APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

CURRICULUM

BACHELOR OF ARCHITECTURE

2021

CURRICULUM I TO X: B.ARCH, 2021

Every course of B. Arch Program shall be placed in one of the five categories as listed in table below:

Sl. No	Knowledge Segment	Category	Code	Credits
1	Professional Courses			**154**
1.a		Architectural Design	AD	100
1.b		Architectural Studies	AS	15
1.c		Architectural Theory	AT	39
2.	Building Science and Applied Engineering			**65**
2.a		Basic and Building Sciences	BS	26
2.b		Applied Engineering	AE	20
2.c		Building Construction	BC	19
3.	Elective Course		EC	**13**
4.	Professional Ability Enhancement Courses		PE	**26**
5.	Skill Enhancement Courses		SE	**02**
		Total Mandatory Credits	**260**	

As outlined in the Regulation R 3.6 Category Code is based on the 5 knowledge segments prescribed by COA and further sub divided for better clarity.

Semester-wise credit distribution

Semester	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
Credits	28	28	28	28	28	28	15	28	28	21	**260**

Category Description

Architectural Design Courses (AD) : Basic Design and Visual Arts, Architectural Design, Architectural Design Thesis.

Architectural Studies courses (AS) : Architectural Graphics and Drawing, Carpentry and Model Making Workshop, Site Planning and Interior Design.

Architectural Theory (AT) : Theory of Architecture, History of Architecture and Culture, Landscape Design, Specifications, Cost Estimation and Budgeting, Human Settlements Planning, Building Economics and Sociology, Urban Design, Housing.

Basic and Building Sciences Courses (BS) : Mathematics, Climate and Built Form, Building Services, Environmental Science for Architecture.

Applied Engineering Courses (AE) : Theory of Structures, Surveying and Levelling.

Building Construction Courses (BC) : Building Materials and Construction Techniques, Building Materials Construction Techniques and Working Drawing.

Elective Courses (EC): Electives

Professional Ability Enhancement Courses (PE) : Internship or Practical Training, Material Study/ Critical Analysis, Research Methodology, Professional Practice, Project Management, Dissertation.

Skill Enhancement Courses (SE) : Communication Skills & Techniques

Course Code and Course Number

Each course is denoted by a unique code consisting of three alphabets followed by three numerals. For example A R L 2 0 1. The first two alphabets in the code refer to the department offering the course.

AR stands for a course in Architecture, AE stands for a course in Engineering ,MA stands for a course in Mathematics, EC stands for Elective courses in any Department, SE stands for Skill Enhancement courses in any Department etc.

Third letter stands for the nature of the course as indicated in the Table 1.

Table 1: Code for the nature of the courses

Code	Description
T	Theory based courses (other than the lecture hours, these courses can have tutorial and practical hours, L-T-S-P/D structures Lecture– Tutorial–Studio–Practical/Drawing.(e.g., 2-1-0-0, 3-0-0-1, 2-0-1-0 etc.)
S	Studio courses which are not project based
M	MOOC Courses
D	Project based courses (Design, PT, Thesis)
L	Lab/Work shop/Practical
Q	Seminar Courses

Course Number is a three digit number and the first numeral refers to the academic year in which the course is normally offered, i.e. 1, 2, 3, 4 or 5 for the Program of five year duration. Of the other two numerals, the last digit identifies whether the course is offered normally in the odd semester (odd number), even semester (even number). The middle numeral could be any digit.

SEMESTER I

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
A	III	ART 101	Theory of Architecture - I	AT	3-0-0-0	3	3
B	III	MAT 103	Mathematics	BS	3-0-0-0	3	3
C	III	AET 101	Theory of Structures - I	AE	2-1-0-0	3	3
S	I	ARD 101	Basic Design and Visual Arts	AD	0-2-8-0	10	10
T	II	ARS 101	Building Materials and Construction Techniques - I	BC	1-0-0-2	3	3
U	II	ARS 103	Architectural Graphics and Drawing - I	AS	1-0-0-3	4	4
V	IV	SEL 101	Communication Skills & Techniques	SE	1-0-0-1	2	2
TOTAL						**28**	**28**

NOTE:

ARD 101- Basic Design and Visual Arts course is assigned 8 hours of studio and 2 hours of tutorial which is earmarked for contents from visual arts to be handled by fine arts faculty

ARS 101- Building Materials and Construction Techniques - I is assigned 1 hour of lecture and 2 hours for drawing and practical sessions in the construction yard

SEMESTER II

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
A	III	ART 102	Theory of Architecture - II	AT	3-0-0-0	3	3
B	III	ART 104	History of Architecture and Culture-I	AT	3-0-0-0	3	3
C	III	AET 102	Theory of Structures - II	AE	2-1-0-0	3	3
S	I	ARD 102	Architectural Design - I	AD	0-0-8-2	10	10
T	II	ARS 102	Building Materials and Construction Techniques- II	BC	1-0-0-2	3	3
U	II	ARS 104	Architectural Graphics and Drawing -II	AS	1-0-0-3	4	4
W	IV	ARL 102	Carpentry and Model Making Workshop	AS	0-0-0-2	2	2
TOTAL						**28**	**28**

NOTE:

ARD 102 - Architectural Design - I course is assigned 8 hours of studio and 2 hours of drawing. 2 hours of drawing is earmarked for documentation of buildings both historic and contemporary.

ARS 102- Building Materials and Construction Techniques - II is assigned 1 hour of lecture and 2 hours for drawing and practical sessions in the construction yard

SEMESTER III

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
A	III	ART 201	Climate and Built Form - I	BS	2-0-0-2	4	4
B	III	ART 203	History of Architecture and Culture-II	AT	3-0-0-0	3	3
C	III	AET 201	Theory of Structures - III	AE	2-1-0-0	3	3
D	III	AET 203	Building Services - I	BS	2-0-1-0	3	3
S	I	ARD 201	Architectural Design - II	AD	0-0-8-2	10	10
T	II	ARS 201	Building Materials and Construction Techniques- III	BC	1-0-0-2	3	3
U	IV	AEL 201	Surveying and Levelling	AE	1-0-0-1	2	2
TOTAL						**28**	**28**

NOTE:

ART 201- Climate and Built Form – I is assigned 2 hours of lecture and 2 hour of practical which is earmarked for conducting experiments in building science laboratory.

AET 203 - Building Services – I, deals with Water Supply, Plumbing and Sanitation. This course is assigned 2 hours of lecture and 1 hour of studio so that contents learnt can be applied to a design problem.

ARD 201 - Architectural Design - II course is assigned 8 hours of studio and 2 hours of practical which is earmarked for training of fundamental application of computer in design and drafting.

ARS 201- Building Materials and Construction Techniques - III is assigned 1 hour of lecture and 2 hours for drawing and practical sessions in the construction yard

SEMESTER IV

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
A	III	ART 202	Climate and Built Form - II	BS	2-0-0-2	4	4
B	III	ART 204	History of Architecture and Culture-III	AT	3-0-0-0	3	3
C	III	AET 202	Theory of Structures - IV	AE	2-1-0-0	3	3
D	III	AET 204	Building Services - II	BS	2-0-0-1	3	3
S	I	ARD 202	Architectural Design - III	AD	0-0-8-2	10	10
T	II	ARS 202	Building Materials and Construction Techniques- IV	BC	1-0-0-2	3	3
U	II	ARS 204	Site Planning	AS	1-0-1-0	2	2
TOTAL						**28**	**28**

NOTE:

ART 202- Climate and Built Form – II is assigned 2 hours of lecture and 2 hour of practical which is earmarked for conducting experiments in building science laboratory.

AET 204 - Building Services – II, deals with Electrical, Lighting and Illumination. This course is assigned 2 hours of lecture and 1 hour of practical which is earmarked for conducting experiments in building science laboratory.

ARD 202 - Architectural Design - III course is assigned 8 hours of studio and 2 hours of practical which is earmarked for training of advanced application of computer in design and drafting.

ARS 202- Building Materials and Construction Techniques - IV is assigned 1 hour of lecture and 2 hours for drawing and practical sessions in the construction yard

ARS 204 – Site Planning is assigned 1 hour of lecture and 1 hour of studio so that contents learnt can be applied to a design problem.

SEMESTER V

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
A	III	ART 301	Landscape Design	AT	2-0-1-0	3	3
B	III	ART 303	History of Architecture and Culture-IV	AT	3-0-0-0	3	3
C	III	AET 301	Theory of Structures - V	AE	2-1-0-0	3	3
D	III	AET 303	Building Services - III	BS	2-0-1-0	3	3
E	III	ECT 301	Elective I	EC	3-0-0-0	3	3
S	I	ARD 301	Architectural Design - IV	AD	0-0-10-0	10	10
T	II	ARS 301	Building Materials and Construction Techniques- V	BC	1-0-0-2	3	3
TOTAL						**28**	**28**

NOTE:

ART 301- Landscape Design is assigned 2 hours of lecture and 1 hour of studio so that contents learnt can be applied to a design problem.

AET 303 - Building Services – III, deals with HVAC, Fire Fighting and Safety. This course is assigned 2 hours of lecture and 1 hour of studio so that contents learnt can be applied to a design problem.

ARS 301- Building Materials and Construction Techniques - V is assigned 1 hour of lecture and 2 hours for drawing and practical sessions in the construction yard

SEMESTER VI

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
A	III	ART 302	Specifications, Cost Estimation and Budgeting	AT	2-1-0-0	3	3
B	III	ART 304	History of Architecture and Culture-V	AT	3-0-0-0	3	3
C	III	AET 302	Theory of Structures - VI	AE	2-1-0-0	3	3
D	III	ART 306	Building Services - IV	BS	2-0-0-1	3	3
E	III	ECT 302	Elective II	EC	2-0-0-0	2	2
S	I	ARD 302	Architectural Design - V	AD	0-0-10-0	10	10
T	II	ARS 302	Building Materials, Construction Techniques and Working Drawing	BC	1-0-0-3	4	4
TOTAL						**28**	**28**

NOTE:

ART 306 - Building Services – IV, deals with Architectural Acoustics. This course is assigned 2 hours of lecture and 1 hour of practical which is earmarked for conducting experiments in building science laboratory.

ARS 302- Building Materials, Construction Techniques and Working Drawing is assigned 1 hour of lecture and 3 hours of practical sessions in the construction yard and learning to prepare working drawings.

SEMESTER VII

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
S	V(iii)	ARD 401	Internship or Practical Training	PE	NA	NA	12
T	V(iii)	ARD 403	Critical Analysis, Material Study/ Market Survey	PE	NA	NA	3
TOTAL						**--**	**15**

NOTE:

ARD 401 - Internship or Practical Training is to be done in a registered architects office for a minimum of 100 working days

ARD 403 - Critical Analysis and any one of Material Study, Market Survey is to be carried out during the same period as Internship

SEMESTER VIII

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
A	III	ART 402	Human Settlements Planning	AT	3-0-0-0	3	3
B	III	ART 404	Research Methodology	PE	2-1-0-0	3	3
C	III	ART 406	Building Economics and Sociology	AT	3-0-0-0	3	3
D	III	AET 402	Environmental Science for Architecture	BS	3-0-0-0	3	3
E	III	ECT 402	Elective III	EC	3-0-0-0	3	3
S	I	ARD 402	Architectural Design - VI	AD	0-0-10-0	10	10
T	II	ARS 402	Interior Design	AS	1-0-2-0	3	3
TOTAL						**28**	**28**

NOTE:

ART 404 - Research Methodology is assigned 2 hours of lecture and 1 hour of tutorial in order to enable students to learn designing of research.

ARS 402 – Interior Design is assigned 1 hour of lecture and 2 hours of studio so that contents learnt can be applied to a design problem.

SEMESTER IX

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
A	III	ART 501	Urban Design	AT	2-0-1-0	3	3
B	III	ART 503	Housing	AT	3-0-0-0	3	3
C	III	ART 505	Professional Practice	PE	2-1-0-0	3	3
D	III	ART 507	Project Management	PE	2-0-0-1	3	3
E	III	ECT 501	Elective IV	EC	2-0-0-0	2	2
S	I	ARD 501	Architectural Design - VII	AD	0-0-12-0	12	12
T	V(ii)	ARQ 501	Dissertation	PE	0-0-2-0	2	2
TOTAL						**28**	**28**

NOTE:

ART 501 - Urban Design is assigned 2 hours of lecture and 1 hour of studio so that contents learnt can be applied to the design problem.

ART 505 - Professional Practice is assigned 2 hours of lecture and 1 hour of tutorial so that contents learnt can be applied

ART 507 - Project Management is assigned 2 hours of lecture and 1 hour of practical so that computer applications can be introduced.

SEMESTER X

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
S	V(i)	ARD 502	Architectural Design Thesis	AD	NA	NA	18
T	V(iii)	ECM 502	Elective V - MOOC	EC	NA	NA	3
TOTAL						**--**	**21**

NOTE:

ECM 502 – Elective V has to be a MOOC course approved by the university.

Passing grade in an approved course done during the semesters S8 to S10, is to be accepted and no further assessment done.

SEMESTER - I

Semester I

Course No.	Course Name	L – T – S –P/D	Credits	Year of Introduction
ART101	THEORY OF ARCHITECTURE I	3 – 0 – 0 – 0	3	2021

Course Objectives

- To lay the foundation of architecture as a field of study
- To develop an appropriate vocabulary in the student for understanding and expressing architectural works
- To evaluate architectural work on the basis of aesthetical and functional needs

Course Outcome

At the end of successful completion of the course students will be able –

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To define architecture from various perspectives	Understand and Analyze
CO2	To identify and evaluate the basic elements of design and architecture	Understand, Analyze and evaluate
CO3	To analyze the various visual principles of composition	Understand and Analyze
CO4	To evaluate the relationship of form and space in architecture	Understand, Analyze and evaluate
CO5	To appreciate the importance of circulation in architecture	Understand, Analyze and evaluate

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question carries 8 marks. One or two questions can have subdivisions. Some questions can be framed in such a manner to assess the student's capacity for analyzing the topics and linking it with other courses.

Syllabus

Introduction, origin and definition of Architecture – Elements of Design and Architecture – Principles of Composition – Form and Space –Circulation

Course Plan			
Module	**Contents**	**Course Outcome**	**Hours**
I	**Introduction** Origin of Architecture, Etymology of the Word 'Architecture', Definition of Architecture and Understanding Architecture as Identification of Place, Natural and Man-made form, Gestalt principles of visual perception	CO1	6
II	**Elements of Design and Architecture** Basic elements of design – point, line, plane, volume and their architectural expressions. Basic elements of Architecture Modifying elements of Architecture	CO1 CO2	9
FIRST INTERNAL TEST			
III	**Principles of Composition** Proportion and scale in architecture, Proportioning systems and their role in establishing visual relationship. Ordering principles- Axis, Symmetry, Balance, Hierarchy, Datum, Rhythm, Repetition, Pattern, Transformation,	CO2 CO3	12

	Harmony, Contrast, Unity, Dominance, Emphasis, Climax.		
IV	**Form and Space** Evolution, Transformation and Articulation of form. Geometry in Architecture. Elements defining spaces – Spatial relationships – Spatial organization – centralized, linear, radial, clustered, grid – built form and open space relationships. With architectural examples.	CO2 CO3 CO4	12
SECOND INTERNAL TEST			
V	**Circulation** Experiencing Architecture through movement in space, Relationship between architectural form and circulation – Types of circulation – Building approach and entrance, path configuration and form, pathspace relationship, orientation. With architectural examples.	CO4 CO5	6
END SEMESTER EXAMINATION			

Required Reading

- Francis D.K. Ching, 'Architecture – Form, Space and Order', Van Nostrand Reinhold Company, New York,2007.
- JohnBeverlyRobinson,'PrinciplesofArchitecturalComposition',Wentworth Press,2016
- Kurt Koffka, 'Principles Of Gestalt Psychology', Mimesis International,2014
- PramarV.S.,'Design Fundamentals in Architecture',Somaiya Publications Private Ltd., New Delhi,1973.
- Simon Unwin, 'Analysing Architecture', Routledge, London,2003.

Further Reading

- Bryan Lawson, 'The Language of Space', Architectural Press,2001.
- James C. Snyder, 'Introduction to Architecture', McGraw-Hill,1979
- K N Iengar, 'Composing Architecture', Academy of Art and Architecture, Mysore,1996.
- Leland M Roth; 'Understanding Architecture: Its Elements, History and Meaning', Craftsman House,1994.
- Wucius Wong, 'Principles of two Dimensional Design', Wiley,2009
- Wucius Wong, 'Principles of Three Dimensional Design', Wiley,2009
- Yatin Pandya, 'Elements of Space making', Mapin2007.

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B. ARCH. DEGREE EXAMINATION, MONTH AND YEAR

Course Code: ART 101

Course Name: THEORY OF ARCHITECTURE - I

Max. Marks: 60		Duration: 3 Hours

PART A

		All questions need to be answered. ***To be answered in a maximum of 50 words with supporting sketches.***	Marks
1		How does Unwin establish that Architecture goes beyond the design of building?	(4)
2		Enumerate and categorize the various planes in architecture.	(4)
3		Explain the relevance of Datum as a principle of composition.	(4)
4		Briefly explain the role of geometry in architecture.	(4)
5		Name and sketch three ways a building can be approached.	(4)

PART B

To be answered in a maximum of 200 words with supporting sketches.
Answer any one question from each module.

		MODULE 1	
6		"The idea of architecture as identification of place asserts the indispensable part played in architecture by the user as well as the designer". Bring out the validity of this statement with an example.	(8)
7		Differentiate between Natural form and Man-made form.	(8)
		MODULE 2	
8		Enumerate various modifying elements in Architecture. Explain in detail how light acts as a modifying element.	(8)
9		Explain how linear elements in architecture can be used to -	(8)
	i	Contain a volume	
	ii	Articulates the edges of planes and volumes	
	iii	Create texture & Pattern	
		MODULE 3	
10		Define proportion and scale.	(8)
	i	What is meant by proportioning system?	
	ii	Elaborate any two proportioning system explaining how they are effective in bringing order in architectural built form.	
11		What is meant by ordering principles in architecture? Citing a known example, identify and explain 5 principles of composition used in its built form.	(8)

		MODULE 4	
12		Citing known examples, explain any 3 spatial organizations in architecture.	(8)
13		Bring out the necessity of transforming forms in architecture.	(8)
		MODULE 5	
14		By citing a known example, bring out how the circulation pattern has impacted the architectural form.	(8)
15		Write short notes on –	(8)
	i	Path – space relationship	
	ii	Elements of circulation	
		****	

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
MAT103	MATHEMATICS	3-0-0-0	3	2021

Course Objectives:

To understand and analyze Architecture, one needs the basic knowledge of the statistical methods available for calculating the Correlation coefficient and Probability distributions and their application along with various statistical methods of hypothesis testing and linear algebra. Mathematics and its application is required as a fundamental basis for equipping Architecture students with analytical, logical and practical skills required to be acquired by them to excel in design. Data and mathematical analysis works as essential tools to make the right decision in many practical situations.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Solve system of linear equations	Understanding and Analysing
CO-2	Learn about important statistical measures of central tendency, dispersion and correlation essential for data analysis.	Understanding And Analysing
CO-3	learn about important probability distributions and important statistical tests of hypothesis based on it.	Understanding and Analysing

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4marks for each question. Students should answer all the questions (5x4= 20marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Linear Algebra – Application of Measures of central tendency, Dispersion in statistics – Correlation coefficient – important probability distributions and statistical tests for analysis of hypothesis.

Course Plan

Module	Topic	Course outcome	No. of hours
I	**Linear algebra (Text 1: Sections 7.3, 7.4, 7.5)** Systems of linear equations, Solution by Gauss elimination, row echelon form and rank of a matrix, fundamental theorem for linear systems (homogeneous and non-homogeneous, without proof)	CO-1	8
II	**Statistics (Text 2: Sections 25.5, 25.6, 25.7, 25.8)** Measures of central tendency- Mean-median-mode, Measures of Dispersion- Mean deviation-standard deviation- variance.	CO-2	8
FIRST INTERNAL TEST			
III	**Statistics (Text 2:Sections 25.13, 25.14, 24.4, 24.5)** Correlation coefficient- Regression lines- Method of least squares- Fitting of straight line and parabola	CO-2	8
IV	**Probability distributions (Text 2: Sections 26.7, 26.8, 26.9, 26.10, 26.14, 26.15, 26.16)** Probability distributions: Random variable- probability density function- probability distribution function- properties Expectation of a random variable- Mean and variance. Probability distributions: Binomial- Poisson- Normal (without proof of mean and variance)	CO-3	10
SECOND INTERNAL TEST			

V	**Testing of hypothesis (Text 2: Sections 27.1- 27.6, 27.9-27.15)** Sampling distribution- Standard error- Testing a hypothesis- Type I and Type II errors- Level of significance. Large sample tests: Test of significance for a single mean- Test of significance for difference of means. Small sample tests: Student's t-distribution- Test of significance of a sample mean- Test of significance of difference between sample means.	CO-3	11
END SEMESTER EXAMINATION			

Text Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 10thEdition, John Wiley &Sons,2016.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.

Reference Books

- Richard A Johnson, Probability and Statistics for Engineers(Miller and Freunds)- Prentice Hall of India, 8thEdition.
- S C Gupta and V K Kapoor , Fundamentals of Mathematical Statistics , S Chand Publications

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B. ARCH. DEGREE EXAMINATION, MONTH AND YEAR

Course Code: MAT 103

Course Name: MATHEMATICS

Max. Marks: 60 | Duration: 3 Hours

PART A

Answer all questions. Each question carries 4 marks. | Marks

1		Find the rank of the matrix $\begin{bmatrix} 3 & 0 & 2 & 2 \\ -6 & 42 & 24 & 54 \\ 21 & -21 & 0 & -15 \end{bmatrix}$	(4)
2		The mean of 200 items was 50. Later on it was discovered that two items were misread as 92 and 8 instead of 192 and 88. Find out the correct mean.	(4)
3		In a partially destroyed laboratory record of an analysis of a correlation data, the following results only are legible: Variance of x=9, Regression equations: 8x-10y+66=0,40x-18y=214. What are (i) the mean values of x and y. (ii) the coefficient of correlation between x and y.	(4)
4		Suppose that X has Poisson distribution. If P(X=2) =2/3P(X=1), find P(X=0) and P(X=3).	(4)
5		A normal population has mean 6.8 and standard deviation of 1.5. A sample mean of 400 members gave a mean of 6.75. Is the difference significant?	(4)

PART B

Answer any one question from each module. Each question carries 8 marks.

MODULE 1

6		Solve the following system of equations by Gauss elimination method: 2x+2y+4z=18, x+3y+2z=13, 3x+y+3z=14.	(8)
7		For what values of λ and μ the given system of equations x+y+z=1, x+2y+3z=10, x+2y+λz=μ has (i) No solution (ii) unique solution (iii) infinite number of solution.	(8)

MODULE 2

8		Find the mode of the following data.	(8)

Marks	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45
No. of candidates	7	10	16	32	24	18	10	5	1

9		Find the mean deviation from the median of the following frequency distribution.	(8)

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	5	8	15	16	6

		MODULE 3	
10		Obtain the equations of the lines of regression from the following data: X: 1 2 3 4 5 6 7 Y: 9 8 10 12 11 13 14	(8)
11		Fit a straight line to the following data. X: 1 2 3 4 5 Y: 14 27 40 55 68	(8)
		MODULE 4	
12		In a test of 2000 electric bulbs, it was found that the life of a particular make was normally distributed with an average life of 2040 hours and a standard deviation of 60 hours. Find the number of bulbs likely to burn (i) more than 2150 hours (ii) less than 1950 hours.	(8)
13		A discrete random variable X has the following probability function x: 1 2 3 4 5 6 7 F(x): k 2k 2k 3k K^2 $2k^2$ $7k^2+k$	(8)
	i	Find k	
	ii	Evaluate P(X<3) ,P(X≥6).	
		MODULE 5	
14		In a random sample of size 500, the mean is found to be 20. In another independent sample of size 400, the mean is 1.5. Could the samples have been drawn from the same population with standard deviation 4.	(8)
15		A random sample of size 25 from a normal population gives a sample mean 15 and a standard deviation 8. Test the hypothesis that the population mean is 16 at 5% level of significance.	(8)
		****	

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET101	THEORY OF STRUCTURES I	2-1-0-0	3	2021

Course objectives:

The goal of this course is to expose the students to the fundamental concepts of mechanics and enhance their problem-solving skills. It introduces students the sectional properties and influence of applied force systems on stationary rigid bodies. After this course, the students will be able to recognize similar problems in real world situations and respond accordingly.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO – 1	Identify the components of system of forces acting on rigid bodies	Remembering
CO – 2	Calculate the sectional properties of simple and compound plane sections	Understanding
CO – 3	Apply the conditions of equilibrium to find reactions in rigid bodies and axial forces in simple plane trusses	Applying
CO – 4	Compute the resultant of different force systems using basic principles of mechanics	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Continuous assessment tests(2numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer anyone. Each question can have subdivisions and carries 8 marks.

Syllabus

Introduction to Engineering Mechanics – Concept of rigid body Force concepts – Various force systems – Co planar Concurrent force system, Non-Concurrent force systems; Resultant and Equilibrium – Beams, Support conditions , Load types, Computation of support reactions – Centre of gravity, Centre of mass , Centroid of composite areas – Moment of inertia, Perpendicular axis theorem, Parallel axis theorem, Polar moment of inertia- Simple plane trusses, Truss analysis – Graphical method and Method of joints.

Course plan

Module	Contents	Course outcome	No.of Hours
I	Introduction to Engineering Mechanics –Statics – Basic principles of statics – Parallelogram law, Law of action and reaction(Review) Concept of rigid body – Practical examples Force concepts – Characteristics of a force Principle of transmissibility and super position Various force systems – Practical examples Resolution of forces – Resultant of co planar concurrent force system – Methods of projections – Numerical exercise Co planar concurrent force system – Principle of resolved parts – Numerical exercise Equilibrium of concurrent forces – Laws of equilibrium – Free body diagrams – Exercises for free body diagram preparation – Numerical exercise on analysis of single body Analysis of concurrent force systems – Numerical exercises on analysis of bodies in contact	CO –1 CO –3 CO –4	8
II	Moment of a force –Review Introduction to non-concurrent force systems, Parallel force system, couple Varignon's theorem – Derivation not required Resultant of parallel forces Resultant of non-concurrent force system – Numerical exercise Introduction to beams – types of beams – Support conditions – Load types – Point load, Uniformly distributed and Varying loads – Practical examples	CO –1 CO –3 CO –4	8

Module	Contents	Course outcome	No.of Hours
	Computation of support reactions of cantilever and simply supported beams subjected to concentrated and distributed loads – Numerical exercise		
FIRST INTERNAL EXAMINATION			
III	Centre of gravity – Centre of mass- Centroid – Concept and definition – Practical examples Centroid of thin uniform wire bend in to semi- circular arc Centroid of simple plane areas – Integration method – Numerical exercise Centroid of composite areas – Numerical exercise	CO – 2	6
IV	Moment of inertia –Concept and practical significance Parallel axis theorem Moment of inertia of basic shapes- rectangle, triangle, circle, semi-circle, quadrant of a circle – Derivation Perpendicular axis theorem, Polar moment of inertia, Radius of gyration. Moment of inertia of composite areas – Numerical exercise	CO – 2	7
SECOND INTERNAL EXAMINATION			
V	Concept of truss – Applications – properties– Different configurations Conditions for a stable, determinate truss – Examples Assumptions in the analysis of truss – Different methods of truss analysis Analysis of cantilever and simply supported trusses – Graphical method and Method of joints	CO –1 CO –3 CO –4	7
END SEMESTER EXAMINATION			

Text Books:

- S. Timoshenko, D. H. Young, J. V. Rao, Sukumar Pati, Engineering mechanics, Mc Graw Hill Education
- R.C. Hibbler, “Engineering Mechanics”, Pearson Education, Asia Pvt. Ltd.
- F.P.Beer & E.R.Johnston, “Vector Mechanics for Engineers”, Tata McGraw Hill

Reference Books

- Henry J., Covan, Architectural structures: An introduction to structural mechanics, Pitman Publishing

- Philip Garrison, Basic structures for engineers and architects, Wiley – Blackwell publishers
- Francis D. K. Ching, Barry S. Onouye, Douglas Zuberbuhler, Building structures illustrated, Wiley publishers
- Babu, J., Engineering Mechanics, Pearson Prentice Hall
- Benjamin J., Engineering Mechanics, Pentex Book Publishers and Distributors
- Bhavikkatti, S. S., Engineering Mechanics, New Age International Publishers
- J.L. Meriam &L.G. Kraige, "Engineering Mechanics", John Wiley and Sons
- Kumar, K. L., Engineering Mechanics, Tata McGraw Hill Publishing Company Limited
- R.K Bansal., Engineering Mechanics, Lakshmi Publications PvtLtd
- R.K Bansal., Strength of Materials, Lakshmi Publications PvtLtd
- R.S.Khurmi &N. Khurmi, Priniples of Engineering Mechanics, S. Chand Publishing
- Rajasekaran S. and Sankarasubramanian, G., Engineering Mechanics, Vikas Publishing House Private Limited
- S. Ramamrutham., Strength of Materials, Dhanpat Rai Publishing Company Pvt.

