teaching-Learning Process	<p>Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with administration real time situations).</p>		
Module-2			
<p>Fundamental Rights (FR's), Directive Principles of State Policy (DPSP's) and Fundamental Duties (FD's) : Fundamental Rights and its Restriction and limitations in different Complex Situations. DPSP's and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation building.</p>			
Teaching-Learning Process	<p>Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with administration real time situations).</p>		
Module-3			

Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.

Teaching-Learning Process

Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with administration real time situations).

Module-4

State Executive & Elections, Amendments and Emergency Provisions: State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (Why and How) and Important Constitutional Amendments till today. Emergency Provisions.

Teaching-Learning Process

Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with administration real time situations).

Module-5

Professional Ethics: Definition of Ethics & Values. Professional & Engineering Ethics. Positive and Negative aspects of Engineering Ethics. Clash of Ethics, Conflicts of Interest. The impediments to Responsibility. Professional Risks, Professional Safety and liability in Engineering. Trust & Reliability in Engineering, Intellectual Property Rights (IPR's).

Teaching-Learning Process

Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with administration real time situations).

Course outcome (Course Skill Set)

At the end of the course the student should :

CO 1: Have constitutional knowledge and legal literacy.

CO 2: Understand the profession and Professional ethics and responsibilities of an Architect/Engineer / Management person.

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**

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:

SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject.

- The question paper will have 50 questions. Each question is set for 01 mark.
- SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 50 marks. Duration of the examination is 01 Hour.

Suggested Learning Resources:**Books**

“Constitution of India & Professional Ethics” Published by Prasaranga or published on VTU website with the consent of the university authorities VTU Belagavi.

Web links and Video Lectures (e-Resources):

- <https://www.youtube.com/watch?v=sDstf8ockUo>
- https://www.youtube.com/watch?v=vq2Q1_v6TNU
- https://www.youtube.com/watch?v=F3vdNGFG0LI&list=PLG_pOUNcDW47N8PwD380xECTQtG3hTzJu
- <https://www.youtube.com/watch?v=uH8GqBB-rLQ>
- <https://www.youtube.com/watch?v=3Psh0-mfWzQ>

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

- 1) Group discussions, Seminars, Quizzes in class room.

IV Semester

Computer Application in Architecture -I			
Course Code	21ARC47	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	-
<p>Course objectives:</p> <p><i>To develop and train students to use computers and digital media as tools to explore, develop, evaluate and present architectural ideas. To equip the student with a range of digital tools and techniques in 2D drafting, 3D modelling, and vector graphics.</i></p>			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.</p> <p>1) The teacher can use PPTs, Videos to discuss commands, tools and other application in making a drawing. 2) The students need to practice the commands and tools in a simple building drawing. 3) Quizzes, virtual models, seminars from students can be encouraged.</p>			
Module-1			
<p>1. Introduction to 2D drafting software: Using latest version of relevant CAD software:</p> <p>a. 2D commands, viewports, dimensions, annotations. Time problem introduction; Classroom exercises such as measured drawing of studio (windows, doors and staircases included), architecture School (windows, doors and staircases included) etc.</p> <p>b. Understanding layers, paper space Vs model space, line weights, print set up and Modelling of Walls, Doors, Windows, Stairs etc.</p> <p>2. 2D drafting: Presentation of time problem; plan, sections, elevations of a floor of a single storied building of II / III semester architectural design studio project.</p>			
Teaching-Learning	1) The teacher can use PPTs, Videos to discuss commands, tools and other application in making a drawing.		