	Model question paper	Total Pages: 04
Reg. No.:_____	Name:_____	

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B. ARCH. DEGREE EXAMINATION, MONTH AND YEAR

Course Code: AET 101

Course Name: THEORY OF STRUCTURES - I

Max. Marks: 60 Duration: 3 Hours

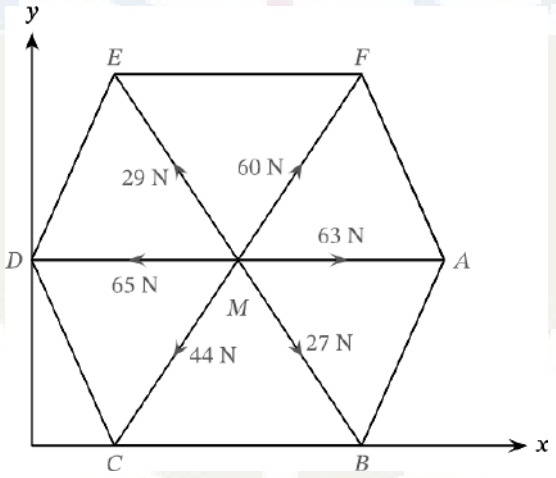
PART A

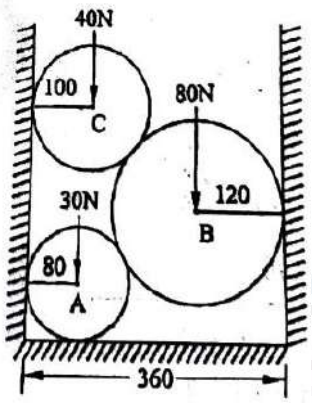
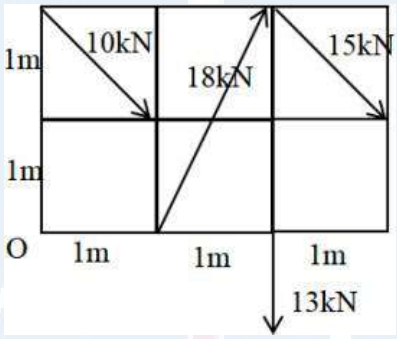
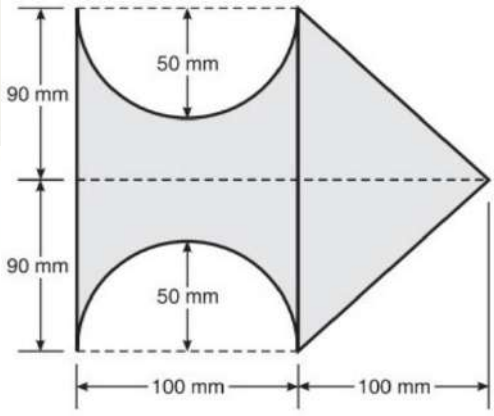
		Answer all questions, each question carries 4 marks	Marks
1		State and prove Lami's theorem.	(4)
2		Explain with neat diagrams, the different types of supports and give practical examples of each.	(4)
3		Locate the centroid of thin uniform wire into semi-circular arc using method of integration.	(4)
4		State and prove Perpendicular axis theorem.	(4)
5		List the assumptions in the analysis of truss.	(4)

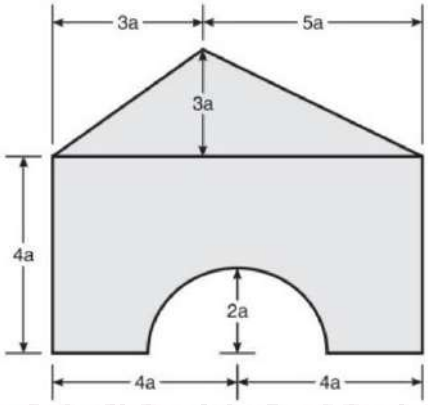
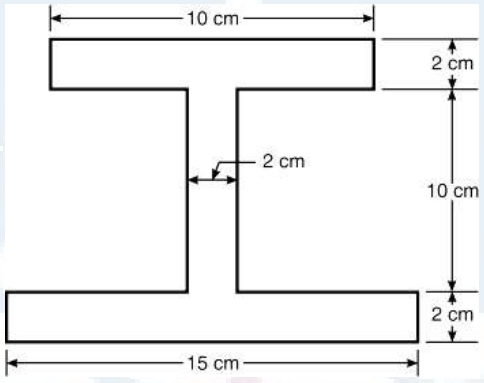
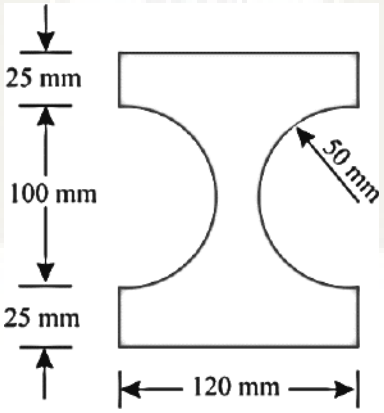
PART B

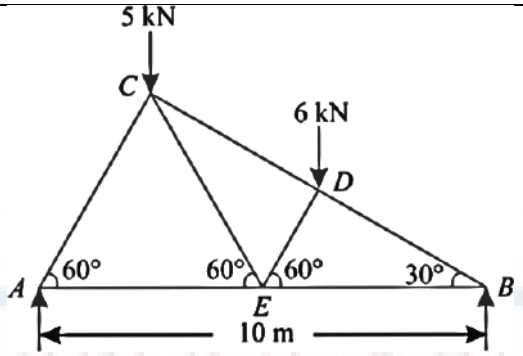
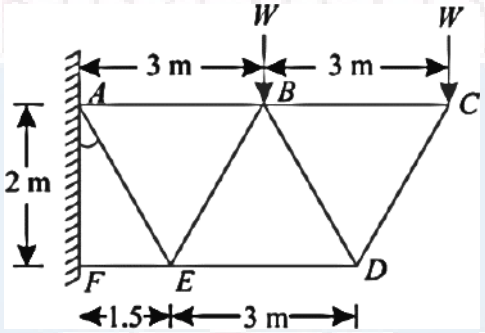
Answer any one question from each module, each carries 8 marks

MODULE 1

6		Concurrent forces of 63, 27, 44, 65, 29, 60 N are applied to the center of a regular hexagon acting towards its vertices as shown in Figure 1. Determine the magnitude and direction of the resultant.  Figure 1	(8)
7		Three cylinders are piled in a rectangular ditch as in Fig.2.Neglecting friction, determine the reaction between cylinder A and vertical wall.	(8)

		 Figure 2	
		MODULE 2	
8		Determine the resultant of the non-concurrent force system shown in Figure 3, and find its position with respect to point O.  Figure 3	(8)
9		A simply supported beam AB of span 6 m is carrying point loads 20 kN, 16 kN & 12kN at l.5 m, 3 m & 4.5 m respectively from support A. In addition, the beam carries a uniformly distributed load of 5kN/m over the entire span. Calculate reactions at supports A and B.	(8)
		MODULE 3	
10		Find the centroid of the shaded area shown in Figure.4.  Figure 4	(8)

11		Find the centroid of the shaded area shown in Figure 5 for a = 10 cm.  Figure 5	(8)
		MODULE 4	
12		Figure 6 shows the T-section of dimensions 10 ×10 × 2. Determine the moment of inertia of the section at the horizontal and vertical axes, passing through the centre of gravity of section.  Figure 6	(8)
13		Determine the moments of inertia of the section shown in Figure7 about horizontal and vertical axes passing through the centroid of the section.  Figure 7	(8)
		MODULE 5	
14		A truss of span 10 meters is loaded as shown in Figure. 8. Find the forces in all the members of the truss.	(8)

		 Figure 8	
15		A cantilever truss is loaded as shown in Figure 9. Find the value W, which would produce the force of magnitude 15 kN in the member AB.  Figure 9	(8)
		****	

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARD101	BASIC DESIGN AND VISUAL ARTS	0-2-8-0	10	2021

Course Objectives:

The primary objective of this course is to familiarize students with the grammar of art by involving them in a series of free hand exercises both indoor and outdoor to enhance their imaginative thinking and creativity and understand form, proportion, scale, etc. This also includes introduction to primary elements and basic principles of design, space articulation, and the use of drawing as a communication tool for design information.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	To understand and gain a fundamental knowledge of art and its expression, design, its elements, and principles.	Understanding
CO-2	To acquire the ability to draw in various media and materials, to develop the power of drawing as a means of coordinating eye and hand in studio	Applying
CO-3	To judge proportion, scale, and spatial relationships, understand principles of visual composition through field observation, anthropometrics, and experiment with them.	Analysing and evaluating
CO-4	To develop ability to assemble simple spatial elements in articulated constructs or design of an object or space and visually represent them through hand-made 2D drawings and 3Dmodels.	Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester jury examination duration
100	50	50	2-3 days

Continuous internal evaluation pattern:

Attendance : 5 Marks
Design Assignments/Reviews/Tests : 45 Marks

Syllabus:

Development of presentation skills, visual expression and representation, imaginative thinking and creativity through a hands on working with various mediums, materials and techniques of art through which artistic expression can be achieved – An insight into Principles of design – harmony, symmetry etc. and their application- Elements of design, and Perception of space -Design Parameters – anthropometrics – human activity and the use of space. Interrelationship of architectural space to form, structure, and materials to help students develop a visual and tacit structural understanding through models and installations – Abstraction to Design – An understanding on how abstraction aids design development.

Course Plan:

Module	Topic	Course outcome	No. of hours
I	**Drawing skills and Visual arts:** Indoor and outdoor sketching: An experience of live drawing in various contexts in pencil and pen/ink, Free- hand perspective drawing and rendering of imagined objects, in pencil and pen/ink. Perception of colour and light: Exploring Colour Schemes based on principles of Harmony and Contrast and degree of Chromatism, Exercises using different painting mediums- water colour, acrylic, oil and encaustic. Basic components of 2-dimensional and3- dimensional art, including subject, form, and content, Sculpture by casting, modelling, additive/subtractive techniques, and fabrication – materials used can include plaster, wire, clay, wood, paint, board, paper, etc.	CO-1, CO-2	30
II	**Introduction to basic elements and principles of design:** Elements of Design: Point, Line, Shape, Plane,	CO-1, CO-2	30

	Volume, Forms etc. Principles of design and their application to endow a quality to spaces and forms: unity, balance, symmetry, proportion, scale, hierarchy, rhythm, contrast, harmony, focus, figure and ground etc Exercises: 2D and 3D compositions demonstrating principles of design.		
FIRST INTERNAL TEST			
III	**Study of Forms: Solids and Voids, Planar, Fluid and Plastic Forms.** Study of linear and Planar forms using simple material like Mount Board, metal foil, boxboards, wire string, thermocol etc., Study of Solids and voids to evolve sculptural forms and spaces and explore the play of light and shade and application of color, Study of fluid and plastic forms using easily moldable materials like clay, plaster of paris etc. Study of texture and schemes of texture both applied and stimulated and their application, Analytical appraisal of building form in terms of visual character, play of light and shade, solids and voids etc.	CO-3	30
IV	**Parameters of design, anthropometrics, human activity and the use of space:** Anthropometric studies – average measurements of human body in different postures, its proportion and graphic representation, application in design of simple household and street furniture. Basic human functions and their implications for space requirements. Minimum and optimum areas for various functions.	CO-3	30
SECOND INTERNAL TEST			
V	**Abstraction to Product Design:** Studying/analysing manmade and natural forms/objects and copying or abstracting patterns and	CO-4	30

	using the same to generate design for a product like chair, lampshade, pen stand etc. Representation of ideas through sketches, diagrams, and drawings with application of line quality, thickness and intensity as appropriate to the intent.		
END SEMESTER EXAMINATION / JURY			

Reference Books

- Webb, Frank, "The Artist guide to Composition", David &Charles, U.K., 1994.
- Drawing a Creative Process", Ching Francis, Van Nostrand Reinhold, New York,1990.
- The art of drawing trees, heads, colours, mixing, drawing, landscape and painting, water colour, oil colour, etc. – The Grumbacher Library Books, New York – 1996.
- Caldwell Peter, "Pen and Ink Sketching", B.T. Bats ford Ltd., London, 1995.
- Charles Wallschlaeger & Synthia Busic Snyder, Basic Visual Concepts &Principles for artists, architects &designers, McGraw hill, USA,1992.
- Edward D.Mills – Planning the Architects Hand Book – Bitterworth, London,1985.
- Francis D.K.Ching – Architecture – Form Space and Order Van Nostrand ReinholdCo.,(Canada),1979
- Owen Cappleman &Michael Jack Kordan, Foundations in Architecture: An Annotated Anthology of beginning design projects, Van Nostrand Reinhold, New York.
- Paul Laseau, Graphic Thinking For Architects and Designers, John Wiley &Sons, New York,2001.
- Wucius Wong, 'Principles of Two-Dimensional Design', John Wiley and Sons Inc., New York,1972.

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Students are required to develop presentation skills, visual expression and representation, imaginative thinking and creativity through a hands-on working with various mediums and materials.
- Students need to be familiarized with the various mediums and techniques of art and the grammar of art by involving them in a series of free hand exercises both indoor and outdoor to understand form, proportion, scale, etc
- Students are required to understand the elements and principles of Basic Design as the building blocks of creative design through exercises that will develop the originality, expression, skill and creative thinking.

- Involve students in a number of exercises to understand the grammar of design and visual composition.
- Enable the understanding of 3 D Composition by involving students in a number of exercises which will help generation of a form from a two dimensional / abstract idea.
- Students need to be equipped to understand the relationship between the grammar of design and architecture by involving the students in seminars/ workshops and simple exercises which will look at building form analytically.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS101	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES I	1-0-0-2	3	2021

Course objectives :

The goal of this course is to expose the students to elementary building materials and their applications. It aims to familiarize students to contemporary as well as vernacular and traditional building materials. It will also introduce students to prevailing &relevant BIS specifications. After this course, the students will be able to recognize materials in the market and use them in their design visualization.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify the relevant BIS specifications.	Remembering
CO2	Identify appropriate mortar mixes for various construction needs.	Understanding
CO3	Work with various building materials in the construction yard and understand their behaviour.	Applying
CO4	Use the various building materials in their design processes appropriately	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance : 5 Marks
Continuous assessment tests (2nos.) : 15 Marks
Portfolio presentation (15)/drawings (15) : 30 Marks

End semester examination pattern:

There will be three parts; Part A, B and C. Part A will contain 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions. Part B will contain 2 questions from each module, of which the student should answer any one. Each question carries 4 marks. Part C will have one essay question which can have subdivisions, to assess the student's capacity for analysing the topics and linking it with other subjects studied. The question carries 15marks.

Syllabus

Classification, properties and uses of Building materials; -Stone– Granite, Laterite, Slate, Marble; - Mud as a building material; - Clay – Clay as building material. Use of terracotta in construction as roofing and flooring tiles; - Brick- country bricks &factory made -properties, available sizes, use; - Structural systems using bricks; - Mortar – lime mortar, mud mortar, cement mortar.

Course plan

Module	Topic	Course outcome	No. of hours
I	**Introduction to building materials**, BIS standards Stone – Classification, Properties Characteristic features of stone and its uses Construction, Documentation and analysis of marble stone use Construction, Documentation and analysis of granite stone use Construction, Documentation and analysis of laterite stone use	CO1, CO2, CO3, CO4	**9**
II	**Introduction to clay as a building material**, its properties and uses. Brick as a building material including properties, sizes, types of bonds, sketches of the same to be done Terracotta as a building material, including its properties and use in flooring and roofing. Construction, Documentation and analysis of brick masonry including various bonds in walls.(one brick and 1.5 brick). Ornamental brick bonds may also be attempted.	CO1, CO2, CO3, CO4	**9**

Module	Topic	Course outcome	No. of hours
	FIRST INTERNAL TEST		
III	**Mud as a building material**, Introduction and types of mud construction (Adobe, Wattle and Daub and Rammed earth) Stabilised Mud Blocks, Sand lime bricks as a building material, its manufacture, properties and uses. Construction, Documentation and analysis of Adobe construction. Construction , Documentation and analysis of Wattle and Daub Construction, Documentation and analysis of Rammed earth construction. Construction , Documentation and analysis of SMB and Sand Lime Bricks construction	CO1, CO2, CO3, CO4	9
IV	**Introduction to structural systems using bricks** – Arches & Vaults with drawings Discussion on Footings, T junction and cross walls using bricks Construction , Documentation and analysis of arches using Bricks. Construction , Documentation and analysis of vaults using Bricks. Construction , Documentation and analysis of footings, cross junction and T Junction using Bricks.	CO1, CO2, CO3, CO4	**9**
	SECOND INTERNAL TEST		
V	**Introduction to mortars**- Proportions, water cement ratio Discussion on Mortar types, stabilised mud mortar, lime mortar, cement mortar Properties and application of mortars Comparison of mud, lime and cement mortar- advantages and disadvantages **Safe Site visit** to document mortar application and presentation through seminars	CO1, CO2, CO3, CO4	**9**
	END SEMESTER EXAMINATION		

Text Book

- 1. P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005

Reference Books

- Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley &Sons Canada,1958
- HLeslie Simmons, 'Construction – Principles, Material &Methods', 7th edition, John Wiley &Sons Inc., New York,2001.
- Relevant BIS codes.
- Rosen Harold J, Construction materials for Architecture, Krieger Pub Co,1992
- Doran, David; Cather, Bob; Doran, D. K; Cather, R – Construction materials reference book, Routledge,2013

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS103	ARCHITECTURAL GRAPHICS AND DRAWING I	1-0-0-3	4	2021

Course Objectives:
To introduce students to the fundamentals of technical drawings.

Course Outcomes:
After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Summarise the basic principles of technical drawing	Understanding
CO-2	Draw orthographic projections of simple solids	Applying
CO-3	Draw measured drawings of small objects	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance : 5 Marks
Tests (2 numbers) : 15 Marks
Assignment/Quiz/Course project : 30 Marks

End semester examination pattern:
There should be two parts; **Part A** and **Part B**. **Part A**
Contains **four** questions.
Module 1: 1 Question (**10** Marks)
Module 2: 1 Question (**10** Marks)
Module 3: 2 Questions (**10** Marks x **2**) Answer **any three** questions

Part B

Module 4: 1 Question (**20** Marks)

Syllabus

Architectural lettering, Scales, Orthographic projection, Measured drawing.

Course Plan

Module	Topic	Course Outcome	No. of Hours
I	**1 Architectural lettering** **2 Scales** Introduction to scales Graphical scales. Plain scales **Drawings:** 1. Architectural lettering 2. Construction of plain scales	CO1	10
II	**1 Introduction to projection** Projection, types of projections and classification of projections **2 Orthographic projections** Projections of points, lines and planes. True and apparent lengths and angles. Traces Projections of solids in simple positions and positions inclined to the reference planes **Drawings:** 1. Projection of lines 2. Projection of solids (prisms, pyramids, cylinders and cones)	CO1, CO2	22
FIRST INTERNAL TEST			
III	**1 Auxiliary projection** Projection of solids on auxiliary inclined and	CO2	16

	Auxiliary vertical planes **2 Sections of solids** Introduction to sections and relevance of sections in drawings. Sections of solids (prisms, pyramids, cylinders and cones) True shapes of sections **3 Development of surfaces** Developments of simple solids. Relevance in architectural model making. Development of a simple hipped roof. **Drawings:** 1. Auxiliary projections of solids 2. Sections of solids 3. Development of surfaces of solids 4. Development of a simple hipped roof		
IV	**1 Measured Drawing** Orthographic projection of small furniture likes tools, chairs and tables (plans, elevations and sections) Drafting techniques, graphical symbols and annotations Dimensioning, labeling and representation of materials Composing the drawing sheet **Drawings:** 1. Measured drawing of small furniture	CO3	12
SECOND INTERNAL TEST			
END SEMESTER EXAMINATION			

Reference Books

- Ching, Francis D. K., Architectural Graphics, Hoboken, New Jersey: John Wiley & Sons,2015
- Bhatt, N. D., Engineering Drawing, Anand, Charotar Publishing House,2012

Course materials, Guidance and Evaluation methods

- Emphasis should be given for making the students understand the basic concepts of projection.
- Students should be made aware of the practical Architectural applications of each topic.
- Students should be encouraged to find and solve complex problems so that their visualization skills improve.
- Importance should be given for the development of drafting and presentation skills.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
SEL101	COMMUNICATION SKILLS AND TECHNIQUES	1-0-0-1	2	2021

Course Objectives

- To develop the communication skills of students by helping them in the areas of four skills of English Language-Listening, Speaking, Reading, and Writing.
- Help them to become confident speakers of English while dealing with their clients, suppliers, business partners and colleagues.
- Help to cultivate their analytical skills in writing especially writing resumes, letters, e-mails, proposals and reports

Syllabus

Use of language in communication, listening skills, reading skills, writing skills, Speaking skills

Expected Outcome

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	PRESCRIBED LEARNING LEVEL
CO1	Understanding new vocabulary and language skills in communication	Understanding, Analysing, Interpreting
CO2	To identify the listening patterns and applying listening techniques	Understanding and Applying
CO3	To analyse and interpret reading skills	Analysing and Interpreting
CO4	To create awareness in writing skills	Understanding and Applying
CO5	To train the students in the skill of speaking	Understanding and Applying

Mark distribution:

Total marks	Continuous internal evaluation marks
100	100

Continuous Internal Evaluation	
Total Marks	:100 Marks
Attendance	: 10 Marks
Presentation/Demonstration (Course work)	: 40 Marks
Report/Record	:25 Marks
Final Test &Viva voce	:25 Marks

Reference Books

- Anderson, P.V, Technical Communication, Thomson Wadsworth, Sixth Edition, New Delhi,2007.
- Evans, D, Decision maker, Cambridge University Press,1997.
- John Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New Delhi,2004.
- Prakash, P, Verbal and Non-Verbal Reasoning, Macmillan India Ltd., Second Edition, New Delhi,2004.
- Thorpe, E,and Thorpe, S, Objective English, Pearson Education, Second Edition, New Delhi,2007.
- Turton, N.D and Heaton, J.B, Dictionary of Common Errors, Addision Wesley Longman Ltd., Indian reprint1998.
- English for Engineers and Technologists (Combined edition, Vol. 1 and 2), Orient Blackswan2010.
- Meenakshi Raman and Sangeetha Sharma, Technical Communication: Principles and Practice", 2nd Edition, Oxford University Press ,2011

Course Plan			
Module	**Contents**	**Course Outcome**	**Hours**
I	**Use of language in communication:** Types of communication-objectives-verbal and non- verbal communication -effective communication and communication breakdown-significance of technical communication-technical vocabulary, vocabulary used in formal letters/e-mails/ reports etc. Reduction of speech sounds in natural speech-Phonetics, intonation in natural speech, Basic Grammar. Technology based communications-Effective email messages-slide presentations, editing skills using software-Modern day research, and search, plagiarism, piracy, patent and copyright laws.	CO1	6
II	**Listening skills:** Active and Passive listening- listening for general content and listening for specific information-listening to technical talks, TED talks, news bulletins and interviews on TV channels interview etiquette, dress code, body language-online (skype) interviews, FAQs related to job interviews.	CO2	6
FIRST INTERNAL TEST			
III	**Reading skills:** Reading comprehension-reading styles and critical analysis, reading shorter and technical articles from journals, newspapers etc. related to architecture- Skimming, scanning, Close reading, -Comprehension – Note taking – interpretation- critical reading and analysis – speed reading. Approaches to efficient reading. Tips for effective reading, Benefits of Effective reading.	CO3	6
IV	**Writing skills:** Technical writing, Differences between technical and literary style-Letter writing formal and informal- Email writing- job applications-Minute preparation, CV preparation-difference between BIO-DATA, CV and	CO4	6

	RESUME-Writing reports and Resumes-structure of a report, types of reports, references and bibliography- Creative writing exercises.		
SECOND INTERNAL TEST			
V	**Speaking skills:** Participating in group discussions, debates-Oral Presentations-expression for starting a presentation- introducing a topic-visual presentation tools- listing supporting ideas -body language and audience analysis. Voice modulation-high pitch and low pitch-public speaking skills-business presentations- Differences between GD and debate-GD strategies- activities to improve GD skills-soft skills and its relevance-Time management, psychometrics and stress management- manners and etiquette.	CO5	6
END SEMESTER EXAMINATION			

SEMESTER - II

Course No.	Course Name	L – T – S – P/D	Credits	Year of Introduction
ART102	THEORY OF ARCHITECTURE II	3 – 0 – 0 –0	3	2021

Course Objectives

- To establish the link between architecture to the historical, cultural and geographic contexts
- To understand the significance of character and style in various period
- To analyze the importance of creativity in design process
- To evaluate the philosophies, ideologies and theories of architects through their exemplary works

Course Outcome

At the end of successful completion of the course students will be able –

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To evaluate the significance of context in architecture	Understand, Analyze and evaluate
CO2	To identify and evaluate the elements that contributes to character and style in different historical periods.	Understand, Analyze and evaluate
CO3	To appreciate the relevance of creativity in architectural design	Understand and evaluate
CO4	To analyze the various stages of design process and their significance in architecture	Understand and evaluate
CO5	To evaluate the development of architectural theories and philosophies from built examples	Understand, Analyze and evaluate

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests(2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question carries 8marks. One or two questions can have subdivisions. Some questions can be framed in such a manner to assess the student's capacity for analysing the topics and linking it with other courses.

Syllabus

Vernacular architectural form and analysis – Architectural Character and Style – Creativity and Meaning in Design – Design Process - Architectural inspirations, philosophies, ideologies and theories of architects

Course Plan

Module	Topic	Course outcome	No. of hours
I	**Vernacular architectural form and analysis** Importance of Context - Climate as determinant, Structure and Building materials as determinants. Socio cultural determinants – Culture, temporal and regional influences as determinant in architecture – Beliefs, Aspiration, values of the user Eg: Kerala vernacular houses, Wattle and daub construction of Assam, Toda huts, Yurt tents.	CO1	12
II	**Architectural Character and Style** Concepts of character and style. Examples from various periods in history – Prehistoric, Greek, Roman, Byzantine, Medieval, Gothic, Renaissance, Impact of Industrial Revolution on Architecture, new materials and technological development.	CO1 CO2	12
FIRST INTERNAL TEST			
III	**Creativity and Meaning in Design** Creativity in design – Function and Expression, Role of causes in the process of design, Understanding the concept of creativity, Theories on thinking- left / right brain, convergent and divergent thinking, lateral and vertical thinking, various techniques to generate creativity	CO3	6
IV	**Design Process** Need for integration of aesthetics and function in design, Formative ideas, Concepts related to spatial organization and characteristics, Importance of Massing in built form, Application of design process through case studies	CO3 CO4	6
SECOND INTERNAL TEST			

V	**Architectural inspirations, philosophies and theories of architects** Aalvar Aalto, Charles Correa, Eero Saarinen, F L Wright, Geoffery Bawa, Laurie Baker, Le Corbusier, Louis Sullivan, Mies Van de Rohe, Walter Gropius	CO1, CO2, CO3, CO4, CO5	9
END SEMESTER EXAMINATION			

Required Reading

- Emily Cole, 'The Grammar of Architecture', Metro Books, New York,2002
- Garry Stevens,' Reasoning Architect: Mathematics and Science in Design', McGraw-Hill Education,1990
- PatrickNuttgens,'TheStoryofArchitecture',PhaidonPressLimited,1983
- Robert Gilliam Scott, 'Design Fundamentals', McGraw-Hill Inc.,US, 1951

Further Reading

- Carmen Kagal, VISTARA, 'The Architecture ofIndia',1986
- Gabriele Leuthauser , 'Architecture in the 20th Century', Taschen GmbH, 2005
- Gautum Bhatia, 'Laurie Baker', Penguin India,2000
- Geoffery Broadbent, 'Design in Architecture', Wiley–Blackwell, 1973
- Helen Marie Evans and Carla David Dunneshil, "An invitation to design", Macmillan Publishing Co. Inc., New York,1982.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART104	HISTORY OF ARCHITECTURE AND CULTURE-I	3-0-0-0	3	2021

Course Objectives:

The aim of the course is to understand architecture as a process evolved from culture- social, religious, economic, political and environmental aspects- of a place. It discusses the architectural developments in historical context and explores the cultural and contextual determinants that produced a specific architectural vocabulary. It also throws an insight into the development of architectural form and character with reference to technological innovations.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	To understand the beginnings of architecture, how prehistoric shelters and settings for rituals evolved around the world in different cultures	Understanding and Analysing
CO-2	To relate the architectural innovations with the social practices, geographical context, materials, geology, hydrology, climate and other environmental aspects and generic forces that shape settlements and habitats.	Understanding and Analysing
CO-3	To understand the influence of culture and religion in forming architectural styles during the First Millennium in India.	Understanding and Analysing
CO-4	To understand the progress of Architecture into a noble process with a governing theory and aesthetics- prominent architectural styles, religious and secular architecture, materials, construction technology, and theory of architecture during the First Millennium in the cultural context of Europe.	Understanding, Analysing, Memorising

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks

Tests (2 numbers) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with1 question from each module, having 4marks for each question. Students should answer all the questions (5x4= 20marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Prehistoric cultural practices and architecture- The first Agricultural Revolution and urban revolution- River Valley Civilizations, their architecture and town planning, Cultural and Religious developments in India and Asia after Indus Valley Civilization- Vedic and Buddhist Architecture. Forming a theory and Style of Architecture during Classical Period in Greece and Rome- Cultural and Religious changes and related Architectural Styles in Europe after the Rise of Christianity- Early Christian, Byzantine, Romanesque and Gothic Architecture.