Process	<p>2) The students need to practice the commands and tools in a simple building drawing.</p> <p>3) Practice the use of layers in a drawing.</p>
Module-2	
<p>3. Introduction to 3D modelling: Latest version of relevant 3D modelling software – software interface, demonstration of 3D modelling commands required to convert 2D project (of 2D drafting) into 3D as a time-problem.</p> <p>4. Simple 3D modelling: Presentation of time problem; drawing quickly with basic shapes in 3D, viewing models in 3D, adding detail to Models in 3D space, use of cameras, material applications. Presenting models.</p>	
Teaching-Learning Process	<p>1) The teacher can use PPTs, Videos to discuss commands, tools and other application in making a 3D drawing.</p> <p>2) The students need to practice the 3D commands and tools in a simple building drawing.</p> <p>3) Practice the use of 3D modelling in a drawing.</p>
Module-3	
<p>5. Rendering & Visualization: Presentation of time problem, generating 3D Model and introduction to concepts of visualization using rendering engines such as V-Ray, Flamingo, 3D studio Max or any other appropriate software.</p> <p>6. Introduction to concepts of Building Information Modelling (BIM) using REVIT or other relevant BIM software.</p>	
Teaching-Learning Process	<p>1) The teacher can use PPTs, Videos to discuss rendering tools and other application in visualization.</p> <p>2) The students need to practice the rendering software in a simple building drawing.</p> <p>3) Practice the use of 3D modelling with rendering in a drawing.</p>
Module-4	
<p>7. Introduction to graphics editing tools:</p> <ol style="list-style-type: none"> a. Introduction to appropriate techniques to model walls, insert fenestration, curtain walls & staircases. b. Lecture and Classroom exercise to convert into BIM project, relationship of other Industry standard file types (.dwg for AutoCAD or Trimble Sketch up input files or from any other relevant software.). c. Lecture and Classroom exercise to further utilize rendering and visualization 	
Teaching-Learning	<p>1) The teacher can use PPTs, Videos to discuss graphics editing tools and other application in visualization.</p>

Process	2) The students need to practice the BIM software in a simple building drawing. 3) Practice the use of various applications in BIM software in a project work.
Module-5	
<p>8. a. Concepts of image scanning, image editing, effects and filters. b. Classroom exercise to demonstrate use of Image editing for simple architecture design project projects. For e.g., rendering of 2D drawings, adding nature to 3D visualizations.</p> <p>9. Graphics editing tools: – Presentation of any simple project to illustrate skills attained in 2D drafting, 3D modelling, graphics editing tool.</p>	
NOTE: A portfolio of exercises and assignments done in the class to be submitted for progressive marks.	
Teaching-Learning Process	1) The teacher can use PPTs, Videos to discuss Image editing works. 2) The students need to practice the imaged editing in a simple building drawing. 3) Practice the use of various graphics editing tools in a project work.
<p>Course outcome (Course Skill Set)</p> <p>1) The students will be able to learn the computer aided drafting and designing. 2) The students will be able to use the learnings for their academic projects in higher classes.</p>	
<p>Assessment Details (both CIE and SEE) ` (methods of CIE need to be defined topic wise i.e.- Studio/lab 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.</p> <p>Continuous Internal Evaluation: Methods suggested:</p> <ol style="list-style-type: none"> 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. <p>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.</p>	
<p>Suggested Learning Resources: Books:</p> <ol style="list-style-type: none"> 1. Website and training material of relevant Image/Graphics editing software 2. Learning resources on Building Information Management (BIM). 3. Vast amount of CAD learning resources available on the Internet. 4. Vast amount of learning resources for Graphics editing tools available on the Internet. 	
Web links and Video Lectures (e-Resources):	

- <https://ndl.iitkgp.ac.in>
- <https://www.youtube.com/watch?v=p-qA3SILDfA>
- <https://www.youtube.com/watch?v=9j9ZAEXB3Z8>
- <https://www.youtube.com/watch?v=h0865EIE0p0>
- <https://www.youtube.com/watch?v=34AZCGIXToA>

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

1. The students are encouraged to make a project of previous semester Architectural Design in to a computer aided drawings 2D & 3D with rendering and photo editing.
2. students are encouraged to use Building Energy Modelling Software and Sustainable Cooling System Modelling Tools (e.g. ISHRAE's Smart Energy Software) to enable students to estimate energy conservation and climate impact mitigation of their design projects through integration of passive design features such as insulation, shading, thermal mass, appropriate window-wall-ratios etc. and sustainable cooling systems (including direct and indirect evaporative cooling, radiant cooling, structure cooling) in the above project.

IV Semester

Elective-2			
Course Code	21ARC48	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. ENVIRONMENT RESPONSIVE ARCHITECTURE

OBJECTIVE: *To develop awareness and familiarity with green design and its integration with Architectural design.*

OUTLINE:

- 1) **Introduction to Green Buildings:** Why make Buildings Green? Concept and necessity.
- 2) **Green Building Rating System:** The seven categories in the rating system : Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation in Design and Regional Priority.

- 3) **Introduction to a design exercise (Project application):** Design of a small building with an objective to integrate categories of green building rating.
- 4) **Sustainable Sites:** Site Specific Design; Development Density and Community Connectivity, Alternative Transportation, Site Development, Storm water Design and Heat Island Effect.
- 5) **Water Efficiency:** Innovative Wastewater Treatment and Reuse and Water Use Reduction and Re-use factors.
- 6) **Energy and Atmosphere:** Optimization of Energy Performance, On-site Renewable Energy, Enhanced Commissioning and Green Power. To apply the principles of Solar Passive Architecture to design of buildings.
- 7) **Materials and Resources:** Building Reuse: Maintain Existing Walls, Floors, and Roof, Construction Waste Management, Materials Reuse, Recycled Content, Regional Materials and Certified Wood.
- 8) **Indoor Environmental Quality:** Construction Indoor Air Quality Management Plan and Daylight and Views. Rating Systems: GRIHA and LEED Systems.
- 9) **Regional Priority:** To provide incentive for project teams to address geographically significant environmental local issues. Introduction to passive techniques of cooling such as evaporative cooling, earth tubing, wind scoops, roof ponds, shaded courtyards etc.
- 10) Review of a design project considering various factors listed above.

Activity Based Learning: Calculate the carbon footprint of material used in building a formal house and an informal house. Include the carbon footprint of functions/ operations of the respective houses. Reflect on the scores and analyze the reasons. Document how lifestyles of residents of formal and informal houses contribute to carbon footprint.

REFERENCES:

1. Steemers, Koen and Steane, Mary Ann. Environmental Diversity in Architecture, Spon Press, 2004.
2. McGlynn, Sue et al., Responsive Environments, Architectural Press, 2008

b. PRODUCT DESIGN

OBJECTIVES:

- 1) *To introduce the students to the discipline of Product Design*

2) To develop basic skills required in handling simple product design projects

OUTLINE:

Preamble:

We live in a world of objects. Objects can have meanings, carry associations or be symbols of more abstract ideas. These objects are predominantly functional in nature, some are purely symbolic / decorative in nature and there are a few which combine both the functional with the symbolic and decorative.

Great Architecture has demonstrated this fusion of the functional with the symbolic through the ages. Product design, on a smaller scale, seeks to blend the technical with the aesthetic, the utilitarian with the emotional delight; the dialogue between what people need / want vs what people will buy / discard.

1. **Product design as a noun:** the set of properties of an artifact, consisting of the discrete properties of the form (i.e., the aesthetics of the tangible good and/or service) and the function (i.e., its capabilities) together with the holistic properties of the integrated form and function.
2. **Product design as a verb:** the process of creating a new product to be sold by a business to its customers. A very broad concept, it is essentially the efficient and effective generation and development of ideas through a process that leads to new products.
3. **Product design process:** from idea generation to commercialization; concept, development, detail; materiality, technicality, Imageability.
4. Relationship between Design, Technology and Product.
5. History of product design as a discipline, the various theories of design via study of design practices.
6. Mode and method of Design Process as applicable to product ideation and development.
7. Materials and manufacturing process and its influence on product ideation and development.
8. Influence of ergonomics on product ideation and development.
9. Impact of culture i.e. the aesthetics on product ideation and development, the dialogue between people's aspirations and people's needs.
10. Relationship and difference between craft based and mass manufactured products.
11. Market as a tool for product promotion.
12. Indian aesthetic sense and its influence on product ideation and development.
13. Influence of product design on other disciplines like automobile styling,

furniture, jewellery, toys, systems design, computer interfaces, etc.

Class assignments / exercises:

Short projects along with a time problem will be tackled in the class exploring the influences of design process, and ergonomics on the product ideation and development.

The student will also study the product changes that will occur through the choices made of materials, manufacturing process, and marketing techniques.

Discussions, video presentations, seminars and case studies will cover all the other topics

Activity Based Learning: Study a few houses in Informal settlements. Based on their requirements, design a multipurpose product or spatial resolution that can help informal household dwellers make their small spaces more multi functional. (Could be an architectural system, furniture, modular low cost housing, etc.)