Course Plan

Module	Topic	Course outcome	No. of hours
I	A brief overview of Paleolithic and Neolithic Culture- Art forms. Lascaux Cave. Evolution of shelters. Ritual sites, Settlements, Megaliths and types of Burial Systems. Gobekli Tepe (Gire Mirazan). Trabeated system. Newgrange, Stonehenge. Jericho culture. Catal Huyuk. Paleolithic sites in India- Bhopal Bhimbetka rock shelters. Visit to any megalith in Kerala/South India. (eg. Kudakkallu Parambu/Edakkal Caves)	CO-1, CO-2	6
II	Generic forces shaping settlements and habitats. Socialstructure and layout of cities in Mesopotamia, City of Ur. Ziggurat at Ur. Nile Valley civilization. Egyptian culture and burial, Transformation of mastabas to Pyramids, Great Pyramid of Giza. Mortuary temple of Queen Hatshepsut. Egyptian drawing methods. A brief overview of Mayan Architecture. Indus Valley civilization, culture, Layout and built forms of Mehrgarh - Mohanjodaro and Harappa.	CO-1, CO-2	9
FIRST INTERNAL TEST			
III	Aryan invasion and Vedic Age- an overview. Emergence of caste and class systems. Mahajanapadas in India. Early and Late Buddhism. Typologies of Buddhist Architecture. Chaitya Hall atKarli, Sanchi complex, Rock cut Ajanta Caves, Yungang Caves, China. Mahavihara at Nalanda.	CO-3	9

	Anuradhapura and Sigiriya, Sri Lanka. Evolution of Pagodas from stupa. Horyu ji Temple. Kofun in Japan. Gandhara architecture. Buddhist cave temples in South India. Visit to a Rock cut (Cave) temple in Kerala.		
IV	Background of emergence of Greek culture- Greek Temple form. Greek Orders. City Planning. Hippodamian system. Stoa, Agora, Acropolis- Parthenon. Theorizing Architecture- Vitruvius. Hellenistic Period- importance of sculpture. Roman Architectural innovations. Amphitheatre- The Colosseum, Forums, Baths, Roman urban villa. Roman vertical surfaces, concrete walls. Wall as an architectural element -fornix system, aedicule, Triumphal Arches. Arcuate Structural system, arches, vaults and domes. Aqueducts, Pantheon. Roman Basilica design, Hadrian's villa, Tivoli	CO-4	9
SECOND INTERNAL TEST			
V	Struggles and Rise of Christianity. Late Pagan and Early Christian Architecture. Catacombs. Congregational spaces. Old St. Peter's Basilica, Rome. Underground cities of Turkey. Byzantine Architecture. Greek Cross and Latin Cross. Pendentives. Haggia Sophia. Pre Romanesque Carolingian empire. The Pilgrimage'. Romanesque Architecture- Characteristics. Development of stone vaulting into groined systems– leading to development of church plan. Pisa Cathedral. Gothic Architecture- importance in culture - Characteristics of Gothic churches and cathedrals. Notre Dame, Paris.	CO-4	12
END SEMESTER EXAMINATION			

Text Books:

- A Global History of Architecture/ Francis. D. K. Ching, Mark Jarzombek, Vikramaditya Prakash. Published by John Wiley and sons, Third edition 2017
- A History of Architecture: Settings and Rituals/ Spiro Kostoff. Revisions by Greg Castilo. Published by Oxford University Press, 1985, 1995
- Sir Banister Fletcher, "A History of Architecture", CBS Publications (Indian Edition),1999.
- Percy Brown, 'Indian Architecture: Buddhist and Hindu Periods', D. B.Taraporevala,1965
- Satish Grover, 'The Architecture of India: Buddhist and Hindu', Vikas, 1980

Reference Books

- Leland M Roth; "Understanding Architecture: Its Elements, History and Meaning"; Craftsman House;1994
- Lloyd S. and Muller H.W., "History of World Architecture – Series", Faber and Faber
- Patrick Nuttgens,"The Story of Architecture FROM ANTIQUITY TO THE PRESENT", H.F.Ullmann Pub:1983
- Pier Luigi Nervi, General Editor, "History of World Architecture – Series", Harry N. Abrams, Inc. Pub., New York,1972.
- Vincent Scully, "Architecture – The Natural and the Manmade", Harper Collins Pub:1991.
- A World History of Architecture / Marian Moffett, Michael Fazio &Lawrence Wodehouse /McGraw-Hill
- Encyclopedia of Architectural Technology / Ed: Pedro Guedes / McGraw- Hill
- CRASH COURSE IN ARCHITECTURE / Eva Howarth / Caxton Editions
- The Great Ages of World Architecture / G. H. Hiraskar / Dhanpat Rai
- The Civilization of the Renaissance in Italy, 1860, English translation, by SGC Middle more, in 2 vols., London,1878)
- Erwin Panofsky, Renaissance and Renascences in Western Art, (New York: Harper and Row,1960)
- Arnold Hauser, Mannerism: The Crisis of the Renaissance and the Origins of Modern Art, Cambridge: Harvard University Press, 1965, ISBN 0-674- 54815-9
- Wolfflin, Heinrich (1971). Renaissance and Baroque. London:Collins.
- Stefan Muthesius (1994). Art, architecture and design in Poland, 966- 1990: an introduction.
- K.R. Langewiesche Nachfolger H. Koster Verlagsbuchhandlung. p. 34. ISBN3-7845-7611-7.
- Jean-Francois Gabriel, "Classical Architecture for the Twenty-first Century", Norton,2004

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Faculty to act as facilitator and guide rather than one way lecturing.
- Book Reviews are to be part of assignments.
- Students are to be encouraged to watch movies and documentaries which give information about culture and architecture and prepare reviews/ reports and have discussions in class.
- As far as possible the students are to be encouraged to visit the architectural monuments in their vicinity and prepare reports and sketches, regardless of whether they are part of the syllabus.
- At the end of the course, each student has to prepare a short video on any of the topics in the syllabus.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
AET102	THEORY OF STRUCTURES II	2-1-0-0	3	2021

Course objectives:

This course provides fundamental concept of mechanics of deformable bodies and helps the students to develop their analytical and problem-solving skills. Through this course, the students will be able to understand the internal effects in various structural elements under various loading conditions.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Recall the fundamental terms and theorems Associated with mechanics of linear elastic deformable bodies	Remembering
CO - 2	Explain the behaviour and response of various structural elements under various loading conditions.	Understanding
CO - 3	Calculate internal stresses/ strains, stress resultant in structural elements subjected to axial/ transverse loads and bending/twisting moments and present the results graphically	Applying
CO - 4	Calculate safe load carrying capacity of beams and columns	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Continuous assessment tests(2numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

Concept of deformable bodies ; Strength, Stiffness, Stability - Simple stresses and strains; axial and shear stresses; elastic constants - Deformation of axially loaded bars - uniform cross section, composite bars - Beam analysis- Shear force diagram and Bending moment diagram of cantilever, simply supported and overhanging beams with point loads, uniformly distributed loads &moment- Theory of simple bending, bending stresses in symmetrical beams, bending of composite beams – Concept of shear stresses in beams, distribution of shear stresses in symmetric cross sections – Torsion; torsional stresses in circular sections - Columns and Struts; Effective Length; Slenderness Ratio; Critical load; Safe load; Different end conditions ; Strength of columns

Course plan

Module	Topic	Course outcome	No. of hours
I	Review of statics Concept of deformable bodies – Strength, Stiffness, Stability- Bending and Buckling **Concept of stress, Types of stresses. Concept of strain , Types of strains. Stress – Strain relation - Hooke's law** **Young's Modulus of Elasticity, Shear Modulus, Bulk Modulus, Relation between elastic constants (Derivation not required)** - Numerical exercise **Stress-strain (-) diagram of mild steel – Proportionality limit, Yield point, Ultimate stress, True and Engineering Stress strain curve, Idealized Stress strain curves. Factor of safety, Working stress** - Numerical exercise **Axially loaded bars with uniform cross section– Calculation of stress, strain and deformation –** Numerical exercise **Deformation of axially loaded bars with varying axial loads** - Numerical exercise Analysis of axially loaded composite bars (with maximum two materials) - Numerical exercise	CO -1 CO –2 CO –3	8
II	**Beams – Different types. - Types of loading on beams.** **Concept of bending moment and shear force. Practical examples** **Shear Force and Bending Moment diagrams.** **Practical significance - Numerical example** Cantilever beams with point loads, UDL and moment - Numerical exercises	CO -1 CO –2 CO –3	8

	Simply supported beams with point loads, UDL and moments –Numerical exercises Simply supported overhanging beams (one side and both sides) with point load, UDL and moment – Numerical exercises		
FIRST INTERNAL TEST			
III	**Theory of simple bending – Assumptions and Limitations** **Variation of bending stress across the cross section - Maximum bending stress, section modulus, moment of resistance - Practical significance** **Section modulus calculation of different cross sections (solid rectangle, hollow rectangle, solid circle, hollow circle, I section)** - Numerical exercise **Bending stresses in symmetrical and composite beams** – Numerical exercise **Calculation of allowable loads in beams based on bending stress criteria. - Proportioning of beam sections to carry given load without exceeding the allowable bending stress** **- N**umerical exercise	CO –2 CO –3	7
IV	Shear stress in beams (Derivation of equation not required) Variation of shear stress across various cross sections – rectangular, circular and triangular sections (Derivation required) **Calculation of shear stress in symmetric cross sections - N**umerical exercise **Calculation of allowable loads in beams- based shear stress criteria –** **Numerical exercise**	CO –2 CO –3 CO –4	6
SECOND INTERNAL TEST			
V	Concept of torsion - Torsion equation (Derivation not required), Assumptions, Torsional stresses in circular sections, Polar moment of inertia, Polar modulus - Practical significance	CO –2 CO –3 CO –4	7

	Torsion of solid and hollow circular shafts, Variation of stress across the cross section - Numerical exercise **Power transmitted by circular shafts and hollow circular shafts. - Proportioning the shafts to transmit a given power based on shear stress and angle of twist considerations** Numerical exercise Definitions of Columns and Struts – Long, Medium, and Short columns – Effective Length – Slenderness Ratio Critical load – Safe load — Different end conditions — Euler's formula for critical load for columns with different end conditions (derivations not required)— Assumptions and its limitations **Effective length of columns with different end conditions -** Numerical exercise **Determination of the strength of columns – Proportioning of column sections -** Numerical exercise		
END SEMESTER EXAMINATION			

Text Books:

- Gere and Timoshenko, Mechanics of Materials, CBS Publishers and Distributors
- Stephen Timoshenko, Strength of Materials, Part 1 Elementary Theory and Problems, CBS Publishers and Distributors
- Stephen Timoshenko, Strength of Materials, Part 2 Advanced Theory and Problems, CBS Publishers and Distributors

Reference Books

- Henry J., Covan, Architectural structures: An introduction to structural mechanics, Pitman Publishing
- Philip Garrison, Basic structures for engineers and architects, Wiley – Blackwell publishers
- Francis D. K. Ching, Barry S. Onouye, Douglas Zuberbuhler, Building structures illustrated, Wiley publishers
- R.K Bansal., Strength of Materials, Lakshmi Publications PvtLtd
- Benjamin J., Engineering Mechanics, Pentex Book Publishers and Distributors
- S. Ramamrutham., Strength of Materials, Dhanpat Rai Publishing CompanyPvt
- Junarkar S. B. and Shah S. J., Mechanics of Structures (Vol. I), 30/e, Charotar Publishing House Pvt. Ltd., New Delhi, 2012
- Punmia B. C., A. K. Jain and A. K. Jain, Strength of Materials &Theory of Structures (Vol.I), Laxmi Publications, New Delhi, 2013.
- Vaidyanathan R. and P.Perumal, Structural Analysis (Vol.I), Laxmi Publications,2004
- A.P.Dongre , Structural Engineering for Architecture, Scitech Publications Ltd.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARD102	ARCHITECTURAL DESIGN-I	0-0-8-2	10	2021

Course Objectives:

The key objective of this course is to develop a basic understanding of space, form, structure, and the built environment, to enable the conceptualization of form, space and structure through creative thinking and to initiate architectural design process deriving from first principles. And also to involve students in a design project(s) that will involve simple space planning and the understanding of the functional aspects of good design.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	To get a basic understanding of space, form, structure, and the built environment, to enable the conceptualization of form, space and structure through creative thinking.	Understanding
CO-2	To initiate architectural design process deriving from first principles, building case study by choosing appropriate examples and space standards to enable them to formulate and concretize their concepts and architectural program.	Applying
CO-3	To acquire skills of drawing and representation, built environment and its components, construction technology and structures to apply to architectural design.	Analysing and evaluating
CO-4	To involve students in a design project(s) that will involve simple space planning understanding the functional aspects of good design, small scale building project(s) which will sensitize them to intelligent planning responsive to the environmental context.	Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester Jury examination marks	End semester Jury examination duration
100	50	50	2-3 days

Continuous internal evaluation pattern:

Attendance : 5 Marks
Design Assignments/Reviews/Tests : 45 Marks

Syllabus :

Looking at the immediate built environment and understanding its fundamental components and their impact on the surroundings - Exploring personal experiences to behavioural needs and translating them into documented information that can be used as a basis for design - Documentation of a building of importance to understand its history and evolution through documents research and measured drawings -To understand the various structural systems in relation to its applications in buildings - Presentation skills in the 2-D format - Systematic introduction to issues related to design, its components and space standards

Course Plan:

Module	Topic	Course outcome	No. of hours
I	**Concept of space, form and enclosure** Design of a simple architectural space based on an understanding of anthropometrics and human scale in context of the built environment and experiencing spatial quality in relation to personal experiences to behavioural needs, understanding nature and culture as a contextual setting. *Scale/Complexity:* Projects involving small span, single use spaces with simple movement. *Typology/Project:* bedroom, bathroom, kitchen, exhibition pavilion, atrium or courtyard, children's environment, work module, phone kiosk, snack corner, ATM Centre, security cabin, etc.	CO-1, CO-2 CO-4	30
II	**Documentation of a Building of special interest.** Documentation of a complete building of a special	CO-1,	30

	interest in terms of history, building construction, architectural excellence or technology using photographs, measuring tapes etc., along with the relevant study of the building based on its history, morphology, and context. Measured drawing of plans, elevations, sections, isometric projections of building details etc. using pen and ink rendering technique.	CO-2	
FIRST INTERNAL TEST			
III	**Built environment and understanding its major components** Introduction to Architectural elements and space standards through exercises on observation and visual perception, understanding human scale in context of the built environment of varied scales and spatial quality, exercises relating to aesthetic and psychological experience of form and space in terms of scale, colour, light, texture, etc., and translating them into documented information that can be used as a basis for design.	CO-3	20
IV	**Study of simple structural systems and behaviour under load:** Working model of structures (Like post and lintel, cantilever, trusses, arches, space frame, suspension etc), Development of basic skill in design expression through visual analysis of structural forms, sculptural and spatial qualities of the structural system, Three dimensional projects related to structural systems developed through models and sketches.	CO-3	20
SECOND INTERNAL TEST			
V	**Integration of form and function in the Architectural design:** Design of a basic shelter: an architectural form with a specific function, stressing on concept generation and development of rich design process. Representation of ideas through sketches, diagrams, and architectural drawings with application of line quality, thickness and intensity as appropriate to the intent, isometric, axonometric, and oblique views, one and multi-point perspectives, sectional perspectives, light, shade, shadows and skiagraphy.	CO-4	50

	Scale/ Complexity: Small scale simple function private/public buildings predominantly single floor *Typology/Project:* Shop, flower kiosk, Bake house, petrol bunk, fire station, weekend cottage etc.		
END SEMESTER EXAMINATION/ JURY			

Reference Books

- Arthur L. Guptill and Susan E. Meyer, 'Rendering in Pen and Ink', Watson- Guptill,1997
- Francis D. K. Ching, 'Architectural Graphics', Wiley,2009.
- Francis D. K. Ching, 'Architecture: Form, Space and Order', John Wiley &Sons,2007.
- GeoffreyBroadbent`DesigninArchitecture'JohnWileyandSons,1973.
- Neuferts' Architect's Data
- Simon Unwin, 'Analysing Architecture', Routledge,2003.
- Simon Unwin, 'An Architecture Notebook Wall' Routledge,2000.
- Simon Unwin, 'Doorway', Routledge,2007.

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- The students need to be familiarized with the basic functional aspect of designing simple building type and its relevant spatial organization.
- The students need to be oriented to reciprocate and sensitize the design and concept to the environment and develop that design skill in all the project they undertake.
- Students need to be equipped to understand the relationship between the grammar of design and architecture by involving the students in seminars/ workshops and simple exercises which will look at building form analytically.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS102	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES II	1-0-0-2	3	2021

Course objectives:

The goal of this course is to expose the students to elementary building materials and their applications. It aims to familiarize students to contemporary as well as vernacular and traditional building materials. It will also introduce students to prevailing &relevant BIS specifications. After this course, the students will be able to recognize materials in the market and use them in their design processes.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify relevant BIS specifications for wood and concrete	Remembering
CO2	Identify various buildings materials including wood and concrete and their application for various construction needs.	Understanding
CO3	Use and work with various building materials in the workshop and construction yard and understand their behaviour.	Applying
CO4	Use the various building materials in their design processes appropriately	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance : 5 Marks
Continuous assessment tests (2 nos.) : 15 Marks
Portfolio presentation (15)/drawings (15) : 30Marks

End semester examination pattern:

There will be three parts; Part A, B and C. Part A will contain 5 questions with1 question from each module, having 3 marks for each question. Students should answer all the questions. Part B will contain 2 questions from each module, of which the student should answer any one. Each question carries 4 marks. Part C will have one essay question which can have subdivisions, to assess the student's capacity for analysing the topics and linking it with other subjects studied. The question carries 15 marks.

Syllabus

Classification, properties and uses of Building materials: Wood and concrete-Wood as a building material. Use of wood and bamboo in construction, methods and techniques - Concrete -both PCC and RCC- as a building material, properties and uses in construction.

Course plan

Module	Topic	Course outcome	No. of hours
I	**Classification of timber**, use of wood in construction. Types of timber and its suitability for construction Seasoning of wood various methods of seasoning Documentation and presentation of wood samples of various species as part of portfolio	CO2, CO3	**6**
II	**Study of wood joints and its details in doors, windows** etc. Drawings - wooden joints in architectural elements- doors windows, trusses etc. Construction of wood joints in carpentry workshop, discussion on the same with analysis and properties of joints.	CO2, CO3, CO4	**12**
FIRST INTERNAL TEST			
III	**Defects in timber** - various types and its causes Modern and traditional methods of treating timber. Treatment of samples of wood in construction yard, analysis and documentation of the same.	CO2, CO3, CO4	**7**

IV	**Bamboo as a building material** -types, properties, application. Comparison of bamboo with wood. Strength and workability as criteria Various steps involved in working with bamboo, required sizes of members. Methods of joining bamboo for various applications. Drawings- Joining details of bamboo for various Applications, Construction of bamboo joints in construction yard and documenting and presentation in portfolio	CO1, CO2, CO3, CO4	**11**
SECOND INTERNALTEST			
V	**Introduction to concrete as a building material**, relevant IS codes Concrete: Ingredients of plain cement concrete- grades, properties- applications and uses. Reinforced cement concrete, water- cement ratio, workability, curing Various types of concrete in construction such as Light weight concrete, Rapid setting concrete etc. Safe onsite experience - concrete - listing out observations, Documentation and presentation through seminar.	CO1, CO2, CO3, CO4	**9**
END SEMESTER EXAMINATION			

Text Book

- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi,2005

Reference Books

- Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley &Sons Canada,1958.
- H Leslie Simmons, 'Construction – Principles, Material &Methods', 7th edition, John Wiley &Sons Inc., New York, 2001.
- Relevant BIS codes.
- RosenHaroldJ,ConstructionmaterialsforArchitecture,KriegerPubCo,1992
- Doran, David; Cather, Bob; Doran, D. K; Cather, R - Construction materials reference book, Routledge,2013

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS104	ARCHITECTURAL GRAPHICS AND DRAWING II	1-0-0-3	4	2021

Course Objectives:

To equip students with the necessary skills required to prepare different types technical drawings to represent buildings.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Prepare technical drawings using pen and ink	Applying
CO-2	Draw the orthographic projections of helix & helical springs	Applying
CO-3	Draw pictorial projections of simple solids	Applying
CO-4	Prepare architectural drawings of small buildings	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance : **5** Marks
Tests (2 numbers) : **15** Marks
Assignment/Quiz/Course project : **30** Marks

End semester examination pattern:

Contains a single question (50 marks) to prepare the architectural drawings of small buildings. The parts of the question should include the contents from all three modules.

Syllabus

Drafting with pen and ink, Orthographic projection of helix and helical springs, Sciography, Axonometric and perspective projections, Measured drawings of buildings.

Course Plan

Module	Topic	Course outcome	No. of Hours
I	**1 Drafting with pen and ink** Introduction to drafting with pen and ink **2 Orthographic projection of helix and helical springs** Application in architecture. Orthographic projection of spiral stairs **3 Sciography** Projection of shadows on plans and elevations of simple solids **Drawings:** 1. Projection of helix, helical springs and spiral stairs 2. Projection of shadows on plans and elevations of solids (prisms, pyramids, cylinder and cone)	CO1, CO2	12

II	**1 Axonometric Projection** Types of axonometric projections Isometric projection of solids **2 Perspective projection** One-point, two-point and three-point perspectives Projection of one-point and two-point perspectives (vanishing point method) **3 Application of sciography in pictorial views** Drawing shadows on isometric and perspective views **Drawings**: 1. Isometric projection of solids (prisms, pyramids, cylinder, cone and sphere) - projection of shadows 2. One-point and two-point perspectives of solids (prisms, pyramids, cylinder, cone and sphere) - projection of shadows	CO1, CO3	20
FIRST INTERNAL TEST			
III	**1 Measured drawing** Measured drawing of a small building Preparation of plans, elevations, sections and three-dimensional views Interior perspectives, sectional perspectives **Drawings:** 1. Plans,elevations and sections ofthe building 2. Isometric views of the building 3. Perspective views of the building with shadows 4. Interior perspectives of the building	CO1, CO4	28
SECOND INTERNAL TEST			
END SEMESTER EXAMINATION			

Reference Books

- Ching, Francis D. K., Architectural Graphics, Hoboken, New Jersey: John Wiley & Sons,2015
- Ching, Francis D. K., Design Drawing, Hoboken, New Jersey: John Wiley &Sons, 2010
- Norling. Earnest R., Perspective Made Easy, New York: Dover Publications, Inc.,1999

Course materials, Guidance and Evaluation methods

- All the drawings in the course should be prepared using pen and ink.
- Emphasis should be given to the quality of architectural drafting and presentation.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARL102	CARPENTRY AND MODEL MAKING WORKSHOP	0-0-0-2	2	2021

Course Objectives:

The aim of the course is to Improve the student's overall capability in model making that helps them to translate their architectural ideas.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcom e	Description of Course Outcome	Prescribed learning level
CO-1	The course will equip the students with their necessary model making skills that would help them in their architectural explorations.	Understanding and Analysing
CO-2	Students will be able to demonstrate different wooden joineries and its applications.	Understanding , Analysing and Prototyping
CO-3	Students will be able to research on different wood finishes	Understanding and Analysing
CO-4	Students will be able to explore different geometrical form developments based on materials.	Understanding , Analysing and Prototyping

Mark distribution:

Total marks	Continuous internal evaluation marks
100	100

Continuous internal evaluation pattern:

Attendance	: 10 Marks
Presentation/Demonstration	: 40 Marks (Internal)
Marks for record/report	: 25 Marks (Internal)
Viva	: 25 Marks (Internal)

Syllabus

Material properties, Introduction to Modelling with Wood, Paper, Paper boards, Plaster of Paris, Clay, Sticks. Basic Model making technique, Different types of material and their techniques. Different types of wood joinery, tools and its surface finishes.

Course Plan

Module	Topic	Course outcome	No. of hours
I	Identification and familiarization of tools, Safety precautions for using carpentry tools.	CO-1	4
II	**Wooden Joinery :** Wooden joineries- Mortise-And- Tenon Joints, Tongue and groove joint, Lap joints, Dovetail Joints. **Preparation of surface :** Wooden Finishes – Sand papering, Use of Wax Polish and French polish.	CO-2, CO-3	10
FIRST INTERNAL TEST			
III	Geometrical form exploration displaying various material properties- Demonstrative exercises.	CO-4	8
IV	Free form exploration displaying various material properties- Demonstrative exercises.	CO-4	8
SECOND INTERNAL TEST			
END SEMESTER EXAMINATION			

Reference Books

- Jackson, A., & Day, D. (1996). Collins complete woodworker's manual.
- Knoll, W., &Hechinger, M. (2007). Architectural models: construction techniques.

  J. Ross Publishing.
- Roark T.Congdon, 'Architectural model building: Tools techniques and Materials' Bloomsburry Academic,02-Apr-2010

Course materials, Guidance and Evaluation methods

- Faculty to act as facilitator and guide rather than one way lecturing.
- Students are to be encouraged to visit carpentry workshops, familiarize with different materials and its usages, finishes etc. and prepare reports and demonstrate in class.
- At the end of the course, each student has to prepare a presentation/report and demonstration video of their works in the syllabus.
- Each student should have a record book with sketches and illustrations of all the topics covered.

SEMESTER III

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART201	CLIMATE AND BUILT FORM- I	2-0-0-2	4	2021

Course Objectives: To introduce students to climate responsive architecture and enable them to apply climate responsive design strategies in the design of built environment.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Interpret the global and local climate	Understanding
CO-2	Examine the thermal comfort of a space	Analysing
CO-3	Summarize the heat exchange process in buildings and the thermophysical properties of building materials	Understanding
CO-4	Apply climate responsive design strategies in the design of shelters for tropical climates	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Introduction to Climate, Climate in Site Study, Thermal Comfort, Heat transfer in buildings, Climate responsive design for tropical climates.

Course Plan

Module	Topic	Course Outcome	No. of Hours
I	**Introduction to climate** Definitions – climate and weather, Climate and architecture, Need of study – comfort, sustainability, Active and passive systems, Global climatic factors Climate classifications - global classification (Koppen), Indian climate classification (SP 41) Tropical climates and its classification	CO1	10
II	**Climate in site study** Elements of climate, Macro and microclimate Site climate – factors affecting site climate and their influence on different elements of climate Urban climate **Exercises (Lab):** 1. Measurement of temperature 2. Measurement of humidity 3. Measurement of mean radiant temperature	CO1	15
FIRST INTERNAL TEST			
III	**Thermal comfort** Thermal balance of the human body – regulatory mechanisms and subjective variables Thermal comfort – factors affecting thermal comfort Thermal comfort indices – effective temperature, corrected effective temperature, bioclimatic chart, Fanger's model of thermal comfort **Exercises (Lab):** 1. Calculation of ET and CET 2. Evaluation of thermal comfort using architectural evaluation System	CO2	15
IV	**Heat transfer in buildings** Heat exchange process in buildings, Thermophysical properties of materials – conductance, resistance and transmittance (U value), Absorbance reflectance and emittance, Specific heat and thermal capacity, Sol air temperature and solar gain factor Periodic heat flow	CO3	10

SECOND INTERNAL TEST			
V	**Climate responsive design for tropical climates** Design considerations for warm humid, hot dry and composite climates.	CO4	10
END SEMESTER EXAMINATION			

Reference Books

- Koenisberger O. H., Ingersoll T. G., Mayhew A., Szokolay S. V., Manual of Tropical Housing and Building, Orient Blackswan, 1975.
- Givoni B., Man, Climate and Architecture, Elsevier Publishing Company Limited, 1969.
- Olgyay V., Design with Climate, Princeton University Press, 2015.
- Krishan A., et al., Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, Tata McGraw-Hill Education, 2001.

Course materials, Guidance and Evaluation methods

- Aspects of climate to be examined in the site study for architectural projects should be emphasised in module 2.
- Students should be made aware of the practical Architectural applications of each topic.

	Model Question Paper	**Total Pages: 2**
Reg. No.:	Name:	

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B. ARCH. DEGREE EXAMINATION, MONTH AND YEAR

Course Code: ART 201

Course Name: CLIMATE AND BUILT FORM- I

Max. Marks: 60		Duration: 3 Hours

PART A

		Answer all questions, each question carries 4 marks	Marks
1		Differentiate between Climate and Weather.	(4)
2		What are the factors affecting site climate?	(4)
3		What are the parameters that affect Human Thermal Comfort?	(4)
4		What do you mean by Sol – Air Temperature?	(4)
5		How walls with high thermal capacity affects thermal comfort?	(4)

PART B

Answer any one question from each module, each carries 8 marks

MODULE 1

6		Explain the global climatic factors. Also explain how seasons are formed on earth.	(8)
7		What are tropical climates? How tropical climates are classified? Explain the characteristics of warm humid equatorial climate and hot dry desert climate.	(8)

MODULE 2

8		What are the elements of climate to be studied during site analysis? Describe how these elements are measured?	(8)
9		What is urban climate? Discuss the factors affecting urban climate?	(8)

		MODULE 3	
10		Describe how human body is thermally balanced. Explain the subjective variables that affect thermal comfort.	(8)
11		What are Effective Temperature and Corrected Effective Temperature? Explain in detail.	(8)
		MODULE 4	
12		Explain the heat exchange process in buildings. Explain how U-value of a composite wall can be calculated.	(8)
13		What are time lag and decrement factor? Explain the periodic heat flow in buildings.	(8)
		MODULE 5	
14		What are the aspects need to be considered while designing buildings for hot and dry climates?	(8)
15		Explain in detail, a minimum of five climatic strategies to improve the thermal performance of your own home. Give proper sketches.	(8)

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Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART203	HISTORY OF ARCHITECTURE AND CULTURE - II	3-0-0-0	3	2021

Course Objectives: The course tries to understand religious and domestic architecture in India and Europe during the 5th to 15th century. In Europe, the Architectural vocabulary is studied as it evolved from Gothic to Renaissance. In India, the period of development of a style later known as Hindu architecture in India, and its regional variations are studied. An introduction to the architectural vocabulary of traditional Kerala architecture as it evolved from the climatic and cultural contexts also form part of the course.

Pre-requisite of the course: Understanding of historical development of architecture across Asia, Europe and Africa from prehistoric era to 10th century. Gothic period, Vedic and Buddhist Architecture studied in the second semester has to be refreshed in memory.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Study of evolution of European architecture from Gothic to Renaissance	Understanding
CO-2	Study of Hindu temple Architecture in Asia and India	Understanding
CO-3	Study of evolution of domestic and religious architecture in Kerala from the cultural and climatic contexts	Analysing
CO-4	Understanding of elements and materials of Kerala traditional architecture	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance	: 4 Marks
Tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Hindu Architecture, Early Temple form
Indo Aryan temples and Dravidian Temples. Temple towns and complexes.
An introduction to Architecture of Kerala- culture and traditional Architecture- domestic types.

Course Plan

Module	Topic	Course outcome	No. of hours
I	Cultural changes that led to Renaissance in Europe- Early, Middle and High Renaissance- Characteristics- Brunelleschi, Michael Angelo- Florence Dome, New St. Peter's church, Rome. Baroque, Rococo, Neo Classical- Definition.	CO1	12
II	Hindu Temple Architecture- Evolution and features. Vocabulary of Hindu temples. Kailasnath Temple at Ellora. Angkorwat temple, Cambodia.	CO2	6
FIRST INTERNAL TEST			
III	Evolution of Hindu temples from Buddhist stupas- Gupta Temple at Sanchi. Essential Features of Dravida and Nagara Temples. Temples at Badami, Aihole, Pattadakkal, Virupaksha at Hampi, Belur, Halebid, Ladhkan, Vitthala	CO2	9

IV	Dravidian Temple Architecture- PanchRathas- Shore Temple at Mahabalipuram. Brihadeswara Temple at Tanjore. PanchaPrakara Temple planning- Madurai Meenakshi temple. Nagara Temple Architecture- Kandara Mahadeo temple at Khajuraho, Lingaraja Temple at Orissa.	CO2	9
SECOND INTERNAL TEST			
V	Vernacular architecture- definition. Influence of culture on vernacular architecture. Agraharams Introduction to Kerala Architecture- Geographic, climatic, cultural, socio-economic, occupational and religious structure that helped evolution of Kerala architecture. Evolution of Kerala domestic Architecture. Ekashala to Chatursala.	CO3, CO4	9
END SEMESTER EXAMINATION			

	MODEL QUESTION PAPER	**Total Pages: 02**
Reg No.:_____	Name:_____	

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B. ARCH. DEGREE EXAMINATION (2021 Scheme),
MONTH YEAR

Course Code: ART203

Course Name: HISTORY OF ARCHITECTURE AND CULTURE- II

Max. Marks: 60		Duration: 3 Hours

Answer to the point. Illustrations carry due marks

PART A

		Write a short note on all questions, each carries 4 marks.	Marks
1		Sketch and explain the importance of Florence Dome	4
2		Sketch and explain the features of Angkorwat temple	4
3		Write briefly about the early Hindu temple form.	4
4		Sketch the features of Lingaraja Temple	4
5		Explain with one example the influence of culture on Vernacular architecture	4

PART B

Answer any one question from each module, each carries 8 marks.
To be answered in a maximum of 2 pages with supporting sketches

MODULE 1

6		What is meant by Renaissance? What are the cultural characteristics of Renaissance period? What were the reasons for evolution of Renaissance Architecture?	8
7		Give a detailed description of new St.Peter's church in Rome along with sketches.	8

MODULE 2

8		Explain how Buddhism influenced Hindu temple architecture, with an example	8
9		Narrate the world wide evolution of Hindu temple Architecture	8

MODULE 3

10		Differentiate between Dravida and Nagara Temple forms, with one example for each.	8
11		Write a note on Hampi temples. Illustrate with sketches.	8

MODULE 4

12		What is Pancha Prakara Temple planning? Sketch and explain Madurai Mennakshi Temple.	8

13		Sketch and write a note on Shore temple, Mahabalipuram	8
		MODULE 5	
14		What are the geographic and climatic influences that led to the evolution of vernacular Kerala architecture?	8
15		Differentiate between the structure of a Chaturshala and an Agraharam.	8
		****	

Text Books:

- Sir Banister Fletcher, "A History of Architecture", CBS Publications (Indian Edition), 1999.
- Percy Brown, 'Indian Architecture: Buddhist and Hindu Periods', D. B.Taraporevala,1965
- Satish Grover, 'The Architecture of India: Buddhist and Hindu', Vikas, 1980
- Thampuran, Ashalatha. Traditional Architectural Forms of Malabar Coast. India, Vastuvidyapratishthanam Academic Centre, 2001.
- Koduveliparambil, Jacob Joseph. Construction Practices in Traditional Dwellings of Kerala, India. Canada, McGill University Libraries, 1997.
- Chakrabarti, Vibhuti. Indian Architectural Theory: Contemporary Uses of Vastu Vidya. India, Curzon, 1998.
- Oliver, Paul, ed. Encyclopedia of vernacular architecture of the world. Vol. 3. Cambridge: Cambridge University Press, 1997.

Reference Books

- Hardy, Adam. The temple architecture of India. United Kingdom, Wiley, 2007.
- Encyclopaedia of Indian Temple Architecture. India, American Institute of Indian Studies, set of 3 volumes.
- Desai, Miki. Wooden Architecture of Kerala. India, Mapin Publishing, 2018.
- Sarkar, H.. An Architectural Survey of Temples of Kerala. India, Archaeological Survey of India, 1978.
- Sarkar, H.. Monuments of Kerala. India, Archaeological Survey of India, 1978.
- Leland M Roth; "Understanding Architecture: Its Elements, History and Meaning"; Craftsman House; 1994
- A TEXT BOOK OF VASTUVIDYA (VASTUVIDYAPRAVESIKA) - by Dr.Balagopal. T.S. Prabhu and Dr. A. Achyuthan.
- Lloyd S. and Muller H.W., "History of World Architecture – Series", Faber and Faber
- Patrick Nuttgens,"The Story of Architecture FROM ANTIQUITY TO THE PRESENT", H.F.Ullmann Pub: 1983
- Pier Luigi Nervi, General Editor, "History of World Architecture – Series", Harry N. Abrams, Inc. Pub., New York, 1972.
- Vincent Scully, "Architecture – The Natural and the Manmade", Harper Collins Pub: 1991.
- Amos Rapoport: House Form and Culture

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Faculty to act as facilitator and guide rather than one way lecturing.
- Book Reviews are to be part of assignments.
- Students are to be encouraged to watch movies and documentaries which give information about culture and architecture and prepare reviews/ reports and have discussions in class.
- As far as possible the students are to be encouraged to visit the architectural monuments in their vicinity and prepare reports and sketches, regardless of whether they are part of the syllabus.
- At the end of the course, each student has to prepare a short video on any of the topics in the syllabus.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET201	THEORY OF STRUCTURES- III	2-1-0-0	3	2021

Course Objectives: The goal of this course is to assess the structural response of simple structures subjected to different types of loads. The students will be trained to develop mathematical models of structures and to analyse them using appropriate methods. The course will help the students to enhance their problem-solving skills. Students are introduced to the concept of determinate beams and indeterminate beams as well as to force and displacement methods of analysis. Special cases of structural response analysis of arches and cables are also introduced in this course. After this course, the students will be able to perform the analysis of similar problems in real world situations and respond accordingly.

Pre-requisite of the course: Understanding of historical development of architecture across Asia, Europe and Africa from prehistoric era to 10th century. Gothic period, Vedic and Buddhist Architecture studied in the second semester has to be refreshed in memory.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Compute the slope and deflection of determinate beams using appropriate method	Applying
CO - 2	Explain the concept of static and kinematic indeterminacy and calculate the static and kinematic indeterminacy of structures	Understanding
CO - 3	Recognize the fundamentals of force and displacement methods of analysis	Understanding
CO - 4	Apply specific methods to analyse the structural response of beams and frames without sway subjected to different types of loading	Applying
CO - 5	Apply suitable methods to analyse the structural response of cables and arches.	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carries 8 marks.

Syllabus

Determinate beams – Slope and Deflection of determinate beams– Conjugate beam method; Moment area method

Indeterminate beams- Static and kinematic Indeterminacy – Force and displacement methods of analysis

Force methods -Consistent deformation method – Analysis of fixed and propped cantilever

Analysis of continuous beams using Three moment theorem - Discussion on Support settlement case

Displacement method – Slope deflection method and Moment distribution method - Analysis of beams and frames without sway

Arches - Analysis of three hinged arches – Parabolic and segmental arches with supports at same level

Cables – General cable theorem – Cables under concentrated load and uniformly distributed load – Anchor cables

Course Plan

Module	Topic	Course Outcome	No. of hours
I	Determinate beams – Slope and Deflection of determinate beams only – Conjugate beam method; Moment area method (subjected to concentrated load and full uniformly distributed load only)	CO1	9

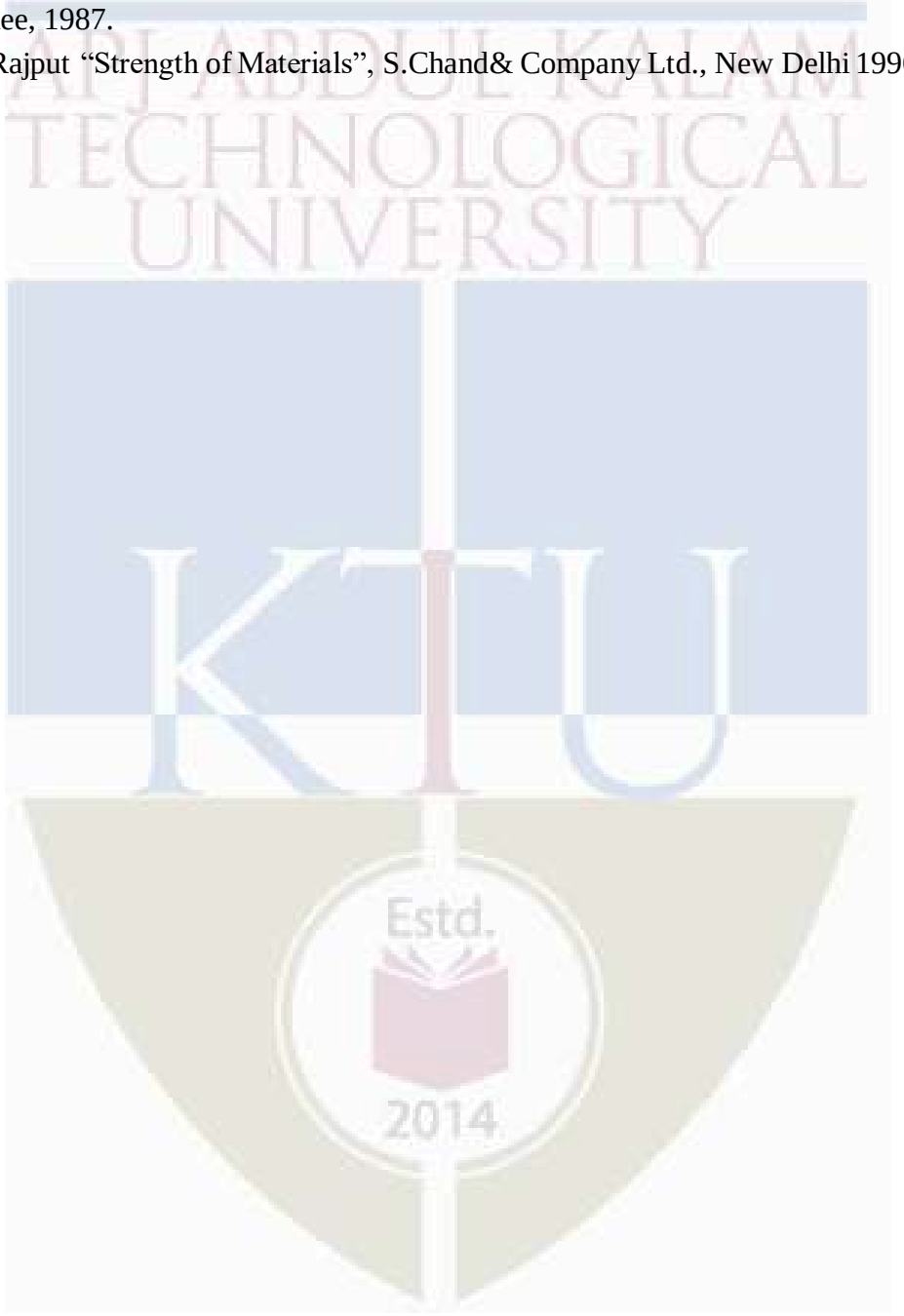
II	Indeterminate beams- Static and kinematic Indeterminacy – Force and displacement methods of analysis Force methods -Consistent deformation method – Analysis of fixed and propped cantilever (subjected to single concentrated load and full uniformly distributed load only) Analysis of continuous beams using Three moment theorem - Discussion on Support settlement case (Derivation not required)	CO2 CO3	10
FIRST INTERNAL TEST			
III	Displacement method – Slope deflection method- Analysis of beams and frames without sway (subjected to single concentrated load and full uniformly distributed load only) - Settlement case not required	CO4	9
IV	Displacement method – Moment distribution method- Analysis of beams and frames without sway (subjected to single concentrated load and full uniformly distributed load only) - Settlement case not required	CO4	9
SECOND INTERNAL TEST			
V	Arches - Analysis of three hinged arches – Parabolic and segmental arches with supports at same level only Cables – General cable theorem – Cables under concentrated load and uniformly distributed load – Anchor cables	CO5	8
END SEMESTER EXAMINATION			

Text Books

- Junnarkar S. B. and H. J. Shah, Mechanics of Structures, Vol – II, Charotar Publishing House Pvt. Ltd., 2017.
- Punmia B. C., A. K. Jain and A. K Jain, Theory of Structures (SMTS- II), Laxmi Publications Pvt. Ltd., 2017.
- Ramamrutham S. and R. Narayan, Theory of Structures, Dhanpat Rai Publishing Company Ltd., 2020
- H. J. Shah, and Junnarkar S. B., Mechanics of Structures (Vol. I), 30/e, Charotar Publishing House Pvt. Ltd., New Delhi, 2017
- M.M. Ratwani, S. K. Duggal & V.N. Vazirani, Analysis of Structures, Vol. 1, Khanna Publishers – Delhi, 1987

References Books:

- Devdas Menon, Structural analysis, Alpha Science International Ltd
- Timoshenko, S.P. and D.H. Young, Elements of Strength of Materials, Fifth edition, East West Press, 1993.
- A.R. Jain and B.K.Jain, Theory and analysis of structures, Vol. 1, Nemchand andBros, Roorkee, 1987.
- R.K. Rajput "Strength of Materials", S.Chand& Company Ltd., New Delhi 1996



	Model Question Paper	Total Pages: 3
Reg. No.:	Name:	

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B. ARCH. DEGREE EXAMINATION, MONTH AND YEAR

Course Code: AET 201

Course Name: THEORY OF STRUCTURES - III

Max. Marks: 60		Duration: 3 Hours

PART A

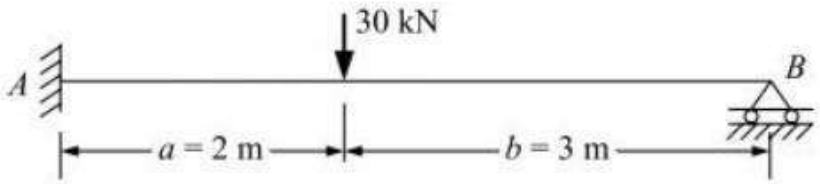
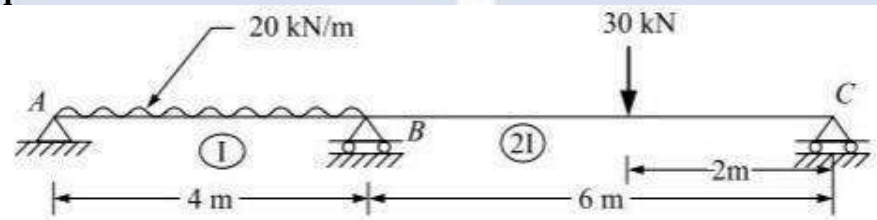
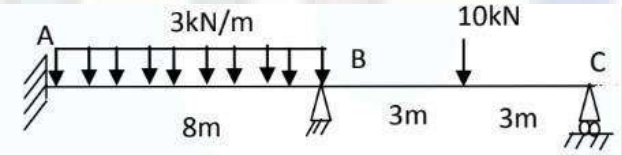
		Answer all questions, each question carries 4 marks	Marks
1		State Moment area theorems I and II.	(4)
2		Distinguish between static indeterminacy and kinematic indeterminacy. Also determine the static indeterminacy of a propped cantilever beam.	(4)
3		Explain displacement method of structural analysis. List out any two displacement methods of analysis.	(4)
4		Define the terms. (i) Stiffness (ii) Carryover factor (iii) Carryover moment (iv) Distribution factor	(4)
5		Prove that parabolic shape is a funicular shape for a three hinged arch subjected to a uniformly distributed load over to its entire span.	(4)

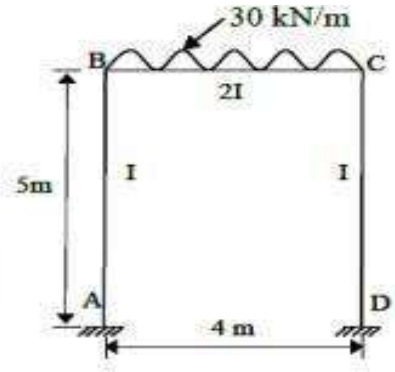
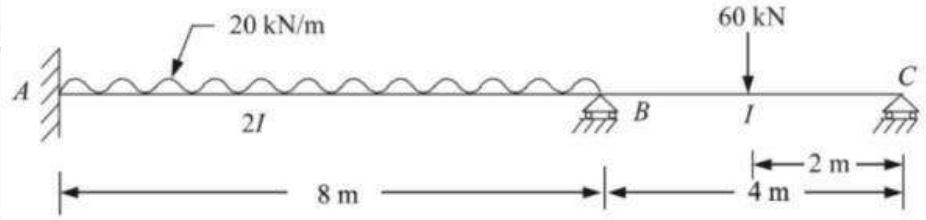
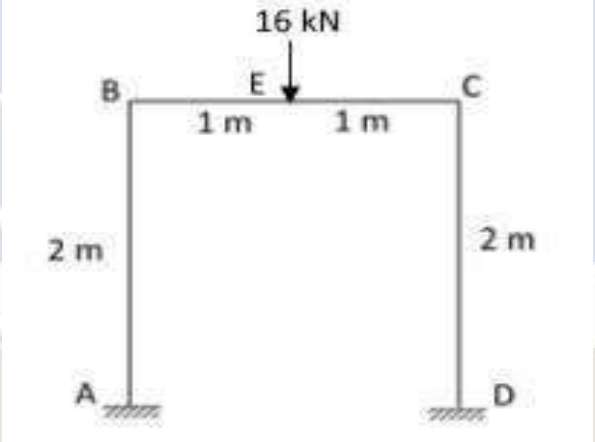
PART B

Answer any one question from each module, each carries 8 marks

MODULE 1

6		A cantilever beam of 2m long carries a load of 15kN at a distance of 1m from the fixed end and a load of 10kN at the free end. Determine the deflection at the free end. Use ***Conjugate beam method***.	(8)
7		A simply supported beam 5m long carries concentrated loads of 10kN each at points 1m from the ends. Calculate the maximum slope and deflection of the beam. Take EI= 1.2 x 10^4 kNm^2. Use ***Moment area***	(8)

		method.	
		MODULE 2	
8		Determine the reaction components of a propped cantilever beam shown in Figure 1. Use ***consistent deformation method.***  **Figure 1**	(8)
9		Analyse the continuous beam shown in Figure 2 by **three moment equation.**  **Figure 2**	(8)
		MODULE 3	
10		Using slope deflection method, analyse the continuous beam shown in Figure 3 and draw BMD  **Figure 3**	(8)

11		Analyse the rigid frame shown in Figure 4 by slope deflection method and draw bending moment diagram.  **Figure 4**	(8)
		MODULE 4	
12		Analyse the continuous beam shown in **Figure 5** by **moment distribution method** and draw BMD and SFD.  **Figure 5**	(8)
13		Analyse the rigid frame shown in Figure 6 by moment distribution method and draw bending moment diagram. EI is same for all the members.  **Figure 6**	(8)
		MODULE 5	

14		A three hinged parabolic arch hinged at the supports and at the crown has a span of 24m and a central rise of 4m. It carries a concentrated load of 50 kN at 18m from left support and a uniformly distributed load of 30kN/m over the left –half portion. Determine the moment, thrust and radial shear at a section 6m from the left support.	(8)
15		A Cable of span 120m and dip 10m carries load of 6kN/m of horizontal span. Determine the maximum tension in the cable and the inclination of the cable at the support. Find the forces transmitted to the supporting pier if the cable passes over smooth pulleys on top of the pier. The anchor cable is at 30° to the horizontal. Determine the maximum bending moment for the pier if the height of the pier is 15m.	(8)
		**********	

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET203	BUILDING SERVICES I- (WATER SUPPLY, PLUMBING AND SANITATION)	2-0-1-0	3	2021

Course objectives: The course is to develop an understanding of fundamentals of water supply, wastewater management and solid waste management in buildings.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To identify and evaluate the basic elements of water supply	Understanding, Analyzing and evaluating
CO2	To analyse the various stages of water supply within buildings	Understanding and analyzing
CO3	To acquire the ability to apply basic principles of sanitation in buildings and carryout documentation	Understand and applying
CO4	To understand the various elements of wastewater transport and treatment and to design treatment unit for isolated buildings	Understand, Analyzing and Applying
CO5	To appreciate the importance of solid waste management in houses and suggest suitable solution	Understand and Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks

Continuous assessment tests (2 numbers) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

Introduction to water sources – water demand and factors affecting demand – characteristics - water supply – building sanitation – wastewater management – sewage and sewage treatment – plumbing systems – layout and documentation – solid waste management

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Water** Sources of water / hydrological cycle – Per capita demand –Types of water demand and factors effecting demand and consumption – population forecasting – Drinking water standards – physical and chemical characteristics of water, Flowchart of a centralized water treatment system (brief description only) -Water supply systems (Gravitational, pumping, combined) - Water distribution networks	CO1	10
II	**Water supply in buildings** House/service connection, upfeed and downfeed systems, capacity of over head tanks and calculation of water consumption. Domestic water piping systems: Cold and hot water distribution within the building. Plumbing fittings - valves, taps and other fittings for water supply and conveyance	CO2	10
FIRST INTERNAL EXAMINATION			

III	**Wastewater and wastewater treatment** Wastewater characteristics - Sanitation: Basic principles of sanitation from buildings – Plumbing systems in buildings (4 types) – Sanitary fittings – Wash basin, bath tub, water closets etc. – Types of traps Design of sanitary plumbing system – General principles, design considerations, Model bye laws regarding sanitation of buildings - Preliminary data for design in individual buildings, plumbing layout in residential - documentation	CO3	10
IV	**Sewers and wastewater treatment system** Disposal of sewage from isolated buildings (septic tank, soak pit), Design of septic tank and soak pit Sewers and types of sewers - sewer systems (separate, combined, partially combined) –Self cleaning velocity - Sewer appurtenances: Manholes, Sub drains, culverts, ditches and gutters, drop inlets and catch basins, storm overflow/regulators. Flowchart of a centralised waste water treatment system (brief description only)	CO4	10
SECOND INTERNAL EXAMINATION			
V	**Solid waste management** Solid waste management – Source based classification of solid waste – factors affecting generation – 3R concept – Decentralised solid waste management systems - Composting, Vermicomposting, Bio gas systems.	CO5	5
END SEMESTER EXAMINATION			

Text Books:

- B.C Punmia, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., 2016
- B.C Punmia , "Waste Water Engineering", Laxmi Publications Pvt. Ltd, 2012
- S.K.Garg, "Water Supply Engineering", Khanna Publishers. 2010
- S.K. Garg,, Environmental Engineering, Vol. II, Khanna Publications, New Delhi, 2009.
- P.N. Modi, Sewage Treatment and Disposal and Wastewater Engineering, Standard Book House, New Delhi, 2008
- George Tchobanoglous, Frank Kreith et al "Hand book of solid waste

management." Mc Graw hill publications –New York

- Relevant BIS Codes, CPHEEO Manuals, KMBR, National Building Code

Reference Books

- Metcalf and Eddy, Wastewater Engineering Treatment, Disposal and Reuse, Tata McGraw Hill, 2007.
- G. Kiely., Environmental Engineering, McGraw Hill, McGraw Hill, 2009.
- Mark J. Hammer and Mark J. Hammer Jr., Water and Waste Water Technology, Prentice Hall of India Pvt. Ltd. New Delhi, 2009.

Course materials, Guidance and Evaluation methods

- Contents learnt can be applied to a design problem.

	MODEL QUESTION PAPER	Total Pages: 02
Reg No.:_____	Name:_____	

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B. ARCH. DEGREE EXAMINATION (2021 Scheme),
MONTH YEAR

Course Code: AET203

Course Name: BUILDING SERVICES I- (WATER SUPPLY, PLUMBING AND SANITATION)

Max. Marks: 60 Duration: 3 Hours

PART A

		Answer all questions, each carries 4 marks.	Marks
1		Define per capita demand. What is its significance?	4
2		List any five factors to be considered while providing hot water supply in a building	4
3		Differentiate between BOD and COD	4
4		Define (a) Sewerage (b) Self-cleansing velocity.	4
5		What are the typical components of solid waste generated in a country like India?	4

PART B

Answer any one full question from each module, each full question carries 8 marks.