REFERENCES:

1. Alexander, Christopher ,Notes on the Synthesis of Form, Harvard University Press, 1964
2. Morris, R, The fundamentals of product design, AVA Publishing 2009

c. HERITAGE DOCUMENTATION

OBJECTIVE: *To understand the character of a settlement, street, building, spaces, materials through a process of measured drawings and photographic documentation.*

OUTLINE:

1. Introduction to Documentation

- Need for Documentation undertaken? Tools for Documentation available, Methodology, Importance of Archival research, Old Photographs, Maps etc

2. Site work

- Secondary information on the /street/heritage
- Reconnaissance survey of the /street/heritage building;
- Mapping of the street
- Identification of selected typology of structures for detailed measured drawing
- Recording of measurements- horizontal, vertical, measuring angles, marking center lines, datum, notations, building orientation

- Legend of materials used; Structural details and joineries
- Details of various elements – openings, ornamental details
- Mapping activities in various locations
- Supporting sketches
- Information on people, surroundings, climate, Access to site

3. Preparation of Drawings

- Developing drawings from the field data – Plans at various levels, Building floor plans, Reflected ceiling plans, roof plans, all elevations, relevant sections.
- Drawings of details such as openings, ornamental details, joineries

4. Analysis:

- Analysis as tools for understanding and interpreting the measured drawings
-

Activity Based Learning: Documentation of an old Heritage structure (or any local informal settlement) redevelopment / up gradation/ rehabilitation program and the consequences on livelihoods, current informal architecture, increased vulnerabilities of the community, etc.

REFERENCES:

- 1) Building Craft Lab- DICRC, CEPT University

OPEN ELECTIVE:

The college has the discretion to offer an open elective in the areas/subject/field 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.

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=AU2wTudKmX8>
- <https://www.youtube.com/watch?v=n6rPyLZiqlE>
- <https://www.youtube.com/watch?v=KCcvnMb8vNY>
- <https://www.youtube.com/watch?v=I0dGT5uzWEU>

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.

IV Semester

Universal Human Values and Professional Ethics			
Course Code	21UH49	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:2:0:0	SEE Marks	50
Total Hours of Pedagogy	25	Total Marks	100
Credits	01	Exam Hours	1

Course objectives:

This introductory course input is intended:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

This course is intended to provide a much-needed orientational input in value education to the young enquiring minds.

Teaching-Learning Process (General Instructions)

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

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

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. The course is in the form of 20 lectures (discussions)
3. It is free from any dogma or value prescriptions.
4. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation
- the whole existence is the lab and every activity is a source of reflection.
5. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
6. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs

Module-1

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations

Teaching-Learning Process

Introduction to Value Education- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos

Module-2

Harmony in the Human Being (4 hours)

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

Teaching-Learning Process

Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos

Module-3

Harmony in the Family and Society (4hours)	
Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order	
Teaching-Learning Process	Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos
Module-4	
Harmony in the Nature/Existence (4 hours)	
Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence	
Teaching-Learning Process	Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos
Module-5	
Implications of the Holistic Understanding – a Look at Professional Ethics (4 hours)	
Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models- Typical Case Studies, Strategies for Transition towards Value-based Life and Profession	
Teaching-Learning Process	Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos
Course outcome (Course Skill Set)	
<p>By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.</p> <p>They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.</p> <p>Therefore, the course and further follow up is expected to positively impact common graduate attributes like:</p> <ol style="list-style-type: none"> 1. Holistic vision of life 2. Socially responsible behaviour 3. Environmentally responsible work 4. Ethical human conduct 5. Having Competence and Capabilities for Maintaining Health and Hygiene 6. Appreciation and aspiration for excellence (merit) and gratitude for all 	

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 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)

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 multiple choice question papers for the subject (**duration 01 hour**)

Suggested Learning Resources:

Books

-READINGS:

Text Book and Teachers Manual

a. The Textbook

A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

Teachers' Manual for *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G

Reference Books

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - Pandit Sunderlal
9. Rediscovering India - by Dharampal

10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)
14. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
15. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
16. ANagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
17. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
18. AN Tripathy, 2003, Human Values, New Age International Publishers.
19. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
20. EG Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
21. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
22. BP Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
23. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Web links and Video Lectures (e-Resources):

1. Value Education websites, <https://www.uhv.org.in/uhv-ii>, <http://uhv.ac.in>, <http://www.uptu.ac.in>
2. **Story of Stuff**, <http://www.storyofstuff.com>
3. **Al Gore, An Inconvenient Truth**, Paramount Classics, USA
4. **Charlie Chaplin, Modern Times**, United Artists, USA
5. **IIT Delhi, Modern Technology – the Untold Story**
6. Gandhi A., Right Here Right Now, Cyclewala Productions
7. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEKQw
8. https://fdp-si.aicte-india.org/8dayUHV_download.php
9. <https://www.youtube.com/watch?v=8ovkLRYXljE>
10. <https://www.youtube.com/watch?v=OgdNx0X923I>
11. <https://www.youtube.com/watch?v=nGRcbRpvGoU>
12. <https://www.youtube.com/watch?v=sDxGXOgYEKM>

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

- 1) Video watching on ethics topic to sensitise the students
- 2) Assignments, Group discussions
- 3) Participations in seminars, conferences on relevant topics for greater understanding of ethics and human values
- 5) Participation in Guest/expert lectures to sensitise the students.