MODULE 1

6	a	Write a brief note on any 2 physical characteristics of drinking water and state the standard limits as per Indian Standard Code	4
	b	What will be the population of a city in the year 2041 by Geometrical Increase Method, if the census data is as follows:	4

Year	1980	1990	2000	2010	2020
Population	83330	93300	117500	140000	156600

7		What are the different water distribution networks? Explain with illustrations	8

MODULE 2

8		Draw the sketch of a house service connection and mark the parts. Explain the function of each unit.	8
9		Differentiate between upfeed and downfeed systems of water supply	8

MODULE 3

10		Write ten important principles to be followed while designing a sanitary	8

		drainage system	
11	a	What is a trap? What is its significance in house drainage systems?	2
	b	Differentiate between one pipe system and two pipe system with suitable sketches.	6
		MODULE 4	
12		Design a septic tank-soak pit system for a population of 150 people. Assume necessary data	8
13		What is the role of Manholes in sewage systems? Explain each type of manhole and its purpose in detail	8
		MODULE 5	
14		What are the major factors that affect solid waste generation? Identify the major types of solid wastes generated in your institution	8
15		Explain the process of aerobic and anaerobic composting based on one typical method each as example	8
		****	

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARD201	ARCHITECTURAL DESIGN - II	0-0-8-2	10	2021

Course Objectives: To study about the spatial relationships and organization, form and space in the built environment. By the end of the course students should develop a sense of structure and enclosure along with application of concept like accessibility for differently abled and elderly in design of built environment. To enable students to understand the processes involved in the transformation of space into place as well as to involve students in design process through analysis of factors like context, site, environmental conditions.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribedlearning level
CO-1	To get a basic understanding of standards, concepts in design of built environment and get familiarized with individual activity space, group activity space.	Understanding
CO-2	Application of knowledge to initiate architectural design process by using space standards and environmental aspects to formulate concepts and design.	Applying
CO-3	Analysis and inference through data collection, case studies of projects related to the design project and developing skills so as to create a design programme	Analysing and evaluating
CO-4	To involve students in a design project that includes design of a built space integrating site planning aspects, needs of differently abled and elderly and also climate responsive elements.	Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester Jury examination marks	End semester Jury examination duration
100	50	50	2-3 days

Continuous internal evaluation pattern:

Attendance : 5 Marks

DesignAssignments/Reviews/Tests/CAD Assignments : 45Marks

Syllabus:

To understand the needs of the elderly and differently-abled, and to design accessible built environment. Study of accessibility needs in context of built environment for diverse user typologies, Design of a public building and outdoor space based on the consideration of the context. Integration of climate factors and site planning into design.Introduction to 2D drafting in CAD software. Development of design programme and concept development and detail drawings

Course Plan:

Module	Topic	Course outcome	No. of hours
I	**Concept of Universal Design for the Built Environment** Study of Accessibility needs in context of built environment for diverse user typologies, anthropometric and spatial allowances for differently abled. Exercises relating to detailing of ramps, steps, handrails, circulation spaces etc for elderly and differently abled.	CO-1, CO-2	30
II	**Introduction to 2D drafting in CAD software** Computer aided design tools, drawing lines and shapes, modifying lines and shapes, text styles and sizes, hatches and dashed lines. Stencils and blocks, advanced editing tools, and dimensioning drawings. Drawings of plans, sections of simple single unit room using CAD tools.	CO-1	30

FIRST INTERNAL TEST			
III	**Application of Universal design** Design and detailing of a built space based on an understanding of factors (contextual) influencing the design of built environment. Needs of differently abled and elderly to be incorporated in design and detailing. *Scale/Complexity:* Projects involving multi-room, single use, single floor and small span projects *Typology/Project:* Clinic, art gallery, crèche, cafeteria, cottage etc	CO-1, CO-2, CO-3, CO-4	30
IV	**Integration of climate factors and site planning into design:** Introduction to site planning. Interpretation of site information as a decision making aid and to design the buildings suitable to climatic conditions Design of a public building and outdoor space based on the consideration of the context. Understanding usage of locally available materials and appropriate construction techniques, in addition to thermal comfort, circulation pattern, furniture arrangement, texture, colour etc. in the built environment. *Scale/Complexity:* Multi use, multifloor, multifunctional spaces with interconnection between spaces, etc. *Typology/Project:* Nursery school, Health club, Restaurant, library, bank, post office, etc- emphasizing on site planning, spatial relationships and organization	CO-2, CO-3, CO-4	30
SECOND INTERNAL TEST			
V	Use of standards, handling of space, and application of knowledge gained from other subjects related to design. Study & analysis of various user types & their activities in public buildings. Development of design programme; Concept & detailed design drawings	CO-2, CO-3, CO-4	30
END SEMESTER EXAMINATION/ JURY			

Reference Books

- Arthur L. Guptill and Susan E. Meyer, 'Rendering in Pen and Ink', Watson-Guptill, 1997
- Francis D. K. Ching, 'Architectural Graphics', Wiley, 2009.
- Francis D. K. Ching, 'Architecture: Form, Space and Order', John Wiley & Sons, 2007.
- Geoffrey Broadbent `Design in Architecture' John Wiley and Sons, 1973.
- Neuferts' Architect's Data
- Simon Unwin, 'Analysing Architecture', Routledge, 2003
- Prak, N. L, 'The Language of Architecture: A contribution to architectural theory'. Hague: Mouton & Co, 1968.
- 'Harmonised Guidelines and Space Standards for Barrier-Free Built Environment for persons with Disability and Elderly Persons' 2016, Ministry of Urban Development, Government of India
- Preiser, W. 'Towards universal design evaluation. New York', McGraw-Hill, 2001.
- Seidle, J. 'Barrier-free design.' 1st Ed. New York : Routledge,1996.
- Story, M. F., Mueller, J. L. and Mace, R. L 'The universal design file: Designing for people of all ages and abilities, North Carolina State University Press, 1998.
- Aouad.G, 'Computer Aided Design Guide for Architecture, Engineering and Construction', Taylor & Francis Publication, 2011

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS201	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES III	1-0-0-2	3	2021

Course objectives:

The goal of this course is to expose the students to elementary building materials and their applications. It aims to familiarize students to contemporary as well as vernacular and traditional building materials. It will also introduce students to prevailing & relevant BIS specifications. After this course, the students will be able to recognize materials in the market and use them in their design visualization.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify the relevant BIS specifications.	Remembering
CO2	Identify appropriate foundations for various construction needs.	Understanding
CO3	Work with various building materials in the construction yard and understand their behaviour.	Applying
CO4	Use the various building materials in their design processes appropriately	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance : 5 Marks
Continuous assessment tests (2 nos.) :15 Marks
Portfolio presentation (15) / drawings(15) : 30 Marks

End semester examination pattern:

There will be three parts; Part A, B and C. Part A will contain 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions. Part B will contain 2 questions from each module, of which the student should answer any one. Each question carries 4 marks. Part C will have two drawing questions, from any two different drawing-based modules, of which the student should answer any one. The question carries 15 marks.

Syllabus

Foundations: General- Types of foundations. Soil- Bearing capacity of soil. Shallow Foundations: Types of shallow foundatins. Deep foundations: Types of pile foundations-Caissons. Iron: Different forms of Iron- its uses in building constructions- Steel: properties-types of steels-its uses in construction. Aluminium: its uses in building constructions. Market forms of steel and aluminium. Door&Windows: Doors- Types of Doors. Windows- Types of windows.

Course plan

Module	Topic	Course outcome	No. of hours
I	**FOUNDATIONS: GENERAL** Introduction to Foundations – definition, function, types – selection criteria – bearing capacity of soil – methods of testing – settlement of foundations, excavation and timbering of foundation trenches, setting out foundation trenches. Various types of foundations – Wall Footing, Isolated Footing, Causes of failure of foundation and remedial use. *Exercise: Sketchesof various types of foundations & site visit*	CO1,CO2, CO3,CO4	**9**
II	**SHALLOW FOUNDATIONS** Depth of footings, strip footing, isolated footing or pad footing, eccentrically loaded footings, grillage foundations, combined footings, strap or cantilevered footing, raft foundations, foundations for black cotton soil, Footings at different levels: stepped footings. Adjacent footings, machine foundations. *Exercise: Drawings of various types of foundations &site visit*	CO1,CO2, CO3,CO4	**9**
FIRST INTERNAL TEST			
III	**DEEP FOUNDATION** Pile foundation: Bearing piles, friction piles – concrete, timber,	CO1,CO2, CO3,CO4	9

Module	Topic	Course outcome	No. of hours
	steel and composite piles. Cased and uncased cast in situ concrete piles, Bored piles, pressure piles and precast concrete piles. Screw piles & disk piles. Under reamed piles. Bored compaction piles. Sand piles. Sheet piles. Pile cap. Caissons: Box caissons, Open caissons & pneumatic caissons, Timbering and trenching of foundations *Exercise: Drawings of various types of Pile foundations. Site visits and case study of deep foundation constructionshall be done.*		
IV	**IRON, STEEL, ALUMINIUM** Iron: Forms of Iron used for building construction–Properties and uses - Cast iron, Wrought iron. Steel: Properties, uses, Anti corrosive measures, mechanical and heat treatment of steel, Forms of steel used for building construction: steel for reinforcement-Hot rolled bars, Cold rolled steel, TMT bars, Welded wire fabrics. Structural Steel, Stainless steel, Steel alloys, current developments. Aluminium in building construction: Properties, Advantages, Available Forms- Extrusion, casting, foil, powder & sheet - uses- finishes - anodizing, surface texture, colour coating & painting. Applications in buildings *Exercise: study of standard aluminium & steel products and profiles used for building construction.*	CO1,CO2, CO3,CO4	**9**
SECOND INTERNAL TEST			
V	**DOORS&WINDOWS** Door: Different types of doors and uses. Wooden doors, PVC doors, glass doors, Steel doors Solid doors, Flush doors, revolving doors, folding doors, sliding doors, swinging doors, collapsible doors. Windows: Aluminium, Steel & UPVC windows - French windows, bay windows - fixed, casement, sliding & pivoting windows *Drawings: Joinery details, Panelled door, battened door, glazed door, sliding door, folding door Aluminium and steel window.*	CO1,CO2, CO3,CO4	**9**
END SEMESTER EXAMINATION			

Text Book

- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005
- Dr.B.C Punmia , Building Construction.

Reference Books

- Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
- H Leslie Simmons, 'Construction – Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
- Relevant BIS codes.
- Rosen Harold J, Construction materials for Architecture, Krieger Pub Co, 1992
- Doran, David; Cather, Bob; Doran, D. K; Cather, R – Construction materials reference book, Routledge, 2013

Course No.	Course Name	L-T-S-P/D	B.Arch Credits	Year of introduction
AEL201	SURVEYING AND LEVELLING	1-0-0-1	2	2021

Course objectives : To understand various techniques of site surveying.

To learn the importance of site and its content in Building and Infrastructure Design

To bring about awareness of the role of surveying and levelling in architectural and planning projects..

To develop skills using surveying instruments including tapes, compass, levels, theodolites, and advanced measurement equipment such as total stations.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Describe the importance, objectives and principles of surveying and determination of area using chain/tape	Understanding and applying
CO2	Discuss the fundamental aspects of theodolite and compass survey and apply various triangulation techniques in surveying	Understanding and applying
CO3	Apply the principles of levelling to find the level difference between points in the field	Applying and analysing
CO4	Use of Plane Table as an instrument involved in surveying with respect to utility and precision.	Understanding and applying
CO5	Know the use of modern equipments like GPS, EDM, Total station in surveying and area calculations	Understanding and applying

Mark distribution:

Total marks	Continuous internal evaluation marks
100	100

Continuous internal evaluation pattern:

Attendance : 10 marks

Presentation/Demonstration (course work including tests) : 40 marks

- Internal tests (2 no.s) : 20 marks
- Assignments/ practicals:20 marks

Marks for record/ report : 25 marks
Final test & Viva : 25 marks

- Final test :20 marks
- Viva :5 marks

Syllabus

Introduction to surveying and relevance of surveying in architecture. Introduction to chain surveying. Compass survey and computation of bearings and angles. Introduction to theodolite surveying. Measurement of horizontal and vertical angle using theodolite. Principles of levelling and reduction of levels. Introduction to plane table survey. Different methods used for calculation of area. Introduction to modern surveying equipments.

Course plan

Module	Contents	Course Outcomes	No. of hours
I	Introduction: Importance and principles of Surveying. **Chain Surveying**:Types of chains and tapes, chaining and ranging, method of taking offsets. Chaining on sloping ground. Errors in chaining. **Calculation of area**: General methods of determining areas- by dividing the area into triangles. By offsets to base lines- average ordinate rule,trapezoidal rule and Simpsons rule **Practical: Computation of area using chain surveying**	CO1	7
II	**Compass Surveying:** Bearings and angles, computation of angles from bearings, designation of bearings. **Theodolite Surveying:** Theodolite, its temporary and permanent adjustment, measurement of horizontal & vertical angles. **Practical: Computation of height of a building using Theodolite**	CO2	6
FIRST INTERNAL EXAM (THEORY BASED)			
III	**Levelling:** Principles of leveling; Study of instruments – Dumpy level and leveling staff, Temporary and permanent adjustments of level, Booking and reduction of levels – 'line of collimation method' and 'rise and fall method'. Basic ideas on plotting of longitudinal and cross sections **Practical: Determination of elevation of points on ground by differential levelling**	CO3	7

IV	**Contouring:** Contour interval, Contour Maps characteristics, use and interpretation. **Plane Table surveying** – instruments and accessories, advantages and disadvantages of plane table surveying. methods – radiation, intersection, traversing, resection. **Practical:** • **Determination of elevation of points on ground by differential contouring** • **Plane table survey using radiation and intersection method**	CO4	5
SECOND INTERNAL EXAM (PRACTICAL BASED)			
V	**Introduction to modern surveying equipments:** Total Station, GPS, Distomat, Digital Levels and Auto-Levels Electromagnetic distance measurement (EDM) - Principle of EDM **Total Station** – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey. **Practical: Computation of height, distance and area using Total Station**	CO5	5
FINAL TEST (THEORY BASED) AND VIVA			

Text Books

- Punmia, B. C., Jain and Jain, A. K., Surveying (Vol. I and II), Laxmi Publications (P) Ltd., New Delhi, 16th Edition, 2016.
- Edward. T. Q. Site Analysis – Architectural Media, 1983
- John Ormsbee Simonds, Landscape Architecture, Fourth Edition: A Manual of Land Planning and Design
- Joseph De.Chiarra and Lee Coppleman - Planning Design Criteria - Van Nostrand
- Kanetkar and Kulkarni, 'Surveying and Levelling', Vol I, Pune VidyarthiGriha, 2008.

Reference Books:

- Duggal, S. K., Surveying (Vol. I and II), Tata Mc Graw Hill, 2015.
- N. Madhu, R. Sathikumar, SatheeshGopi, Advanced Surveying: Total Station, GIS and
- Remote Sensing, Pearson Education India Publishers2006
- Shahani P.B., 'Surveying and Levelling', Vol I and Vol II, Oxford and IBH Publishing Company, 1971.

SEMESTER IV

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART202	CLIMATE AND BUILT FORM II	2-0-0-2	4	2021

Course Objectives: To introduce students to climate responsive architecture and enable them to apply climate responsive design strategies in the design of built environment.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Apply climate responsive design strategies in the design of shelters for tropical climates	Applying
CO-2	Experiment with the factors affecting ventilation and daylighting	Applying
CO-3	Analyse the climate responsive design strategies used in the existing buildings of tropical climates	Analysing
CO-4	Summarise the need for energy simulation in architecture	Understanding

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Sun and design process, Ventilation and air movement, Daylighting, Application of climate responsive design – examples, Energy modelling.

Course Plan

Module	Topic	Course Outcome	No. of Hours
I	**Sun and design process** Solar geometry – sun path at different latitudes, Solar angles – altitude and azimuth angles, Solar chart, Designing for the sun – orientation, planning of the rooms Shading – types of shading devices, Shadow angles and design process of shading devices	CO1	11
II	**Ventilation and air movement** Ventilation and air movement, Functions of ventilation Wind and ventilation – factors affecting ventilation, Stack effect and ventilation, Induced ventilation – sun induced and wind induced ventilation **Exercises (Lab):** 1. Measurement of wind velocity and wind direction – study on the factors affecting ventilation in indoor spaces	CO2	16
FIRST INTERNAL TEST			
III	**Daylighting** Photometric quantities, Components of daylight entering a building Daylight factor and design sky concepts Daylighting in tropical climates – warm humid and hot dry climates **Exercises (Lab):** 1. Measurement of indoor illumination – study on the effects of opening positions and sizes, effects of shading devices	CO2	16
IV	**Application of climate responsive design - examples** Climate response in vernacular buildings – examples from tropical climates.	CO3	11

	Climate response in the vernacular architecture of Kerala. Case studies of climate responsive modern buildings from tropical climates		
SECOND INTERNAL TEST			
V	**Energy Modeling** Introduction to energy modeling. Advantages. Brief introduction to commonly used energy modelling softwares.	CO4	6
END SEMESTER EXAM			

Reference Books

- Koenisberger O. H., Ingersoll T. G., Mayhew A., Szokolay S. V., Manual of Tropical Housing and Building, Orient Blackswan, 1975.
- Givoni B., Man, Climate and Architecture, Elsevier Publishing Company Limited, 1969.
- Olgyay V., Design with Climate, Princeton University Press, 2015.
- Krishan A., et al., Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, Tata McGraw-Hill Education, 2001.
- Baker N., Steemers K,. Daylight Design of Buildings: A Handbook for Architects and Engineers, Routledge, 2014.

Course materials, Guidance and Evaluation methods

- Lab exercises should be utilised for creating in depth understanding of the related topics.
- Students should be made aware of the practical Architectural applications of each topic.

	Model Question Paper	Total Pages: 02
Reg. No.:	Name:	

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B. ARCH. DEGREE EXAMINATION, MONTH AND YEAR

Course Code: ART 202

Course Name: CLIMATE AND BUILT FORM II

Max. Marks: 60		Duration: 3 Hours

PART A

		Write short note on all questions, each question carries 4 marks	Marks
1		What are solar altitude and azimuth angles?	(4)
2		Explain the functions of ventilation.	(4)
3		Differentiate between illumination and luminous intensity.	(4)
4		How a courtyard regulates thermal comfort in traditional architecture of Kerala?	(4)
5		What is energy modeling?	(4)

PART B

Answer any one question from each module, each carries 8 marks.

MODULE 1

6		Explain how solar geometry affects the design of buildings in different latitudes. What are the passive solar design strategies to be considered for buildings in tropical climates?	(8)
7		What are the different types of shading devices? Describe how each type can be used in the design of buildings.	(8)

		MODULE 2	
8		What are the factors affecting air movement in and around buildings? Explain in detail.	(8)
9		What is induced ventilation? Explain the methods to induce ventilation in buildings	(8)
		MODULE 3	
10		Explain the components of daylight entering a building. Explain daylight factor concept	(8)
11		Elaborate on the daylighting strategies for warm humid and hot dry climates.	(8)
		MODULE 4	
12		Explain passive design strategies used in the vernacular architecture of Kerala for providing thermal comfort.	(8)
13		"Vernacular buildings were successful in responding to the climate of their location". Substantiate the statement using any two examples of vernacular architecture.	(8)
		MODULE 5	
14		Explain briefly the benefits of energy modelling software in assessing climatic performance of a building.	(8)
15		Describe in detail about any two software commonly used for building energy modeling.	(8)

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Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART204	HISTORY OF ARCHITECTURE AND CULTURE- III	3-0-0-0	3	2021

Course Objectives: The course traces the development of architecture across Asia, Europe and Africa during 10th to 19th centuries. Architectural development is to be understood as an outcome of socio-political, economic and religious influences. Focus is given to Islamic Architecture, Mughal Architecture and provincial variations of Islamic architecture in India. Special reference is to be given to important religious and secular architecture in Kerala, and the architectural elements of Traditional Kerala buildings.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Islamic architecture and its features, typologies	Understanding
CO-2	Important Islamic buildings in India and provincial variations	Analysing
CO-3	Mughal Architecture in India	Understanding
CO-4	Religious Architecture in Kerala	Understanding
CO-5	Secular and traditional Architectural elements of Kerala	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20

marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Pre Islamic Architecture of Persia and Iran, Islamic Architecture in India and abroad, Imperial Style, Oriental Architecture, Mughal Architecture, Regional styles, Religious and Secular Architecture in Kerala, Elements of traditional Kerala Architecture

Course Plan

Module	Topic	Course outcome	No. of hours
I	Rise of Islam in Arabia- Structure of typical mosque- Ummayyad Mosque, Damascus- Great Mosque of Cordoba. Muqaranas, Madrasas. Palace of Alhambra. Ottoman Architecture- Topkapi palace.	CO1	6
II	Islam in India- Salient features of Mosques- QutbMinar. Quwwat-ul-Islam mosque complex. Architectural developments during Imperial Era- Alai Darwaza- Tomb of Tughlaq. Khirki Masjid- Sheesh Gumbaz- Purana Kila Provincial styles- Gujarat, Bengal, Bijapur and Hyderabad with significant examples. Stepwells- vav typology.	CO2	12
FIRST INTERNAL TEST			
III	Mughal Architecture- Humayun's Tomb, BulandDarwaza, Fatehpur Sikhri- layout and buildings, Taj Mahal, Red Fort- planning and design. Mughal landscape with special reference to Shalimar Bagh.	CO3	9
IV	Religious architecture of Kerala- Vadakkunnathan temple, Sree Padmanabhaswamy temple. Indigenous church Architecture of Kerala -St Mary's Orthodox church, Kallooppara, Basilica of St. Mary, Champakkulam, Our Lady of Life, Mattanchery, Synagogue in Mattanchery, Juma Masjid at Thazhathangady, Cheraman mosque.	CO4	9
SECOND INTERNAL TEST			
V	Secular- Padmanabhapuram Palace, Krishnapuram palace. Cultural- Koothambalam at Vadakkunnathan Temple complex. Documentation and drawing of features of traditional Kerala architecture- roof forms, joinery- study of proportions, materials and landscape in traditional Kerala architecture as observed during	CO5	9

	documentation.		
END SEMESTER EXAM			

Text Books:

- A Global History of Architecture/ Francis. D. K. Ching, Mark Jarzombek, Vikramaditya Prakash. Published by John Wiley and sons, Third edition 2017
- A History of Architecture: Settings and Rituals/ Spiro Kostoff. Revisions by Greg Castilo. Published by Oxford University Press, 1985, 1995
- Sir Banister Fletcher, "A History of Architecture", CBS Publications (Indian Edition), 1999.
- Brown, Percy. (1975). Indian architecture (Islamic period). Bombay : D.B. Taraporevala
- Shokoohy, Mehrdad. 2013. Muslim Architecture of South India: The Sultanate of Ma'bar and the Traditions of Maritime Settlers on the Malabar and Coromandel Coasts (Tamil Nadu, Kerala and Goa). London and New York: Routledge.
- Thampuran, Ashalatha. 2001. Traditional Architectural forms of Malabar Coast. Calicut: Vastuvidyapratisthanam Academic Centre.
- Zeiphudin, P.A; and Krishnakumar, K.G. 2012. Ponnanni Ponvahini Ponnanayam. Journal of Kerala Local Historians, 1: 1-30.

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Faculty to act as facilitator and guide rather than one way lecturing.
- Book Reviews are to be part of assignments.
- Students are to be encouraged to watch movies and documentaries which give information about culture and architecture and prepare reviews/ reports and have discussions in class.
- As far as possible the students are to be encouraged to visit the architectural monuments in their vicinity and prepare reports and sketches, regardless of whether they are part of the syllabus.
- At the end of the course, each student has to prepare a short video on any of the topics in the syllabus.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

	Question Paper Pattern	Total Pages: XX
Reg. No.:	Name:	

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B. ARCH. DEGREE EXAMINATION, MONTH AND YEAR

Course Code: ART 204

Course Name: HISTORY OF ARCHITECTURE AND CULTURE- III

Max. Marks: 60		Duration: 3 Hours

Answer to the point. Illustrations carry due marks

PART A

		Write short note on all questions, each question carries 4 marks	Marks
1		Define Muqarna	(4)
2		Sketch and explain the features of Alai Darwaza	(4)
3		Write briefly about the landscaping in Shalimar Bagh	(4)
4		Sketch and briefly explain the history of Kallooppara St Mary's Orthodox church	(4)
5		Sketch and mark the essential structural members of a Kerala traditional sloping timber and MP tile roof	(4)

PART B

Answer any one question from each module, each carries 8 marks. To be answered in maximum of 2 pages and supporting sketches.

MODULE 1

6		Sketch the structure of a typical mosque and explain the features	(8)
7		Give a detailed description of Cathedral-Mosque of Cordoba along with sketches.	(8)

		MODULE 2	
8		Explain the architectural features of Qutb Minar Complex in Delhi	(8)
9		Explain the provincial architectural style of Bijapur with sketches.	(8)
		MODULE 3	
10		Explain the planning and design of Agra Fort	(8)
11		Write a note on Humayun's Tomb. Illustrate with sketches.	(8)
		MODULE 4	
12		Explain the architectural features of Vadakkumnathan temple. Illustrate with sketches.	(8)
13		Sketch and write a note on Juma masjid, Thazhathangady	(8)
		MODULE 5	
14		Sketch and describe any two architectural features of traditional Kerala architecture?	(8)
15		Sketch the plan of Padmanabhapuram palace complex and mark the important buildings within.	(8)

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Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET202	THEORY OF STRUCTURES-IV	2-1-0-0	3	2021

Course Objectives: This course provides fundamental concept of reinforced concrete and its design. It enables the students to design and detail reinforced concrete structural elements such as beam, slab, column, and footing. The course also trains the students to use the code of practice of reinforced concrete design, IS 456: 2000.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Comprehend the design philosophy of Limit state method.	Understanding
CO - 2	Recall the structural behaviour of elements subjected to flexure and compression	Remembering
CO - 3	Analyse the reinforced concrete elements such as beam, slab, column and footing subjected to dead and live loads to determine BM, SF, AF, and deflection	Applying
CO - 4	Applying the principles of limit state method to design the reinforced concrete elements such as beam, slab, column and footing subjected to dead and live loads following IS 456 and SP 16.	Applying
CO - 5	Preparation of structural drawings of the designed reinforced concrete elements such as beam, slab, column and footing following SP 34	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

Introduction to plain and reinforced concrete – Design loads and load combinations - Design philosophy of Limit state method – Limit state of collapse and Limit state of serviceability - Analysis and design of singly and doubly reinforced beams by limit state method, Check for deflection. Detailing - Concept of T-Beams and L – beams.

Slabs – Classification- Load distribution and structural action of one way and two way slabs - Design of One Way slab – Detailing - Design of two way slab with corners free to lift up and corners held down condition - Detailing

Columns - Classification- Effective length - Limit state of collapse: Compression - Design of short column subjected to axial loads. Detailing - Column interaction curves. Design of short columns subjected to combined axial load and uniaxial bending [Using SP 16 Charts]. Detailing

Footings-Types of footings. Design of isolated footings of Square and Rectangular shapes subjected to axial compressive loads- Detailing Stair case – Structural action of stairs spanning longitudinally and transversely (Concept only)

Course Plan

Module	Topic	Course Outcome	No. of hours
I	Introduction- Plain and reinforced cement concrete – Design loads and load combinations - Design philosophy of Limit state method – Limit state of collapse and Limit state of serviceability - Analysis and design of singly reinforced beams by limit state method, Check for deflection**.** Detailing	CO1 CO2 CO3 CO4 CO5	10
II	Analysis and Design of Doubly reinforced beams by limit state method- Check for deflection - detailing T-Beams and L - beams (Concept only)	CO2 CO3 CO4 CO5	9
FIRST INTERNAL TEST			
III	Slabs – Classification- Load distribution and structural action of one way and two way slabs - Design of One Way slab – Detailing Design of two way slab with corners free to lift up and corners held down condition - Detailing	CO2 CO3 CO4 CO5	9

IV	Columns - Classification- Effective length Limit state of collapse: Compression Design of short column subjected to axial loads. Detailing Column interaction curves. Design of short columns subjected to combined axial load and uniaxial bending [Using SP 16 Charts]. Detailing	CO2 CO3 CO4 CO5	8
SECOND INTERNAL TEST			
V	Footings-Types of footings. Design of isolated footings- Square and Rectangular shapes only - Subjected to Axial compressive loads alone.- Detailing Stair case – Structural action of stairs spanning longitudinally and transversely (Concept only)	CO2 CO3 CO4 CO5	9
END SEMESTER EXAM			

Text Books:

- Unnikrishnan Pillai and Devadas Menon, Reinforced Concrete Design,Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1999
- M. L. Gambhir, Fundamentals of reinforced concrete design, Prentice Hall India Learning Private Limited, 2006
- M. L. Gambhir, Design of reinforced concrete structures, Prentice Hall India Learning Private Limited, 2008

References Books:

- R. Park and T. Paulay, Reinforced concrete structures, Wiely, 1975
- P. C. Varghese, Limit state design of reinforced concrete, Prentice Hall India Learning Private Limited, 2008
- S.N. Sinha, Reinforced Concrete Design – Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1998.
- P.Dayaratnam, Design of Reinforced Concrete Structures, Oxford and IBH Publishing Co., 1983.
- C. Sinha and S.K. Roy, Fundamentals of Reinforced Concrete, S.Chand& Co., New Delhi, 1983.
- B.C. Punmia, Reinforced Concrete Structures, Vol, 1 & 2 Laxmi publications, Delhi, 1994.

Standards:

- IS 456:2000, Indian Standard, Plain and Reinforced Concrete – Code of Practice, Bureau of Indian Standards.
- SP -16 Design Aids for reinforced concrete to IS 456, Code of Practice, Bureau of Indian Standards.
- SP 34 Handbook on concrete reinforcement and detailing, Code of Practice, Bureau of Indian Standards.

	Question Paper Pattern	Total Pages: XX

Reg. No.:	Name:

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B. ARCH. DEGREE EXAMINATION, MONTH AND YEAR

Course Code: AET202

Course Name: THEORY OF STRUCTURES IV

Max. Marks: 60		Duration: 3 Hours

Assume missing data, if any. Use of IS 456:2000 and charts from SP-16 are permitted. SP16 handbook is not permitted in the exam hall.

PART A

		Answer all questions, each question carries 4 marks	Marks
1		What are different types of shear reinforcement in beam?	(4)
2		Sketch the typical reinforcement detail in a T beam.	(4)
3		Why do we provide reinforcement in two directions in a one-way slab?	(4)
4		What are the purposes of lateral ties in a column?	(4)
5		Explain the terms vertical shear and punching shear in the design of footings. How will you calculate the nominal shear stress in both cases.	(4)

PART B

Answer any one question from each module, each carries 8 marks

MODULE 1

6		Design the shear reinforcement for a beam section of width 200 mm and effective depth 500 mm. The factored shear force is 100 kN and it is reinforced with 3 Nos 16 mm diameter bars on the tension side at the critical section. Use M20 concrete and Fe 415 steel.	(8)
7		Design a simply supported rectangular beam section to carry a superimposed load of 6 kN/m over a span of 5m. Assume a width of beam as 300mm. Use M20 concrete and Fe415 grade steel.	(8)

		MODULE 2	
8		A rectangular beam section is of width 230 mm and effective depth 400 mm. Find the steel required to resist a bending moment of 30 kNm. Use M20 concrete and Fe 415 steel.	(8)
9		Determine the ultimate moment of resistance of a doubly reinforced rectangular beam of width 300 mm and overall depth 600 mm reinforced with 3-32 mm diameter bars on tension side and 2-25 mm diameter bars on compression side. Assume effective cover on both sides as 50 mm. Use M20 concrete and Fe 250 steel.	(8)
		MODULE 3	
10		Design a one-way slab with 3.5 m clear span supported on 230 mm thick walls on all four sides. The edges are simply supported. The live load on the slab is $2kN/m^2$. Use M 20 concrete and Fe 415 steel.	(8)
11		Design a slab 3.5 m x 4 m clear in size supported on 250 mm thick walls on all four sides, and corners not held down. The live load on slab $2kN/m^2$. Use M 20 concrete and Fe 415 steel.	(8)
		MODULE 4	
12		Design a square column to carry a factored axial load of 1500 kN. Use M20 concrete and Fe415 steel. Draw a longitudinal section and a cross section showing the reinforcement.	(8)
13		Design a short circular column of diameter 50cm and length 3m to carry a factored load of 1200 kN and a factored moment of 120 kNm. Use M20 concrete and Fe 415 grade steel. Design the lateral reinforcement also.	(8)
		MODULE 5	
14		Design a square isolated footing for a column of size 450mmx450mm carrying a load of 1600 kN under service conditions. Safe bearing capacity of soil is $190\ kN/m^2$. Use M20 concrete and Fe 415 grade steel.	(8)
15		Draw a typical detailing for tread riser type stair to show all the reinforcement and mark all reinforcement with assumed values	(8)

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CourseNo.	Course Name	L-T-S-P/D	Credits	Year of Introduction
AET204	BUILDING SERVICES-II (ELECTRICAL, LIGHTING& ILLUMINATION)	2-0-0-1	3	2021

Course Objectives : To introduce students to electrical services and illumination and to sensitize them with respect to their integration into Architectural Design.

Course Outcomes: After the completion of this course, the student will be able to

Course Outcome	Description of Course Outcomes	Prescribed learning level
CO 1	Understand the concept of electrical systems	Remembering
CO 2	Acquire knowledge about protection of equipments, and need of earthing,	Understanding and analysing
CO 3	Acquire knowledge about household electrical appliances, various types of wiring systems, and design of electrical installation in domestic dwellings	Analysing and evaluating
CO 4	Understand the need for good illumination and knowledge of the various Electric light sources	Understanding and analysing
CO 5	Enable the students to design of interior and exterior lighting systems- illumination levels for various purposes light fittings- flood lighting- street lighting	Understanding and analysing

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks

Continuous assessment tests (2 numbers) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

Introduction, Basics of electricity, Electrical installations in buildings, protection equipments, Indian electricity rules,Electrical wiring design, Load calculation, Illumination and lighting, Lighting and electricalscheme.

CoursePlan

Module	Contents	Course outcomes	Hours
I	Basics of Electrical systems Introduction to electrical services, General awareness of IS codes- Introduction of IS 732, IS 5216, IS 2309 Classification of voltages, standards and specification, Single and three phase supply basics, Supply and distribution of electricity to buildings-Transformer basics, Substations-Types, Symbols used in electrical wiring drawing layouts **Exercises (Lab):** Demonstrate the precautionary steps adopted in case of electrical shock	**CO 1**	**8**
II	Electrical installations in buildings Main and distribution boards -Diagram Electric meter-basics, Panel board, MCB, RCCB,MCCB-working,uses,fuses-basics and types, Earthing for safety – Types-Pipe earthing, plate earthing, ISI specifications, Lightning protections **Exercises (Lab):** Identify different types of cables, wires, switches, fuses, MCB, RCCB and MCCB with ratings	**CO 2**	**9**
FIRST INTERNAL TEST			

	Introduction to Indian electricity rules. Electrical wiring design- Electrical wiring system in domestic and light commercial buildings- Conduits, types of wiring, UG cables-basics, Accessories (Switches and Outlets, switch boards), Basic household wiring components (eg: Ceiling rose)	B.Arch 2021	gulatio s
III	Electrical load calculations Exercise in load calculation. (Numerical based on problems up to sub circuit calculation only) for exams **Exercises (Lab):** Wiring of a power distribution arrangement using a single phase MCB distribution board with RCCB main switch and Energy Meter	**CO 3**	**10**
IV	Illumination and lighting Commonly used terms in illumination. Laws of illumination, Measurement of luminous flux and lux meter – Working Lighting systems for building Natural/ Artificial Direct/Indirect General/Local Light sources (Incandescent, Fluorescent, HID, HPS and LPS,LED-Comparison) and Luminaries Day lighting and day lighting factor. Energy efficient lighting, Alternative sources of lighting, Basic idea of solar panels and its installation Scope of ECBC-Lighting and controls, Electrical and renewable energy systems Introduction to GRIHA- Criterion 5(Energy efficiency) and 6 (Renewable Energy utilization) **Exercises (Lab):** 1. Experiments proving inverse square law of illumination using a light source . 2. Experiment using Lux meter . (Eg : Measurement of Illumination Indoors- Natural and artificial , Measurement & analysis of daylight factor at room level) 3. Market survey of different types of light sources & luminaries.	**CO 4**	**9**
SECOND INTERNAL TEST			

V	Lighting design and calculation Local/general lighting calculation-Lumen method Criteria and standards for different purpose/activity illumination-Residence, Office,Institution,Hospital and commercial display lighting. Outdoorlighting– Street Lighting –(Arrangement, Types), flood lighting(Sportsstadia)Swimming pool lighting and underwater luminaries. **Exercises (Lab):** 1. Preparationoflightingschemeasapartofassignment. 2. Market Survey of energy efficient lighting Systems.	**CO 5**	**9**
ENDSEMESTER EXAM			

References

- Aly.S.Dadras,Electrical systems for Architects, McGraw-Hill Inc.,US, 1995
- M K Giridharan, Electrical Systems Design Data Hand book, M/s I K International Publishers, New Delhi, 2011 (Data book approved for use in examination)
- H.Cotton,ElectricalTechnology, Sir Isaac Pitman & Sons, Ltd, 1922
- L.Uppal,Electrical wiring, Estimating and Costing, Khanna Publishers, 1987
- LightingManual
- MarcSchiler,Simplified design of building lighting, Wiley, 1997
- NationalElectricalCode
- Raina&Bhattacharya,ElectricalWiring,DesignandEstimation, New Age International Publishers, 1991
- https://www.youtube.com/watch?v=FhTPAuK7LQo(Reference for experiment proving inverse square law)

	Model Question Paper	Total Pages: 03
Reg. No.:	Name:	

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B. ARCH. DEGREE EXAMINATION, MONTH AND YEAR

Course Code: AET 204

Course Name: Building Services – II (ELECTRICAL, LIGHTING & ILLUMINATION)

Max. Marks: 60		Duration: 3 Hours

PART A

		Write short note on all questions, each question carries 4 marks	Marks
1		Classify the different types of transformers and explain the principle of operation.	(4)
2		Define MCB and outline the basic principles.	(4)
3		What are the General safety requirements under Indian Electricity Rules, 1956?	(4)
4		What are the criteria and standards to be followed in Residence lighting	(4)
5		Describe the design considerations for flood lighting	(4)

PART B

Answer any one question from each module, each carries 8 marks.

MODULE 1

6	a)	Construct a schematic diagram to demonstrate the fundamentals of electrical generation and distribution system.	(5)
	b)	Summarize the fundamentals of electrical fuses and mention the different types.	(3)
7	a)	Distinguish between a single-phase and three-phase ac system.	(4)

<table>
<tr><td></td><td>b)</td><td>What are the primary tools employed in substations.</td><td>(4)</td></tr>
<tr><td colspan="4">MODULE 2</td></tr>
<tr><td>8</td><td>a)</td><td>Illustrate how earthing is required in building electrical wiring.</td><td>(5)</td></tr>
<tr><td></td><td>b)</td><td>What aspects must be considered when supplying electricity to buildings.</td><td>(3)</td></tr>
<tr><td>9</td><td>a)</td><td>Distinguish between MCB & RCCB.</td><td>(3)</td></tr>
<tr><td></td><td>b)</td><td>Illustrate the principle of plate earthing in commercial building.</td><td>(5)</td></tr>
<tr><td colspan="4">MODULE 3</td></tr>
<tr><td>10</td><td>a)</td><td>Construct a diagram to illustrate the structure and operation of underground cables.</td><td>(5)</td></tr>
<tr><td></td><td>b)</td><td>Write short notes on conduit wiring system.</td><td>(3)</td></tr>
<tr><td>11</td><td></td><td>A residential building has the following electrical requirements.
<table>
<tr><th>Particulars</th><th>Light</th><th>Fan</th><th>Socket</th><th>Power socket</th></tr>
<tr><td>Verandah</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>Drawing hall</td><td>1</td><td>1</td><td>1</td><td>-</td></tr>
<tr><td>Bed room (2 no’s)</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>Restroom (2 no’s)</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>Kitchen</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td colspan="5">a. Choose a type of supply that will be provided.
b. Calculate the total connected load.
c. Calculate number of sub circuit required in residential building</td></tr>
</table></td><td>(8)</td></tr>
<tr><td colspan="4">MODULE 4</td></tr>
<tr><td>12</td><td></td><td>Explain GRIHA rating system – Objectives, Philosophy and Criteria.</td><td>(8)</td></tr>
</table>

13		A production area in a factory measures 60m x 24m. Find the number of lamps required if each lamp lumen output is 18000 lumen. The illumination required by the factory area is 200 lux. Utilization factor = 0.4, lamp maintenance factor = 0.75	(8)
		MODULE 5	
14	a)	Write notes on swimming pool lighting.	(4)
	b)	Briefly explain the general principles of street lighting	(4)
15	a)	Mention the features of underwater luminaries	(4)
	b)	Write note on energy efficient lighting system	(4)

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Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARD202	ARCHITECTURAL DESIGN-III	0-0-8-2	10	2021

Course Objectives: To enable the students to get introduced to issues related with the design of human habitat, its components and space standards. To understand residential spaces in a specific context, relationship between human behaviour and space through site visits and studio exercises. To explore volume of space, shape, form, function, climatic consideration and material sensitivity through design exercise, and to understand the needs of privacy, communal spaces, efficiency of open spaces and ideas of extended living areas. The objective will be on understanding residential spaces in both the urban and traditional contexts.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Understand and identify different residential typologies and how they relate to spatial use and experience	Understanding
CO-2	Application of knowledge to initiate architectural design process by using space standards and environmental aspects to formulate concepts and design. Visualize design concepts and make simple and complex 3D objects	Applying
CO-3	Analysis and inference through data collection, case studies of projects related to the design project and developing skills so as to create a design programme	Analysing and evaluating
CO-4	To generate design in through conscious consideration of human scale, environmental conditions, material and form	Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester Jury examination marks	End semester Jury examination duration
100	50	50	2-3 days

Continuous internal evaluation pattern:

Attendance : 5 Marks

Design Assignments/Reviews/Tests/CAD Assignments : 45 Marks

Syllabus:

Study based on residential typologies, Consideration of climate and site contours in design development process. Study on usage of local materials, Concept development and design of a building with residential use. Introduction to 3D Modelling and Rendering.

Course Plan:

Module	Topic	Course outcome	No. of hours
I	Study based on residential typologies. Exercises relating personal experiences to behavioural needs and translating them into architectural program requirements Consideration of climate and site contours in design development process. Study on usage of local materials and innovative construction techniques.	CO-1, CO-2, CO-3	30
II	**Introduction to 3D-modelling technique in CAD** 3D basics, 3D Object Modification, 3D Boolean operations, 3D primitive objects. Introduction to 3D Modelling and Rendering, Building Modelling and basic rendering techniques, Drawings of 3D models of buildings using CAD tools.	CO-2	30

FIRST INTERNAL TEST			
III	*Design of built environment for residential use in the immediate or observable environment with a focus on program and use.* Introduction to the initial design parameters which include choice of Geography/situation (context), User Group/development model, and Development guidelines (bylaws).	CO-1, CO-3	30
IV	. Space Standards and building codes for residential typologies. Data Collection, Case studies, Site studies, Analysis and Inferences	CO-1, CO-3	30
SECOND INTERNAL TEST			
V	Concept development, Design development/ Form Development Detailed drawings, Detailing of architectural features	CO-4	30
END SEMESTER EXAMINATION/ JURY			

Reference Books

- Francis D. K. Ching, 'Architecture: Form, Space and Order', John Wiley & Sons, 2007.
- Geoffrey Broadbent `Design in Architecture' John Wiley and Sons, 1973.
- Neuferts' Architect's Data
- Simon Unwin, 'Analysing Architecture', Routledge, 2003
- Simon Unwin, 'An Architecture Notebook :Wall' Routledge, 2000
- Roth, L. M. 'Understanding Architecture: Its Experience History and Meaning', 3rd Ed. Philadelphia : West-view press, 2013.
- Rudolf, A 'The dynamics of architectural form', Berkeley and Los Angeles: University of California Press,1977.
- Aouad.G, 'Computer Aided Design Guide for Architecture, Engineering and Construction', Taylor & Francis Publication, 2011

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS202	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES IV	1-0-0-2	3	2021

Course Objectives: The goal of this course is to expose the students to elementary building materials and their applications. It aims to familiarize students to contemporary as well as vernacular and traditional building materials. It will also introduce students to prevailing & relevant BIS specifications. After this course, the students will be able to recognize materials in the market and use them in their design visualization.

Course Outcomes: After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify the relevant BIS specifications.	Remembering
CO2	Identify appropriate walls, floors and roofs for various construction needs.	Understanding
CO3	Work with various building materials in the construction yard and understand their behaviour.	Applying
CO4	Use the various building materials in their design processes appropriately	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance : 5 Marks

Continuous assessment tests (2 nos.) :15 Marks

Portfolio presentation (15) / drawings(15) : 30 Marks

End semester examination pattern:

There will be three parts; Part A, B and C. Part A will contain 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions. Part B will contain 2 questions from each module, of which the student should answer any one. Each question carries 4 marks. Part C will have two drawing questions, from any two different drawing-based modules, of which the student should answer any one. The question carries 15 marks.

Syllabus

Wall Systems: Concrete- Masonry- steel- wooden. Floor system: Concrete- steel- wooden, Roof systems: Types of roofs- Types of trusses- Materials for roof coverings.Shoring, Underpinning and Scaffolding: Types of scaffoldings.Glass: Types of glass used in building constructions- Purposes and properties of glass. Glazing: Structural glazing and curtain walls.

Course plan

Module	Topic	Course outcome	No. of hours
I	**SHORING, UNDERPINNING AND SCAFFOLDING** Shoring: racking shores, flying or horizontal shores, dead or vertical shores. Underpinning: pit method, pile method Scaffolding: component parts, types of scaffolding- single,double, cantilevered or needle, suspended, trestle, steel scaffolding, patentedscaffolding. *Exercises: Sketches of types of shores, underpinning methods and scaffolding types*	CO1,CO2, CO3,CO4	**9**
II	**WALL SYSTEMS** Concrete System: Concrete columns, concrete walls. Lintels and sunshades Masonry System: Masonry walls unreinforced and reinforced, solid walls and cavity walls, masonry columns and pilasters, Arches. Steel System: Structural steel framing, steel columns,light gauge steel studs, balloon framing. Wooden System: Wood stud framing, stud wall sheathing, wood columns, wood post and beam framing. Partition wall systems. *Drawings: Types of arches, RCC lintel and sunshade*	CO1,CO2, CO3,CO4	**9**
FIRST INTERNAL TEST			
III	**FLOOR SYSTEMS** Concrete: One-way slab, One-way joist slab, Two-way slab,	CO1,CO2, CO3,CO4	9

Module	Topic	Course outcome	No. of hours
	Two-way slab and Beam. Steel: One-way beam system, Two-way beam system, Triple beam system, Semi rigid connections, Open- web steel joists, Metal decking, Light-gauge steel joists. Wood: Wood joists, Wood joist framing, wood beams supports and connections, plank and beam framing. *Drawings: RCC column, slab and beam*		
IV	**GLASS AND GLAZING** Glass products: Types of glass – wired glass, fibre glass, laminated glass, glass building blocks, Heat strengthened glass- toughened glass,laminated glass Special purpose glasses- Low emissivity glass, Solar control glasses and variable transmission glass, Fire resistant glass, Self-cleaning glass their properties and uses in buildings Glazing: Single, double and triple glazing Glazed curtain walls & sky lights. *Exercise: Sketches: Structural glazing, Market surveys of glass products – sizes and cost. Collection of samples Glazing accessories*	CO1,CO2, CO3,CO4	**9**
SECOND INTERNAL TEST			
V	**ROOF SYSTEMS** Flat roof, Sloping roof and curved roof. Deciding the slope or curvature of roof, Roof terminology Wood trusses: Different types of trusses, King post truss, Queen post truss, Fink Truss, North light truss, Structural Steel roof framing: Different types of Steel trusses and their construction details. Roof covering - thatching, tiling, AC sheets, GI and Aluminium sheets, FRP and RMP sheets and modern roofing. Roof drainage systems. Introduction to Space frames and Composite roof Systems *Drawings: Types of Arches, Truss – King post truss, Queen post truss, Steel angular and tubular truss, details of roof covering and gutter details*	CO1,CO2 ,CO3,CO4	**9**
END SEMESTER EXAMINATION			

Text Book

- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005
- Dr.B.CPunmia , Building Construction

Reference Books

- Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
- H Leslie Simmons, 'Construction – Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
- Relevant BIS codes.
- Rosen Harold J, Construction materials for Architecture, Krieger Pub Co, 1992
- Doran, David; Cather, Bob; Doran, D. K; Cather, R – Construction materials reference book, Routledge, 2013

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS204	SITE PLANNING	1-0-1-0	2	2021

Course Objectives:

- To understand the importance of site in architectural design whereby the relationship between the built and the un-built environment and principles of site planning is established.
- To analyse ecological and geomorphological characteristics of a site which govern the siting of a building or group of buildings in a given site.
- To teach various techniques of site analysis through exercises and case studies.

Course Outcomes: At the end of successful completion of the course students will be able

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	To learn various terms involved in site planning and their relevance in design of buildings of varying scales	Understanding
CO-2	To understand various parameters that need to be considered in site analysis and its implications on site	Understanding
CO-3	To evaluate the consequences of interventions in a site at micro and macro scales	Applying Analysing Evaluating
CO-4	To apply the principles of site planning learnt in real/ studio projects	Applying Analysing Evaluating Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance : 5 Marks
Tests (2 numbers) : 15 Marks

Portfolio presentation (15) / drawings (15) : 30 Marks

End semester examination pattern: There will be three parts; Part A, B and C. Part A contains 3 questions with 1 each from module 1, 2 and 4, having 4 marks for each question. Students should answer all the questions (3 x 4 = 12 marks). Part B contains 2 questions each from 1, 2 and 4 modules, of which the student should answer any one. Each question carries 8 marks (Total 3 x 8 =24). Part C will have one question from module 3 or 5 to assess the student's capacity for analysing the site and arrive at findings that lead to decisions in site planning and building design. The question carries 14 marks. Part B and C questions can have subdivisions.

Syllabus

Introduction – Stages in Site Analysis - Preparation of Site Analysis Diagram - Site Context - Site Planning and Site Layout Principles - Site design - Design Application

Course Plan

Module	Topic	Course outcome	No. of hours
I	**Introduction** Objective of Site Planning, Site Planning Process Definition of plot, site, land and region, units of measurements. Contouring – Contour interval – Characteristics, uses of contours. **Site Planning And Site Layout Principles** Organization of vehicular and pedestrian circulation, types of roads, hierarchy of roads, networks, road widths and parking, regulations. Turning radii and street intersections.	CO1 CO2	6
II	**Stages In Site Analysis** Importance of site analysis, Understanding site as an active network, Contextual Analysis Assessing various contexts -Physiographic,Biological,Land use, Infrastructure, Regulatory, Cultural and Historic On site and off site factors, Integration, Synthesis and Analysis leading to inference about the context	CO2	8
FIRST INTERNAL TEST			
III	**Preparation of site analysis diagram** – Case studies and exercises on the above as studio assignments.	CO1 CO2	4

		CO3	
IV	**Site Context** Introduction to existing master plans, land use for cities, development control rules and their implications on the site. Preparation of maps of matrix analysis and composite analysis. Site selection criteria for housing development, commercial and institutional projects - Case studies. Drawing marking out plan, layout plan and centre line plan – Importance, procedure for making these drawings and dimensioning. Setting out the building plan on site – Procedure and Precautions.	CO2 CO3	6
SECOND INTERNAL TEST			
V	**Site design** Elements in site design, considerations and methods used, design process. Design application – Develop a site plan for any one typology as a studio exercise	CO3 CO4	6
END SEMESTER EXAM			

Text Books:

- Kevin Lynch, 'Site Planning', MIT Press, Cambridge, MA. 1957.
- White T. Edward, 'Site Analysis : Diagramming Information for Architectural Design', Architectural Media Publisher, 1983
- James A La Gro, Site Analysis, Informing Context Sensitive and Sustainable Site Planning and Design, John Wiley and Sons, 2013

Reference Books

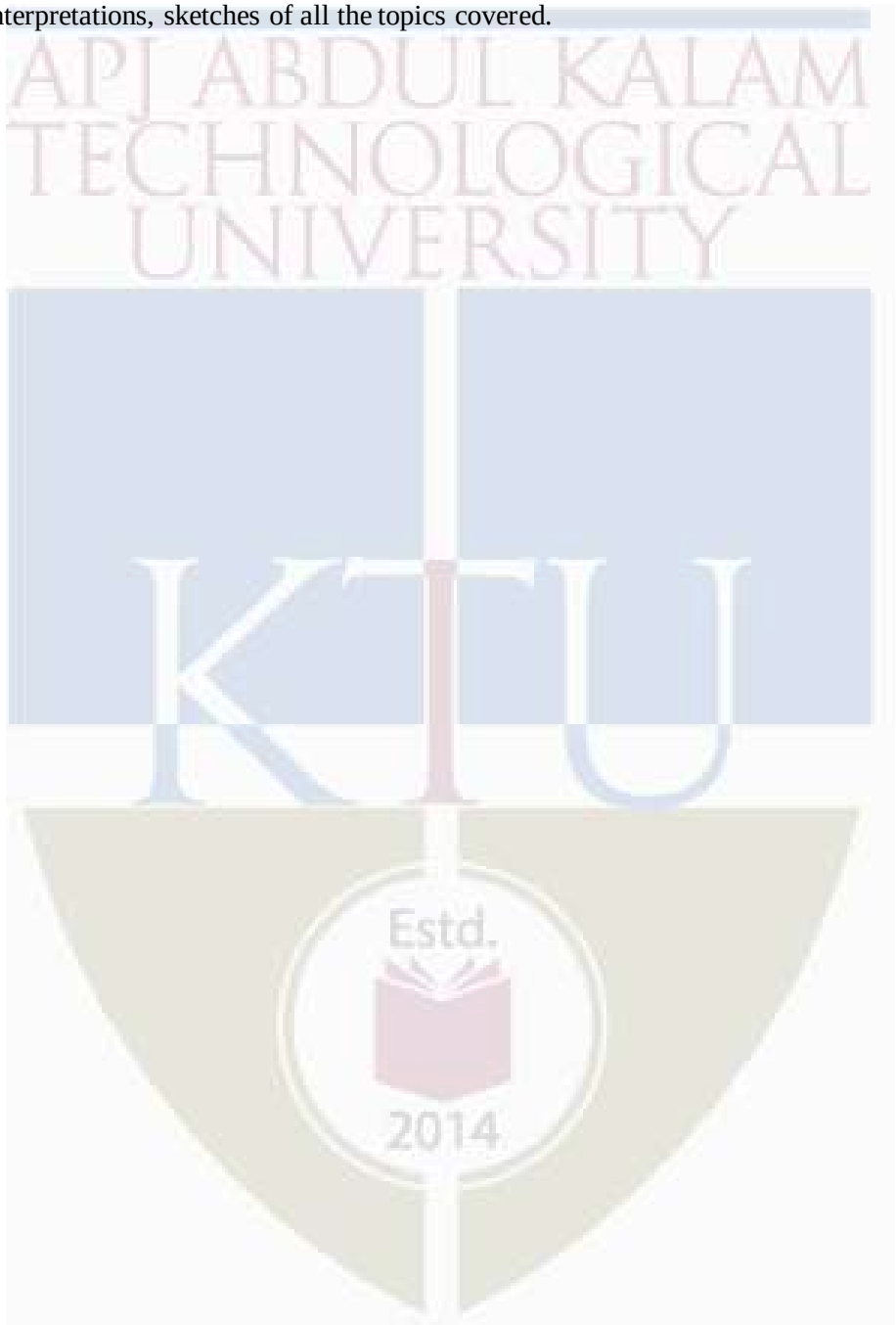
- John Ormsbee Simonds, 'Landscape Architecture: A manual of Site Planning and Design', McGraw Hill, 1961.
- McHarg, lan, 'Design With Nature', Wiley Series in Sustainable Design,1995
- Joseph De Chiarra and Lee Coppleman, 'Planning Design Criteria', Van Nostrand Reinhold Co., New York, 1988.
- Thomas H. Russ, 'Site Planning and Design Hand Book', Pearson Education, 2002.
- Christopher Aalexander et.al., A Pattern Language: Towns, Buildings, Construction (Center for Environmental Structure Series),2015

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Case studies of site analysis, site planning and preparation can be given as class exercises
- Students are to be encouraged to watch movies and documentaries which give

information about ecological and environmental aspects of human intervention of natural settings. Based on these reviews/ reports can be prepared and this can be discussed in class.

- The students can be encouraged to visit a site and photo/ video document the various stages in site preparation
- Each student should be encouraged to have a sketchbook with notes, graphical interpretations, sketches of all the topics covered.



SEMESTER-5

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART301	**LANDSCAPE DESIGN**	**2-0-1-0**	**3**	**2021**

Course Objectives:

To enable the students to understand the principles of landscape design, construction techniques, site planning etc. and imbibe the importance of integrating landscape design with the built environment.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Demonstrate knowledge of fundamental concepts such as elements and principles of landscape architecture.	Understanding
CO-2	Examine the basic principles of site grading, site drainage, and site layout and their application in the design of outdoor environments.	Analysing, Applying
CO-3	Exhibit knowledge about various landscape construction techniques and plant materials	Understanding
CO-4	Appreciate historic precedents to understand how landscape architects utilize the elements and principles of landscape design to shape outdoor spaces.	Analysing, Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Introduction to Landscape Architecture, Landscape Engineering, Landscape Construction, Study of Plant Materials, Historical perspective of Landscape design.