V Semester

ARCHITECTURAL DESIGN - V			
Course Code	21ARC51	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 need for creating architecture as an envelope to system dependent program.*
- 2) *To understand the use of green technologies and materials developed in other fields as a precursor to creating architecture.*
- 3) *To identify and understand the role of sustainable systems and services in the design of buildings; significance of passive/natural cooling systems, material and construction techniques; climatic factors.*
- 4) *Introduction to development Regulations (building byelaws and rules); circulation networks (people, vehicular access), site planning.*
- 5) *To explore Computer Aided Design techniques to generate drawings and models to better understand envelopes and systems in architecture, including the impact of envelope design on building cooling energy needs.*
- 6) *To understand the (thematic) abstract, organic character of architecture (symbolism, aesthetics, identity) in the public domain; influence of environmental, socio-cultural, economic dimensions; user perception.*

OUTLINE:

- (a) *Familiarize with the impact of technology, utilities, and regulations in shaping architecture*
- (b) *Understand the various complex parameters to be considered while designing in the public domain*

Teaching-Learning Process (General Instructions)

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

- 1) The contents of the courses shall be taught in an application-oriented manner on a scientific and design basis. The course contents shall be taught and learned in lectures, seminars, labs or workshops, studio exercises and design projects, etc.
- 2) In-studio exercises the teachers shall take the lead to provide tasks and offer guidance for solutions finding. The students shall work either individually or in groups.
- 3) In design studios, the students contribute to the processing, analysis and solving of problems of direct professional practice, attended by faculty(s) entitled to conduct the studio and examine. The results shall be defended through drawings; models and reports and evaluated through periodic assessment and finally by a jury or panel, and finally, evaluated through periodic assessment and an end semester examination or viva voce.

MODE OF STUDY: 3 component approach to the Design Studio:

- A. Literature review and case studies:** Learning from detailed study and analysis of building systems and envelopes (and understanding the underlying building

physics of systems and envelopes) ; character of public buildings through literature review and visiting buildings in varied settings (urban, contemporary, permanent and temporary).

- B. Seminars:** Seminars are intended to review parallel academic studies completed up to and during 5th semester studies in Building Construction/ Structures/ history/ computer graphics, climatology/services and its importance and integration with the studio.
- C. Design Projects:** Studio projects shall emphasize the non-linear **interdisciplinary design process** encountered in Architectural design and the importance of other fields of knowledge in Architectural Design. The Design Studio will give prominence to bridging the gap between innovations in materials and techniques of construction. An essential part of the studio process should be peer reviews and reviews by consultants in the field of Structures, Utilities and Services.
- D.** The Design studio will also give importance to include and encourage the use of passive design features, natural cooling systems, sustainable active cooling system using natural and low global warming potential refrigerants, vernacular, local, and low embodied energy/carbon materials and sustainable water, waste management systems.

Assignment-1: Case Study

1. Detailed review of each of the building types: retail/hospitality/transport/traditional informal market. Students are split into four groups; each group assigned to perform a case study of one building type. Short study trips to observe, discuss and document building types: retail/hospitality/transport/markets, building projects in the vicinity of their colleges.
2. The emphasis should be on conceptual understanding and accurate measured drawing.
3. Attention should be given to Structures, Utilities and Services and Sustainable and Passive energy systems.
4. Sketches and documentation should show observations and inferences from the studies.

Assignment-2: Seminars

1. Overview by a PHE, MECH/Elec., HVAC (including sustainable HVAC technologies including radiant cooling, direct evaporative and indirect evaporative cooling, structure cooling, vapour absorption cooling and natural refrigerant air conditioning), fire fighting, storm water, water recycling, waste and solar consultant on what to expect and practical rules of thumb to help students plan.
2. Overview by a Structural consultant on large span structural systems in parallel