Course Plan

Module	Topic	Course Outcome	No. of Hours
I	**Introduction to Landscape Architecture:** Introduction to Landscape Architecture, definition, importance, need and scope, Role of landscape design in architecture. Landscape elements (Major and Minor Elements, Natural and Manmade elements, Tangible, and Intangible elements, Soft and Hard landscape elements). Understanding the visual characteristics (colour, form, texture) and the non-visual characteristics (smell, touch, sound) of these elements and their application in functional, aesthetic and environmental goals. Principles of landscape design (harmony, balance, symmetry, contrast, etc.) Surfacing, Enclosure, Vistas, Visual corridor.	CO1	9
II	**Landscape Engineering:** Site Studies and Site Planning - Introduction to grading, Landform modifications; Earth form grading; Basic grading principles, Cut and fill processes, Retaining walls. Surface drainage, vegetation and existing features, etc.	CO2	9
FIRST INTERNAL TEST			
III	**Landscape Construction:** Circulation: Vehicular roads and Parking, Pedestrian paths,	CO3	9

	and plazas; Level Change: Wall, steps, and ramps. Planting: Planters, beds, edges, and terraces. Water elements: Pool types and water bodies. Green Practices, energy efficient site planning		
IV	**Study of Plant Materials:** Trees, shrubs, ground cover, climbers, Indoor plants. Plant selection criteria - Functional, visual, ecological, and microclimatic aspects. The role of plant material in environmental improvement (e.g., soil conservation, modification of microclimate). Planting for shelter, windbreaks, and shelter belts.	CO3	9
SECOND INTERNAL TEST			
V	**Climate responsive design for tropical climates** Changing perceptions of man's relationship with nature till the early 19th century; Ancient Heritage: Mesopotamia, Egypt, Greece, Rome; Western Civilization: Europe; Italy, France, and England The middle east: The Persian tradition and its far-reaching influence Eastern Civilization: China and Japan. Ancient and medieval period in India; Mughal and Rajput Landscapes; Colonial landscape development in India (Lutyens Delhi). Modern and contemporary landscape design.	CO4	9
END SEMESTER EXAMINATION			

Textbooks

- Lynch, K. Site Planning, Cambridge: The MIT Press. 1962
- Motloch, J. L. Introduction to Landscape Design, US: John Wiley and sons

Reference books

- Bose, T.K. and Choudhary, K. Tropical Garden Plants in Colour. Horticulture and Allied Publishers. 1991.
- Dee, C. Form and Fabric in Landscape Architecture: A visual introduction, UK: Spon Press.2001
- Laurie, M. An Introduction to Landscape Architecture, NY: American Elsevier Pub.Co Inc.1975
- Simonds, J.O. Landscape Architecture: The Shaping of Man's Natural Environment, NY: McGraw Hill Book Co. Inc. 1961.
- Simonds, J.O. Landscape Architecture: A manual of Site Planning and Design, McGraw Hill, 1961.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART 303	HISTORY OF ARCHITECTURE AND CULTURE- IV	3-0-0-0	3	2021

Course Objectives:

The course is intended for the student to understand the technological innovations of mid-19th and early 20th century leading to an architectural style called Modernism. It gives a glimpse of the Master works of Modern Architecture and further mentions the evolution of the style, the Utopian concepts that followed and the criticisms about the style. The course also includes the colonial architectural typologies as well as post Independent Modernism influenced architecture that evolved in India during the period corresponding to Modernism in Europe and America.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Understanding how Scientific and technological innovations affect cultural movements that influence architecture	Understanding
CO-2	Study of Modernism as a cultural Movement and an architectural movement	Memorising
CO-3	Understanding how society responds and reacts to architecture as it influences lifestyles.	Understanding and applying
CO-4	Learning about the architectural heritage of India as a mix of styles of vernacular and foreign.	Learning

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance	: 4 Marks
Tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 7 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Industrial Revolution and Modernism

Modern Architecture and prominent architects

Decline of Modernism- reasons and consequences

Colonial Architecture in India

Course Plan

Module	Topic	Course outcome	No. of hours
I	A brief history of Architecture as a profession, till and during 19th century- Practice and Education- Ecole de Beaux Arts- separation of architecture from engineering. Technological advancements of 19th century- Invention of steam engine, formation of factories- Industrial Revolution- New materials - Crystal Palace- Writings of Eugene Viollet le Duc. Eiffel Tower. Movements and counter movements. Arts and Crafts Movement. Modernism as a cultural movement in literature and art- Ulyssus, Cubism. Art Nouveau- Victor Horta. De Stijl, Deutscher Werkbund, Expressionism, Dada Movement. Antonio Gaudi- Sagrada Familia.	CO1	9
II	Breaking away from history- Walter Gropius and Bauhaus. Mies Vander Rohe- Seagram building. Le Corbusier- Villa Savoy. CIAM formation and declarations. Philip Johnson- Glass House, Sony Building. Daniel Burnham- White City, Montauk Building. Chicago School-Skyscrapers- William Le Baron Jenny- Home Insurance Building, Adler and	CO2	9

	Sullivan- Wainwright Building, Frank Lloyd Wright- Prairie style, Robie House, Queen Anne Style, Taliesin School.		
FIRST INTERNAL TEST			
III	International Style definition and characteristics. Alvar Aalto- Villa Mairea, Saynatsalo Townhall, Louis Kahn- Salk Institute, Kimbell Art Museum. Second World War and its influences. Chancellor housing. Modern Utopian concepts- Archigram- Peter Cook- Plugin City. Le Corbusier's City of 3 million inhabitants. Team X and Brutalism. Metabolists of Japan- Kisho Kurokowa. Criticism of Modernism, intellectual, economic and social reasons that led to the bombing of Pruitt Igoe.	CO3	6
IV	Colonial Architecture and Indo Saracenic Architecture in India. New Delhi- Edwin Lutyens, India Gate, Rashtrapati Bhavan. Calcutta- Victoria Memorial Hall. Bombay- Indo-Deco style. CST Terminus, Gateway of India. Character study of Pondicherry French and Tamil Towns- and Goa- Indo Potuguese style. Chennai- Rippon Building. Kochi- St Francis Church, Hill Palace Museum. The Architecture of the Princely States of Jaipur, Bikaner and Mysore. Evolution and definition of typologies of Hill stations, Colonial Bungalows, Cantonments, clock towers, railway stations, public offices, assembly halls, water systems etc.	CO4	12
SECOND INTERNAL TEST			
V	Post-colonial, Nehruvian nation building initiatives; Planning Commission and public sector led industrialisation; Building of new industrial towns (e.g. Bhilai, Durgapur, Rourkela etc.), New capital cities (e.g. Bhubaneswar, Chandigarh and Gandhinagar); Works of Corbusier and Louis Kahn in India and their influences on Indian architects; Millowners Building, IIM Ahmedabad. Works of public nature- Legislative assembly, High Court and Secretariat, Chandigarh.	CO4	9
END SEMESTER EXAMINATION			

Text Books:

1. A Global History of Architecture/ Francis. D. K. Ching, Mark Jarzombek, Vikramaditya Prakash. Published by John Wiley and sons, Third edition 2017
2. A History of Architecture: Settings and Rituals/ Spiro Kostoff. Revisions by Greg Castilo. Published by Oxford University Press, 1985, 1995
3. Sir Banister Fletcher, "A History of Architecture", CBS Publications (Indian Edition), 1999.
4. Chopra P.M., 2000. Monuments of the Raj. Arya Book Depot.
5. Desai Madhavi, Lang Jon, 1997. The Search for identity-India 1880-1980 Architecture and Independence. Oxford Univ. Press
6. Frampton,Kenneth1994.ModernArchitecture:ACriticalHistory.Thames&Hudson,London
7. Pevsner, Nikolaus, 1960 Pioneers of Modern Design, Penguin Books
8. Bhatt,V. &Scriver,P.,1990.AftertheMasters:Contemporary IndianArchitecture. MapinPublishing

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Faculty to act as facilitator and guide rather than one way lecturing.
- Book Reviews are to be part of assignments.
- Students are to be encouraged to watch movies and documentaries which give information about culture and architecture and prepare reviews/ reports and have discussions in class.
- As far as possible the students are to be encouraged to visit the architectural monuments in their vicinity and prepare reports and sketches, regardless of whether they are part of the syllabus.
- At the end of the course, each student has to prepare a short video on any of the topics in the syllabus.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET 301	THEORY OF STRUCTURES- V	2-1-0-0	3	2021

Course Objectives:

This course provides fundamental concept of steel and timber structures and their design. It enables the students to design and detail steel structural elements such as tension members, compression members, and flexural members along with connection design. In addition, an introduction to the design of timber structures is given, which enable the students to design a timber beam and a column. The course also trains the students to use the code of practice of steel design, IS 800: 2007.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Comprehend the design philosophies of Limit state method and working stress method.	Understanding
CO - 2	Recall the structural behaviour of elements subjected to tension, compression, and flexure.	Remembering
CO - 3	Design proper bolted or welded connections for steel structures subjected to given set of loading	Creating
CO - 4	Apply the principles of limit state method to design the steel elements such as tension members, compression members, and flexural members subjected to dead and live loads following IS 800: 2007	Creating
CO - 5	Apply the principles of working stress method to design the timber elements such as beams and columns	Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Continuous assessment tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carries 8 marks.

Standards Permitted in the exam hall:

IS 800: 2007 Indian Standard, General construction in steel – Code of Practice, Bureau of Indian Standards.
SP: 6(1) -1964, Hand book for structural engineers - 1, Structural steel sections, Bureau of Indian Standards
IS 883: 1994 Indian Standard, Design of structural timber in building – Code of Practice, Bureau of Indian Standards.

Syllabus

Introduction to steel and steel structures- Limit state design concept - Analysis and design of bolted and welded connections - Analysis and design of different structural members such as tension members, compression members, column bases and flexural members - Working stress method of design - Timber structures - Design of timber beams and columns - Flitched timber beams

Course Plan

Module	Topic	Course Outcome	No. of hours
I	Introduction to steel and steel structures, Properties of steel; Structural steel sections Limit state design concept Types of Connection, Analysis and Design of Bolted and Welded Connection (Moment Connection not required).	CO1 CO3	9
II	Tension members – Types of sections – net area -Design of tension members – Plate and single angled member	CO1 CO2 CO3	9
FIRST INTERNAL TEST			
III	Compression Members-Design of Struts - normal sections, single angled section. Solid and Built –up Columns for axial load Battens and lacing (Only theory is required) Column Bases-Design of slab bases only	CO1 CO2 CO4	9
IV	Flexural members – laterally restrained and laterally unrestrained beams – Simple and compound beams (Concept only) - Design of laterally restrained beam	CO1 CO2 CO4	9
SECOND INTERNAL TEST			

V	Introduction to Working stress method of design Timber structures, Types of timber – Classification, allowable stresses Design of timber beams - flexure, shear, bearing and deflection considerations Flitched timber beam- Types of Flitched Beam-Design of flitched timber beam Design of timber column	CO1 CO2 CO5	9
END SEMESTER EXAMINATION			

Reference Books/ Standards:

- S. Ramachandra, Design of Steel Structures - Standard Book House, Delhi, 1984
- N. Subramanian, Design of Steel Structures, Oxford Publications
- S.K Duggal, Limit State Design of Steel Structures, Mc Graw Hill Publications
- SP 6 – Part 1: 1964 (Reaffirmed 2003), Handbook for structural engineers - 1. Structural steel sections
- A.S. Arya, Structural Design in Steel, Masonry and Timber, Nemchand and Bros, Roorkee, 1971.
- Dayaratnam P., Design of Steel Structures, Oxford and IBH Publishing Co.
- Gurucharan Singh, Design of Steel Structures, Standard Publishers, New Delhi, 1982
- L.S. Negi, Design of Streel Structures – Tata McGraw Hill Publishing Company Ltd. New Delhi, 1997
- IS 883: 2016 – Code of Practice for Design of Structural Timber in Buildings, Bureau of Indian Standards, New Delhi
- IS 3629: 1986: Specification for structural Timber in building, Bureau of Indian Standards, New Delhi
- IS 800 – Code of Practice for use of Structural Stee in General Building Construction, Bureau of Indian Standards, New Delhi
- National Building Code of India, 1983, Part VI, Structural Design, Bureau of Indian Standards, New Delhi

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET 303	BUILDING SERVICES III- (HVAC, FIRE FIGHTING AND SAFETY)	2-0-1-0	3	2021

Course objectives:

To understand the fundamentals and principles of mechanical ventilation systems.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To learn the fundamentals of Refrigeration, HVAC	Understanding
CO2	To understand principles of Air-Conditioning and required components and equipment.	Understanding
CO3	To understand factors that affect human comfort	Understanding, Applying, Analyzing
CO4	To learn about the techniques and methods of air conditioning, distribution of conditioned air and representing them in drawings using symbols and legends	Understanding, Applying, Analyzing, Evaluating
CO5	To understand the fundamentals of fire safety To understand the requirements of buildings and preparedness of occupants in detecting and fighting fire Representing the components of fire fighting systems in drawings using symbols and legends	Understanding, Applying, Analyzing, Evaluating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks

Continuous assessment tests (2 numbers) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

Fundamentals of Refrigeration, HVAC systems, Concepts on Human Comfort and Air Conditioning, Air Conditioning and Distribution Systems, Fundamentals of Fire Safety, Detection and Fighting

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Fundamentals of Refrigeration** Modes of heat transfer. Basic laws of Conduction, convection and radiation. Heat transfer through Composite wall, composite cylinders, thermal resistance, overall heat transfer coefficient and its importance. Simple numerical examples, Insulation material used in air-conditioned building. Vapour compression refrigeration Cycle- pressure enthalpy diagram. COP.	CO1	6
II	**HVAC Systems** Components of vapour compression refrigeration system, compressors, reciprocating compressors, rotary compressors, scroll compressors, hermetically sealed compressors, their relative merits and demerits, type of evaporators, condensers - air cooled, water cooled , evaporative type , their application and selection, expansion devises, capillary tube, automatic expansion valve. Refrigerants, properties, ODP, GWP, environment friendly refrigerants and their comparison and application.	CO2	9
FIRST INTERNAL EXAMINATION			

III	**Concepts on Human Comfort and Air Conditioning** Psychometric chart, psychometric processes, DBT, WET, dew point temperature, Absolute Humidity, Relative Humidity, Specific Humidity, specific volume, Humidity measurements, human comfort, effective temperature, comfort chart, Simple numerical examples Air conditioning - Capacity of an air condition machine, TONS, EER, ISEER, star rating, cooling load calculation, factors effecting cooling load calculation, sensible and latent heat load, room sensible heat factor. Grand sensible heat factor. heat load due to mixing of outdoor air, numbers of air changes per hour, need of mixing outdoor air, factors to consider percentage of outdoor air mixing and their methods. Cooling load calculations, Simple numerical examples	CO2 CO3	9
IV	**Air Conditioning and Distribution Systems** Type of air conditioning machines, split , cassette system, window, central air conditioning, direct expansion, chilled water system of air conditioning, fan coil unit, double duct system, reheat system , Zonal system, air – water system , relative merits and demerits. Selection criteria of different models. Air distribution systems- supply duct, return duct, location of return duct opening, throw, AHU, Duct lay out pattern, wall duct system, ceiling duct system, Types of diffusers. Air filters, HEPA filters, Symbols and legends used in building HVAC layout. Case Study or Simple drawings of central air conditioning system for an auditorium, for a seminar hall, for an office	CO4	9
SECOND INTERNAL EXAMINATION			
V	**Fundamentals of Fire Safety, Detection and Fighting** Fire sources, spreading, and growth decay curve, Principles of fire behavior, Fire safety design principles _ NBC Planning considerations in buildings – non-combustible materials, egress systems, Exit Access – Distance between exits, exterior corridors – Maximum travel distance, Doors, Smoke proof enclosures General guidelines for egress design for Auditoriums, concert halls, theatres, other building types, window egress, accessibility for disabled. NBC guidelines – lifts lobbies, stairways, ramp design, fire escapes and A/C, electrical systems. Heat smoke detectors – sprinkler systems, Firefighting pump and water requirements, storage – wet risers, Dry rises	CO5	12

	Fire extinguishers & cabinets, Fire protection system – CO2 & Halon system, Fire alarm system, snorkel ladder Configuring, sizing and space requirements for firefighting equipment. Case study or Simple drawings of fire detection and fighting for a medium/ high rise building		
END SEMESTER EXAMINATION			

REQUIRED READINGS:

Text Books:

1. William H.Severns and Julian R Fellows, "Air conditioning and Refrigeration", John Wiley and Sons, London, 1988

2. "Fire Safety: National Building Code of India 1983" published by Bureau of Indian Standards.

3. National Building Code of India, 2005 (NBC 2005).

Reference Books

1. A.F.C. Sherratt, "Air conditioning and Energy conservation", The Architectural Press, London, 1980

2. Andrew H Buchanan, "Design for fire safety", First edition John Wiley & Sons Ltd., New York., 2001

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT311	VERNACULAR ARCHITECTURE	3-0-0-0	3	2021

Course objectives:

To inculcate an appreciation of vernacular architecture; as an expression of local identity and indigenous traditions of the culture.

To understand the process of creation of vernacular architecture specific to a region, to create an understanding about the social and physical environment, climate of the place, materials and methods of construction

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Learning from Vernacular architecture and its relevance.	Understanding
CO-2	Different approaches and concepts to study of vernacular architecture	Understanding
CO-3	Vernacular Architecture as a process – explore the concepts of culture and civilization and their impact on these architectural products	Analysing
CO-4	Studies of Vernacular settlements of the various parts of the world	Analysing
CO-5	Survey and study of vernacular architecture Physical experience of buildings in order to appreciate the complexity of the physical and metaphysical influences bearing on architecture.	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

A brief overview of the process of creation of vernacular architecture, its cultural and contextual responsiveness, its determinants, role of social, cultural, political, economic, symbolic, climatic, technological contest in creation of form, different approaches and concepts to study of vernacular architecture, and the specific vernacular architectural forms in the northern and southern parts of India.

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Introduction to Vernacular architecture** Definitions and classifications of Vernacular architecture. Determinants of vernacular architecture: Role determinants in the creation of vernacular architecture of a region. Cultural and contextual responsiveness of vernacular architecture Learning from Vernacular architecture and its relevance.	CO1	6
II	**Approaches and concepts** Different approaches and concepts to study of vernacular architecture: Aesthetic, Architectural and anthropological studies in detail. Survey and study of vernacular architecture: The process of recording, categorizing and dissemination of knowledge about vernacular architecture.	CO2	9
FIRST INTERNAL EXAMINATION			

III	**Vernacular architecture as a process** Vernacular architecture as a continuous process, dynamic process and participatory process. Study of examples from various regions of the world. Urban vernacular architecture. Vernacular architecture examples of urban settlements. Vernacular architecture as an indicator of changes in social, cultural, economic, climatic, political, symbolic and technological aspects.	CO3	12
IV	**Vernacular Settlements** Studies of Vernacular settlements of the various parts of the world based on location and topographical conditions, regions influenced by social and economic factors, the result of the local population's livelihoods etc. Examples from Egypt , Indonesia , Iceland , China etc	CO4	9
SECOND INTERNAL EXAMINATION			
V	**Regional variations in the vernacular architecture in India** Understanding how various factors impact Vernacular Architecture. Study based on the vernacular architecture of the following regions: Bohra houses of Gujarat, wooden houses of Himachal Pradesh, Bangla houses (village huts) of Bengal, Toda Houses Tamil Nadu, Bhunga Houses of Gujarat, Naga Houses of North East India, Tribal houses of Kerala.	CO5	9
END SEMESTER EXAMINATION			

Reference Books

- Paul Oliver, Encyclopedia of Vernacular Architecture of the World, Cambridge University Press,1997.
- Amos Rapoport, House, Form & Culture, Prentice Hall Inc1969.
- Vellinga Marcel, Oliver Paul & Bridge Alexander , Atlas of Vernacular Architecture of the World , Taylor & Francis Ltd ,2008
- Carmen Kagal, VISTARA—The Architecture of India, Pub: The Festival of India,1986.
- Cooper, I. Traditional buildings of India. Thames and Hudson Ltd, London, 1998
- Desai Madhavi Traditional Architecture: House Form of Bohras in Gujarat, National Institute of Advanced Studies in Architecture (NIASA), 2007

- John May Handmade Houses and Other Buildings the World of Vernacular Architecture, Thames &Hudson2010
- R W Brunskill: Illustrated Handbook on Vernacular Architecture,1987.
- R.W. Brunskill, 4th ed 2000 Faber and Faber, Vernacular Architecture: An Illustrated Handbook
- S. Muthiah and others: The Chettiar Heritage; Chettiar Heritage 2000
- Tejinder S. Randhawa ,Vernacular Architecture of India: Traditional Residential Styles and Spaces, INTACH 2022
- Willi Weber and Simos Yannas, Lessons from Vernacular Architecture: Achieving Climatic Buildings by Studying the Past , Routledge,2013
- Reimar Schefold , Gaudenz Domenig and Peter J. M. Nas, Indonesian Houses: Tradition and Transformtion in Vernacular Architecture, Koninklyk Instituut Voor Taal Land,2003
- Ronald G. Knapp China's Vernacular Architecture: House Form and Culture, University of Hawaii 1989
- G.H.R. Tillotsum – The tradition of Indian Architecture Continuity, Controversy – Change since 1850, Oxford University Press, Delhi, 1989.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT313	APPRECIATION OF ART IN ARCHITECTURE	3-0-0-0	3	2021

Course objectives:

- To explore visual art forms and their cultural connections across historical periods
- To understand and analyze any piece of artwork by means of elements and principles of design
- To acquire basic knowledge about various art mediums and develop skills in using the various mediums as effective and versatile presentation tools.
- To understand the relationship among art, art appreciation and architecture
- To help students Critically interpret, evaluate, and contextualize works of art.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To understand and differentiate art works as expressions of values across varied cultural and historical contexts.	Understanding
CO2	To analyze and summarize the elements of art and the principles of design through creative works in various mediums and materials.	Applying, Analyzing,
CO3	Identify and describe a body of art works, understand the art elements of artists.	Understanding, Creating
CO4	To understand and gain a fundamental knowledge of art expressions, design- its elements and principles and demonstrate using techniques.	Applying, Analyzing, Evaluating, Creating
CO5	To learn about individual artists and their role in society.	Understanding

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Continuous assessment tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question carries 8 marks. One or two questions can have subdivisions. Some questions can be framed in such a manner to assess the student's capacity for analyzing the topics and linking it with other courses.

Syllabus

Introduction and Fundamentals – Art understanding – Indian art – Tools and techniques in print making, photography and plastic arts – works of International artists

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Fundamentals of Art** Introduction to Art- definition and Interpretation. Introduction to History of Art, Artistic Tradition and Theories. Examples from Greek, Roman, Gothic, Renaissance, Art Deco, Modern , Post Modern, Futuristic Art in space perception- Contemporary approaches vs. traditional approach Contemporary Art Issues Recent Art Movements	CO1	6

II	**Understanding Art** Form and content in art Elements & design principles that create artistic form a) line, shape, light, colour, texture, pattern, space, motion b) unity, variety, focal points, emphasis, balance, symmetry, rhythm, scale, proportion Iconography in art	CO1 CO2	6
FIRST INTERNAL EXAMINATION			
III	**Indian Art** Introduction to aesthetics of Indian Art, Sculpture & Painting Art in Prehistoric, Islamic, Medieval, Colonial times Works of Indian artists	CO1 CO2 CO3	9
IV	**Imaging and sculpting** Printmaking: techniques and tools. Digital art Architectural Photography: time, emotion, abstract, construction, environment setting through the lens; technological developments and methods. Plastic arts: sculpture, modeling, installation: artists and techniques.	CO2 CO4	12
SECOND INTERNAL EXAMINATION			
V	**Artists works** Art and approach to art of famous artists- • Picaso, Michelangelo, Van Gogh, Salvador Dali, • Yayoyi Kusama, Kurt Schwitters, Jason Rhoades , Kara Walker, Doris Salcedo • Jeanette Hägglund, Hufton and Crow, Cristóbal Palma Auguste Rodin, Boccioni, Jeff Koons, Anish Kapoor	CO1 CO3 CO5	12
END SEMESTER EXAMINATION			

Text Books:

1. Fichner-Rathus, Lois. Understanding Art. 11th edition
2. Pamela Sachant, Peggy Blood, Introduction to Art: Design, Context, and Meaning 2016
3. Dennis J.Sporre, Perceiving the arts. 11th edition 2015

Reference Books

1. Charles Wallschlaeger & Synthia Busic Snyder, Basic Visual Concepts & Principles for artists, architects &designers, McGraw hill, USA, 1992.
2. Francis D.K Ching, 'Drawing, Space, Form, Expression'.
3. J.H.Bustano, by 'Principles of Colour and Colour Mixing'.
4. Luis Slobodkin, 'Sculpture-Principle and Practice'.
5. Roy C. Craven, 'Indian Art'.
6. Suzanne Huntington, 'Art of Ancient India'.

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Representing art works through drawing, painting, photography, sculpting, printing etc. can be given as class exercises
- The students can be encouraged to attend workshops and visit art related exhibitions, events and sites.
- Each student should be encouraged to have a sketchbook with notes, graphical interpretations, sketches of all the topics covered.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT315	ARCHITECTURAL DESIGN WITH STEEL AND GLASS	3-0-0-0	3	2021

Course Objectives:

- To provide a basic knowledge on Glass and Steel as an architectural building materials.
- To provide the students with the latest & recent trends in architecture and to understand the selection and usage of glass for appropriate purposes and for improving the building performance using glass.
- To introduce the design potential of steel as an important material in modern construction and familiarize the students with the structural merits and limitations of steel.
- To understand the sustainability of steel in construction field.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify the importance of glass and steel in architecture and its types.	Remembering
CO2	Identify appropriate glass and steel for construction and its applications	Understanding
CO3	Introduce the sustainability of steel and identify the technical aspect of combining stesl and glass	Applying
CO4	Case study of green building designed predominantly with energy efficient materials.	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

Glass as a building material: Evolution and importance of glass. Types of glass:

Glass and green architecture: Building physics, Day lighting in buildings, Achieving energy efficient using glass, Case study of green buildings: Steel as a building material – structural properties of steel, advantages of steel in construction - Sustainability of steel: Recycled, reuse and adaptive reuse of steel. Various steel and glass envelope systems

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Glass As Building Material** Evolution & importance of glass in modern architecture. Applications of glass in buildings (façade/ interior applications). Understanding the production & properties of glass. Types of Glass- mirror, lacquered, fire resistant. Modern glass with different applications. Glass for hospitals, green homes, airports, offices, other buildings. Role of glass in acoustics.	CO1,CO2, CO3,CO4	6
II	**Glass And Green Architecture** Building Physics. Theory of electromagnetic radiation. Understanding of internal and external reflections. Day-lighting in Buildings - introduction and basic concepts (VLT). Solar Control and thermal insulation (SF, UV, SHGC). Need for green Buildings. Energy efficient buildings. Achieving energy efficiency using glass. Factors of energy efficient material selection.,	CO1,CO2, CO3,CO4	6

	Case study of green building designed predominantly with energy efficient materials.		
FIRST INTERNAL EXAMINATION			
III	**Introduction to Steel as Building Material** Materiality of steel, structural properties of steel, advantages of steel in construction. History of metal in construction – Iron to Steel. Steel and tension. Industrialization and mass fabrication of steel. Casting of steel in historic and contemporary examples. Invention of hollow structural sections. Hot rolled steel shapes, various hollow structural sections.	CO1,CO2, CO3,CO4	9
IV	**Sustainability of Steel** Introduction to steel as a sustainable material. Recycled, reuse and adaptive reuse of steel. Steel and glazing systems, support systems for glazing. Technical aspects of combining steel with glass. Various steel and glass envelope systems - curtain wall system, wind braced support systems.	CO1,CO2, CO3,CO4	12
SECOND INTERNAL EXAMINATION			
V	**Fabrications, Erection and Implications on Design** Study on transformation of architectural design into fabricated elements. Steel in temporary/ exhibit buildings. Need for corrosion and fire protection. Various finishes and coating systems of steel. Detailed study on corrosion protection and fire protection systems. Transportation, site issues anderection on site. Erection of beams and columns. Effects of climate and weather on erections. Other issues relating to practical implication of design on site.	CO1,CO2, CO3,CO4	12
END SEMESTER EXAMINATION			

Text Books:

1. Christian Schittich, 'Glass Construction Manual', Birkhauser Basel, 2007.

2. 'Architectural Glass Guide', Federation of Safety Glass, 2013.

3. Terrimeyer Buake, 'Architectural Design in Steel', SPON, 2004.

4. Peter Silver et al, 'Structural Engineering for Architects', Laurence King, 2013.

Reference Books

1. 'LEED 2011 For India - Green Building Rating System', Indian Green Building Council, 2011

2. 'Energy Conservation Building Code. User Guide', Bureau of Energy Efficiency, 2009

3. Training Manuals & E- Learning, Glass Academy.

4. Victoria Ballard Bell & Patrick J Rand; 'Materials for Architectural Design', Lawrence King, 2006.

5. Ettinger J. Van et all(Editors), 'Modern Steel Construction in Europe', Elsevier,1963.

6. Leonardo Benevolo, 'History of Modern Architecture Vol 1 & 2', Reprint, MIT Press, 1977.

7. 'Handbook of Steel Construction', Canadian Institute of Steel Construction, 2010.

8. INSDAG Publications and Brochures.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT317	GRAPHIC AND PRODUCT DESIGN	3-0-0-0	3	2021

Course objectives:

To understand the role of visualization in design and to learn how to externalize the visualizations through various illustrations.

To understand the stages and processes involved in product design.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To create geometric forms using light and shadows.	Understanding, Analyzing
CO2	To identify the relevance of proportioning systems.	Understanding, Analyzing
CO3	To articulate the design process.	Understanding, Analyzing, Evaluating
CO4	To evaluate the space dimension factors.	Understanding, Analyzing, Evaluating
CO5	To identify various occupational hazards.	Understanding, Analyzing

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance	: 4 Marks
Continuous assessment tests (2 numbers)	: 20 Marks
Assignment/Quiz/Course project	: 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Introduction to form and proportion – Introduction to product sketching – Introduction to product design - Human physical dimension concern and ergonomics - Percentile and measurements and occupational safety.

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Introduction to form and proportion.** Simple geometric forms and composition, principles of perspective, effect of light and shadows on surface composition, understanding the basics of proportions and application of scales in drawing.	CO1, CO2	6
II	**Introduction to product sketching**. Natural forms sketching, the human body and its parts, human proportions and proportioning systems. Man-made form sketching, introduction to product sketching, understanding the proportions and material properties, importance of line weights in representation.	CO2	9
FIRST INTERNAL EXAMINATION			
III	**Introduction to product design.** Research, Concept Development, Production, Launch. Various types of design process: Linear model, Double diamond, total design, waterfall design, Christmas tree. Importance of human centred design.	CO3	9

IV	**Human physical dimension concern and ergonomics.** Behavioural space dimension factors, Behavioural zones, Value of ergonomics in spaces, Principles of optimal spaces in workspace. Proper posture and proper optimisation of work component.	CO2 CO4	12
SECOND INTERNAL EXAMINATION			
V	**Percentile and measurements and occupational safety.** Percentile selection for design use, general working postures and workstation design. Various occupational safety and stress caused in the workspace and remedial measures	CO1 CO3 CO5	12
END SEMESTER EXAMINATION			

Reference Books

- Edwards Betty; New drawing on the right side of the brain. Publisher: Tarcher 2002
- D.K Francis; Design Drawing, John Wiley and Sons, 1998
- T C Wang; pencil sketching, John Wiley & sons, 1997
- Dalley Terence Ed; the complete guide to illustration & design, Phaidon, Oxford 1980
- Morris, Richard. *The fundamentals of product design*. Bloomsbury Publishing, 2016.
- Chakrabarti Debkumar, Indian Anthropometric Dimensions for Ergonomic Design Practice 1997.

Course materials, Guidance and Evaluation methods

- Design process and methodologies need to be emphasised in module 3 with the help of case studies.
- For Module 4 and 5 real time scenarios can be adopted as examples for a better understanding.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARD301	ARCHITECTURAL DESIGN - IV	0-0-10-0	10	2021

Course Objectives:

- To learn the procedure of documenting and preparing measured drawing of buildings.
- To understand socio-economic, cultural patterns and environmental characteristics of a settlement.
- Students will be introduced to the site and context as the primary generators of design decisions through design exercises, taking into account site conditions, ecological aspects, activities, services, and building methods, as well as social use phenomena in the design development process.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Documentation of a heritage building / settlement study to understand the building materials, construction technology & the various determinants of design of the built form like the context /environment , livelihoods, socio- economic and cultural aspects, climate, rituals, customs etc.	Understanding
CO-2	To increase one's understanding of site planning techniques, barrier-free design principles, and construction techniques in order to develop design programmes that consider context and functional requirements through data analysis, inference from data collection, and case studies of projects related to the design project.	Developing
CO-3	Applying site planning techniques to initiate the architectural design process, with the site and context serving as the primary generators of design decisions	Applying
CO-4	To design through conscious consideration of Site, context, and principles of barrier-free design	Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester Jury examination marks	End semester Jury examination duration
100	50	50	2-3 days

Continuous internal evaluation pattern:

Attendance : 5 Marks
Design Assignments/Reviews/Tests/CAD Assignments : 45 Marks

Syllabus:

Documentation of a heritage building / settlement study. Study complex projects like Polyclinics, Convention Centre, Education institutions like Architecture schools, Dental college etc. emphasizing ecologically responsible site planning techniques and principles of Barrier- free design.

Course Plan:

Module	Topic	Course outcome	No. of hours
I	Preparation of measured drawing of a heritage building to understand the building materials, construction technology & the various determinants of built form. Or Documentation on housing settlements of a small community, with focus on the integration of socio-economic, cultural patterns and environmental characteristics and context as generators of architectural space and forms.	CO-1	20
II	Study of ecologically responsible site planning methods and barrier-free design concepts with a focus on how the built and natural environments interact. The location, the context, and how they relate to the built environment will be the main points of emphasis. Site characteristics, ecological factors, activities, services, construction techniques, and social utilisation are all taken into account during the design creation process.	CO-2	40
FIRST INTERNAL TEST			
III	Introduction to the project – Projects may be on Polyclinics, Convention Centers, Education institutions etc. Emphasis on	CO-2, CO-3	30

	the site planning techniques with respect to the ecological aspects of the site, zoning regulations/land uses, and barrier-free considerations. Study Space Standards and building codes, basic design parameters, such as the user group, zoning laws and regulations, the site context, and barrier-free considerations, etc for the selected project typology. Data Collection, Case studies, Site studies, Analysis, and Inferences		
IV	Concept development, Design development/ Form Development. Understand how site and context as prime generators of design decisions and the significance of landscape, open spaces, circulation networks, and utility infrastructure. Elements of Barrier-free design have to be included to make the design inclusive.	CO-3	30
SECOND INTERNAL TEST			
V	Detailed Site Layout landscape, open spaces, circulation networks, utility infrastructure, etc. Detailed drawings of the proposed design with details of architectural features.	CO-4	30
END SEMESTER EXAMINATION/ JURY			

Reference Books

- Francis D. K. Ching, 'Architecture: Form, Space, and Order', John Wiley &Sons, 2007.
- Christopher Alexander et al, The Oregon Experiment,New York: Oxford UP,1975
- Edward T White, Site Analysis: Diagramming Information for Architectural Design, Architectural Media Ltd.1983
- Simon Unwin, 'Analysing Architecture, Routledge, 2003
- Neuferts' Architect's Data
- Time-Saver Standards for Architectural Design Data Time-Saver Standards for Architectural Design Data.
- Rudolf, A 'The dynamics of architectural form', Berkeley and Los Angeles: University of California Press,1977.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS 301	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES-V	1-0-0-2	3	2021

Course objectives :

The goal of this course is to expose the students to elementary building materials and their applications. It aims to familiarize students to contemporary as well as vernacular and traditional building materials. It will also introduce students to prevailing & relevant BIS specifications. After this course, the students will be able to recognize materials in the market and use them in their design visualization.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify the relevant BIS specifications.	Remembering
CO2	Identify appropriate foundations for various construction needs.	Understanding
CO3	Work with various building materials in the construction yard and understand their behaviour.	Applying
CO4	Use the various building materials in their design processes appropriately	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance : 5 Marks
Continuous assessment tests (2 nos.) :15 Marks
Portfolio presentation (15) / drawings(15) : 30 Marks

End semester examination pattern:

There will be three parts; Part A, B and C. Part A will contain 5 questions with 1 question

from each module, having 3 marks for each question. Students should answer all the questions. Part B will contain 2 questions from each module, of which the student should answer any one. Each question carries 4 marks. Part C will have one essay question which can have subdivisions, to assess the student's capacity for analysing the topics and linking it with other subjects studied. The question carries 15 marks.

Syllabus

Vertical transportation systems;Ramps and Stairs-Planning, Design parameters-Stairs; Standards-types of stairs- construction details- Elevators and Escalators;Planning and design parameters-Different types- Construction details- Wood substitutes: Different types wood substitutes available – Properties- Market forms- Plastics: Plastics as a building materials- Damp proofing and Termite proofing: Causes of damp proofing- Materials used for Damp proofing- Anti termite treatments.

Course plan

Module	Topic	Course outcome	No. of hours
I	**VERTICAL TRANSPORTATION SYSTEMS: RAMPS AND STAIRS** Planning of vertical transportation systems – design parameters. Ramps: Planning of ramps, slope, finishes, safety precautions. Stairs: Planning staircases - Standards, rules and regulations. Components of stairs, Support conditions like inclined slab, cranked slab, cantilever. Stair plans, stairs with straight, circular and curved flights. Construction details of Wood stair, fire escape stairs, Concrete stair, Steel stair and Composite stair *Drawings: Wooden stair, RCC stair, Steel Stair, Composite stair.*	CO1, CO2 CO3 CO4	9
II	**ELEVATORS AND ESCALATORS** Elevators: Planning and grouping of elevators. Elevator design parameters. Different types of elevators – passenger elevators, observation elevators, hospital elevators and freight elevators. Construction details – lift shaft, lift pit, machine room etc. Escalators: Planning and details of escalators and travelators *Drawings: Passenger lift, Capsule lift, Escalator.*	CO1, CO2 CO3 CO4	9

FIRST INTERNAL TEST			
III	**WOOD SUBSTITUTES** Industrial products as substitutes for natural hard wood. Characteristics, physical properties, areas of application, available forms and sizes of: Veneers and veneer ply woods, particle board, hard board, fibre board, block board, lamina-boards, glulam, laminates, cement particle board, e-board, bamboo ply, etc. *Market study: wood substitutes.*	CO1, CO2 CO3 CO4	9
IV	**PLASTICS** Plastic as a building material. Brief history of their use through examples. Manufacture. properties, types, uses and application of plastics in building industry. Different types of adhesives and sealants. Plastic joints. Specific materials such as polycarbonate sheet and teflon. Introduction to plastic based products in building construction such as such as doors, windows, ventilators, partitions, floors, walls, roofs, handrails. Current innovations *Understanding of product literature/ shop drawings. Site visits with documentation in the form of sketches/ photos*	CO1, CO2 CO3 CO4	9
SECOND INTERNAL TEST			
V	**DAMP PROOFING AND TERMITE PROOFING** Damp proofing: Causes and methods of damp proofing of foundation, effect of damp proofing, materials used for damp proofing, walls, floors, roofs. DPC treatment in buildings, swimming pools, roof gardens, water tanks. Termite proofing: Anti termite treatment, site preparation and soil treatment, physical and structural barriers, post construction treatments. *Damp proofing: Causes and methods of damp proofing of foundation, effect of damp proofing, materials used for damp proofing, walls, floors, roofs. DPC treatment in buildings,* *swimming pools, roof gardens, water tanks.* *Termite proofing: Anti termite treatment, site preparation and soil treatment, physical and structural barriers, post construction treatments.*	CO1, CO2 CO3 CO4	9
END SEMESTER EXAMINATION			

Text Book

- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005
- Dr.B.C Punmia , Building Construction.

Reference Books

- Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
- H Leslie Simmons, 'Construction – Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
- Relevant BIS codes.
- Rosen Harold J, Construction materials for Architecture, Krieger Pub Co, 1992
- Doran, David; Cather, Bob; Doran, D. K; Cather, R – Construction materials reference book, Routledge, 2013

SEMESTER-6

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART302	SPECIFICATIONS, COST ESTIMATION AND BUDGETING	2-1-0-0	3	2021

Course Objectives:
The goal of this course is to provide knowledge about various types of estimation and specification of different civil engineering works. It equips students to analyze the rate of various items of work with reference to the standard data and schedule of rate. This course aims to develop capability of students to prepare the detailed estimate of various items of work related to construction and also preparation of the valuation of land and buildings.

Course Outcomes: After completion of the course the student will be able to:

Course Outcomes: After completion of the course the student will be able to:

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Explain the basic principles of quantity estimation, rate analysis and valuation	Understanding
CO-2	Formulate general and detailed technical specification for civil engineering projects	Applying
CO-3	Use CPWD data book and schedule of rates to prepare unit rate for various items of work pertaining to a Civil Engineering project work	Applying
CO-4	Compute the quantity of materials and labour to estimate the cost of civil engineering projects	Applying
CO-5	Assess the value of a property using different methods	Analysing

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks

Tests (2 numbers) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Introduction to specifications and analysis of rates of various items of work. Estimation of building construction cost. Valuation of properties.

Course Plan

Module	Topic	Course Outcome	No. of Hours
I	**Introduction to Quantity surveying** - Basic Principles, Roles / Responsibilities of quantity surveyor at various stages of construction **Specifications**: Necessity of specification, importance of specification **Types of Specification**- General or brief specifications and Detailed specifications - Principles of Specification writing. **General specification** for first, second and third class buildings **Writing of detailed specifications**, for items like earthwork excavations in foundation, DPC, PCC, RCC, Brickwork, Wood work for doors and windows, Plastering cement mortars, Pointing cement mortar, White washing, Colour washing, Distempering, Painting, Flooring like terrazzo flooring and tiles, ceramic tiles, marble, granite, distemper, glazing, and weathering course in terrace as per National Building Code and CPWD specifications	CO 1 CO 2	8
II	**Estimate** - Details required - Types of estimates **Approximate estimates** (plinth area method and cubic content method only), basic differences and advantages	CO 1	8

	Bill of Quantity - Typical format- **Item of works**- Identify various item of work from the drawings **Units of measurement** of various materials and works (focus may give to RCC residential building) - Methods of measurement of building and civil engineering works as per IS 1200 (Part 1). **Introduction to Detailed Building Estimation** or item rate estimate - Introduction of the format of details of measurement and calculation of quantities, format to prepare abstract of estimated cost. Details of documents to be accompanied with detailed estimate		
FIRST INTERNAL TEST			
III	**Introduction to the use of CPWD schedule of rates** as per latest DSR and Analysis of rate as per latest DAR. **Analysis of rates, cost of materials and labour for various works** such as Earth work in excavation for foundation, mortars, reinforced cement concrete Works, finishing work, masonry work, stone works, flooring with reference to latest DSR and latest DAR (Data should be given). **Brief introduction to different methods of execution** i.e., piece work, daily basis, lump sum, labour rates and percentage etc.	CO 1 CO 3	10
IV	**Detailed Estimate**- Preparation of detailed measurement using Centre line method and Short wall-long wall (separate wall) method for RCC single storied building (Flat roof) including stair cabin- Material quantity calculation of the items of works such as Earthwork excavation, Foundation, Superstructure (Brick work, Rubble work, Concrete works, Plastering and Painting) Approximate quantity of reinforcing steel required for various	CO 1 CO 4	11

	RCC members (Detailed Calculation of reinforcement bars not required). **Introduction to format and purpose of bar bending schedule** (Detailed schedule preparation is not required)		
SECOND INTERNAL TEST			
V	**Valuation** – purpose, factors affecting **Introduction to terms**-Value, Cost, Price, Income- Gross income, net income, outgoings, annuity, sinking fund, Year's purchase. **Depreciation** – methods of calculating depreciation – straight line method, constant percentage method, obsolescence. Free hold and leasehold properties **Methods of valuation**- rental method, direct comparison of capital cost, valuation based on profit, depreciation method. Valuation of land – belting method, development method	CO 1 CO 5	8
END SEMESTER EXAM			

Reference Books

1. Dutta B N, Estimation and costing in Civil Engineering, UBS Publishers and Distributors Ltd., New Delhi
2. Rangwala, Estimation, costing and valuation, Charotar Publishing House Pvt. Ltd.
3. M. Chakraborthy, Estimating, Costing, Specification and Valuation in Civil Engineering,Chakraborti,2006
4. Mahajan S P, Civil Estimating and Costing, Satya Prakashan,1996
5. IS 1200: 1968, Methods of measurement of building and civil engineering works
6. CPWD DAR 2018 and DSR 2018 or the latest
7. CPWD Specifications vol. 1 and 2 (2019 or latest)
8. Shah N A, Quantity surveying and specification in Civil Engineering, Khanna Publishers, 1976

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART 304	HISTORY OF ARCHITECTURE AND CULTURE- V	3-0-0-0	3	2021

Course Objectives:

The course looks at the architectural developments after 1970s when Modernism was criticised and counter movements such as Post Modernism and Deconstructivism etc became the new theoretical narratives. The period also saw rising environmental consciousness and an attempt for sustainable development. The New Architecture which includes many other disciplines started to take root and the period saw the rise of digital technologies in Architecture. The course gives special focus to local developments- the works of Indian, especially Kerala architects.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Learn the new and contemporary trends in Architecture and how the current world view influences architectural styles	Understanding
CO-2	Learn from the works of contemporary international architects	Understanding, Applying
CO-3	Understand the New trends in Architecture in India and works of contemporary masters	Understanding, Applying
CO-4	Study the Development of Architecture in Kerala post-independence	Understanding, Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions (5x4= 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 7 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Post Modernism
Deconstructivism, Critical Regionalism, Sustainability, Parametricism
New typologies in architecture and their evolution.
Contemporary architects and their works.
Post Independent Architecture in India and in Kerala.

Course Plan

Module	Topic	Course outcome	No. of hours
I	Critique of Modernism- Challenging CIAM declarations- Historic Revivalism - Pop Architecture - Post and Late Modern Architecture - Writings of Venturi- Jane Jacobs- Aldo Rossi - Christopher Alexander. Works of James Sterling, Charles Moore. Theories of Critical Regionalism, Structuralism, Deconstructivism, Parametricism. CAD/CAM and other digital technologies and their evolution in Architecture. Evolution of new typologies such as malls, resorts, IT parks. Atrium concept in architecture.	CO1	9
II	Industrial aesthetics of Richard Rogers, Norman Foster. Works of I.M.Pei, KenzoTange, Minoru Yamasaki, Toyo Ito. Peter Eisenmann, ZahaHadid, Frank Gehry, Bernard Tschumi, Santiago Calatrava. Rising environmental consciousness, Contemporary concepts of Earthships, Energy Efficiency, Sustainability, Floating Architecture, Berm Architecture. Theory of New Urbanism and Sustainable Architecture. Ideas and Works of Fathy-Ken Yeang -Tadao Ando - Geoffrey Bawa.	CO2	9
FIRST INTERNAL TEST			
III	Architecture and urbanism by great Indian masters: BV Doshi (Institute of Indology Ahmedabad, IIM-Bangalore and Gufa, Ahmedabad) and Charles Correa: (RamaKrishna House, Ahmedabad, Kanchen Junga Apartments, Mumbai and MRF Headquarters, Chennai). 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).	CO3	9

IV	Change in architecture trends from late 1990, Socio-economic changes due to globalization. Rapid urbanisation, Rise of private townships, gated communities and globalised business parks; Rise of informality in production of space. Contemporary theories in Indian Architects like Minimalism, Expressive, Exposed Brick, Earthen Architecture, Sustainable Architecture, etc The concepts of contemporary architects like Hafeez contractor, Christopher Benninger, Sanjay Mohe, Dean D'Cruz, Chitra Viswanath, Jaisim, Morphogenesis Studio etc.	CO3	12
SECOND INTERNAL TEST			
V	Post Independent Architecture in Kerala. Redefining Traditional and Indian Vernacular styles. Change of Role of Courtyard. Works of Contemporary Architects in Kerala. Laurie Baker- CDS, Hamlet. Study Tour to see Masters' works. Submission of Tour Report.	CO4	7
END SEMESTER EXAM			

Text Books:

1. Kenneth Frampton, "Modern Architecture": A Critical History, Thames and Hudson, London, 1994
2. Leonardo Benevolo, "History of Modern Architecture", 2 Vols., Routledge & Kegan Paul, London, 1971.
3. Manfredo Taferi/ Francesodalco, "Modern Architecture'', Faber and Faber/ Electa, 1980.
4. Sigfried Giedion, "Space Time and Architecture": The Growth of a New Tradition, Havard University Press, 1978.
5. Thomas Metcalf, "An Imperial Vision", Faber and Faber, London.1989.
6. Aldo Rossi, the Architecture of the City, MIT Press, Massachusetts, 1982.
7. Charles Jencks, the Language of Post-Modern Architecture, 1984.
8. Christopher Alexander, Pattern Language, Oxford University Press, Oxford.
9. D. Ghirardo, Architecture after Modernism, Thames and Hudson, London, 1990.
10. Miki Desai et.al, Architecture and Independence, Oxford University Press, New Delhi, 1998.
11. Robert Venturi, Complexity and Contradiction in Architecture, The Architectural Press, London, 1977
12. Lang, J.T (2002). A Concise History of Modern Architecture in India.
13. Lu, D (Ed). (2011). Third World Modernism, Architecture, Development and Identity. Oxon : Routledge.
14. Mehrotra, R. (2011). Architecture in India Since 1990. Pictor.
15. Singh, M. and Mukherjee, R. New Delhi- Making of a Capital. New Delhi : Roli Books.
16. Tafuri, M. (1980). Modern Architecture. Harry N. Abrams Inc.
17. Verma, P. (2010). Becoming Indian – The Unfinished Revolution of Culture and Identity. New Delhi : Penguin India.

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Faculty to act as facilitator and guide rather than one way lecturing.
- Book Reviews are to be part of assignments.
- Students are to be encouraged to watch movies and documentaries which give information about culture and architecture and prepare reviews/ reports and have discussions in class.
- As far as possible the students are to be encouraged to visit the architectural monuments in their vicinity and prepare reports and sketches, regardless of whether they are part of the syllabus.
- At the end of the course, each student has to prepare a short video on any of the topics in the syllabus.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AET 302	THEORY OF STRUCTURES-VI	2-1-0-0	3	2021

Course Objectives:

This course provides fundamental concepts of commonly practiced structural systems which were not apportioned in the previous TOS courses. The structural behaviour and design concepts of industrial steel buildings, flat slab, grid / coffered floor systems, masonry structures, prestressed concrete elements along with seismic design philosophies are dealt in various modules.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Summarise the structural behaviour/concept of commonly practiced structural systems such as industrial steel buildings, flat slabs, grid or coffered floor systems, and prestressed concrete.	Understanding
CO - 2	Explain the structural behaviour of masonry structural elements such as pillars, walls, retaining walls and foundations	Understanding
CO - 3	Design masonry structural elements such as pillars, walls, retaining walls and foundations following Indian standards	Creating
CO - 4	Explain the structural behaviour and EQ resistant design provisions of framed and masonry structures	Understanding

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from

each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Standards Permitted in the exam hall:

IS 1905: 1987 Code of practice for structural use of unreinforced masonry, Bureau of Indian Standards.

Syllabus

Industrial steel building - Building configuration and components - Portal frame - Flat slab - Grid or coffered floor systems - Design as per IS code approximate method
Brick masonry pillars and walls - working stress and limit state approaches to analysis and design - Design of unreinforced brick masonry pillars, walls, retaining walls and foundation
Seismic design philosophies - Earthquake resistant design and detailing of framed structures based on IS codes -Earth quake resistant design provisions in masonry structures
Pre stressed concrete – Principles - prestressed beams and slabs - Analysis of rectangular prestressed beams - losses in prestress

Course Plan

Module	Topic	Course Outcome	No. of hours
I	Industrial steel building - Introduction - Building configuration and components - load and load combination as per IS 875 - Portal frame - analysis only (design not required) Flat slab - components - proportioning of component as per IS 456 - Structural behaviour - concept only Grid or coffered floor systems - Different configuration - Design as per IS code approximate method	**CO1**	**9**
II	Introduction to brick masonry pillars and walls - Mechanical behaviour of masonry assemblages under different gravity loads - working stress and limit state approaches to analysis and design of unreinforced, reinforced, confined masonry structures for gravity loads (Theory only) - Design of unreinforced brick masonry pillars and walls (WSM) using IS 1905: 1987	**CO2** **CO3**	**9**
FIRST INTERNAL TEST			
III	Design of unreinforced masonry retaining walls – lateral earth pressure – stability of retaining walls Design of unreinforced masonry foundation – types of foundation –loads acting on the foundation	**CO2** **CO3**	**9**

IV	Seismic design philosophies - Stiffness, strength, ductility, damping, center of mass, center of rigidity, torsion. Strong column- weak beam concept Earthquake resistant design of framed structures based on IS 1893- Reinforcement detailing –beams, columns, beam column joints, openings as per IS 13920. Behaviour of Masonry building during earthquakes. Earth quake resistant design provisions in masonry structures	**CO4**	**10**
SECOND INTERNAL TEST			
V	Introduction to Prestressed concrete – Principles of prestressing – Introduction to pretensioned and post tensioned beams and slabs (Concept only) – Analysis of rectangular prestressed beams at transfer and at service – Losses in prestress (theory only)	**CO1**	**8**
END SEMESTER EXAM			

Reference Books/ Standards:

- IS 1905: 1987 Structural use of unreinforced masonry - code of practice, Bureau of Indian Standards, New Delhi
- IS 4326: 1993, Earthquake resistant design and construction of buildings - code of practice, Bureau of Indian Standards, New Delhi
- IS 13920: 1993 Ductile detailing of reinforced concrete structures subjected to seismic forces - code of practice, Bureau of Indian Standards, New Delhi
- IS 1343: 2012 Prestressed concrete - code of practice, Bureau of Indian Standards, New Delhi
- Dayarathnam, P. Brick and reinforced brick structures, Oxford and IBH Publishing Co. Ptvt. Ltd.
- Arya, Masonry and timber structures including earthquake resistant design, Nem Chand & Bros, Roorkee
- Harbhajan Singh, Design of Masonry and Timber structures, Abhishek Publications, Chandigarh.
- Pankaj Agrawal, Manish Shrikhande, Earthquake Resistant Design of Structures, PHI learning Pvt. Ltd
- Shashikant K. Duggal, Earthquake Resistant Design of Structures, Oxford P CVR Murty, “Earthquake Tips”, National Information Centre of Earthquake
- Engineering , www.nicee.org/EQtips.php
- National Building Code of India 2016 Vol.1, Part 6 Section 4 Structural Design - Masonry
- R E Klingner 2010 Masonry structural design, McGrawHill Companies, Inc. New York
- M Tomazevic 1999 Earthquake-resistant design of masonry buildings, Series on Innovation in Structures and Construction, Vol. 1, Imperial College Press, London
- MJN Priestley and T Paulay 1997 Seismic design and assessment of reinforced concrete and masonry buildings, John Wiley and Sons.
- RG Drysdale, AA Hamid, LR Baker 1994 Masonry Structures: Behaviour and design, Prentice Hall, New Jersey, USA.
- AW Hendry 1981 Structural Brickwork, The Macmillan Press Ltd. Publications

NPTEL COURSE:

- NPTEL course on Design of Masonry Structures, by Prof. Arun Menon, IIT Madras, https://nptel.ac.in/courses/105106197

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ART 306	BUILDING SERVICES-IV (ARCHITECTURAL ACOUSTICS)	2-0-0-1	3	2021

Course Objectives

The objective of the course is to develop a basic understanding of the principles of architectural acoustics, the way we hear and perceive sound both indoors and outdoors, the appropriate criteria for listening environment and acoustical privacy, and the architectural decisions of layout and material selection in design.

Course Outcomes:

After the completion of this course, the student will be able to

Course Outcome	Description of Course Outcomes	Prescribed learning level
CO-1	Identify relevant IS specifications for Acoustic design.	Remembering
CO-2	Understanding the basic concepts of Acoustic design.	Understanding
CO-3	Application and Calculation of Acoustical values	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks

Continuous assessment tests (2 numbers) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carries 8 marks.

Syllabus

Hearing and Perception-Behaviour of sound in enclosed spaces - Room Acoustics and Reverberation- Sound Absorption- Sound Transmission- acoustical materials- acoustical defects-Design Principles of Auditorium -Air borne & Structure Borne Noise- Planning against noise.

Course Plan

Module	Contents	Course outcomes	Hours
I	**Introduction to Architectural acoustics** The nature of sound - propagation of sound-velocity, frequency and wavelength of sound. Sound pressure - Sound intensity and loudness- Decibel and Phons The human ear and hearing characteristics - Instruments and equipment"	CO2	6
II	**Room Acoustics** The behaviour of sound in enclosed spaces (sound phenomena).- Absorption, Diffraction, Diffusion, Reflection, Refraction and Transmission. Design Factors for enclosed spaces- Ray diagram. Acoustic properties of materials and types-Sound absorption coefficient, Sound absorbing materials, Porous materials, Panel materials, and Resonators. Space absorbers - variable absorbers.	CO2, CO3	9
FIRST INTERNAL TEST			
III	Understanding Reverberation Time, Frequency and Volume of spaces. Calculation of reverberation time - Sabine's formula. Acoustical defects in the enclosed spaces. **Acoustical Design Principles of Auditorium** Different acoustical defects in auditoriums and their solutions, acoustical correction design and modification techniques. *Task: Calculating RT of classroom.*	CO2, CO3, CO1	12

IV	**Effect of noise on human beings** Noise sources - airborne and structure borne- Methods of preventing airborne and structure borne noises. Sound transmission- Noise criteria –NC curve - Transmission loss - permissible noise levels for different types of spaces. *Task: Measuring the noise level of a room, comparing it with IS code recommendations.*	CO2, CO3, CO1	9
SECOND INTERNAL TEST			
V	Planning for noise control Reduction of noise by Town Planning and regional planning considerations - landscaping, campus planning and building design. *Task: Acoustical analysis of a neighbourhood/ campus and suggesting remedies.*	CO2, CO3	9
END SEMESTER EXAM			

References

- Cavanaugh, Hoboken, Architectural acoustics : Principles and practice,: Wiley & sons,2010.
- Design for Good Acoustics and Noise Control, Macmillan Education, 1988.
- Ducan Templation, Acoustics in the built environment, Oxford ; Boston : ArchitecturalPress, 1997.
- J. Flynn, J. A. Kremers, A. W. Segil, G. Steffy, Architectural Interior Systems, Lighting,
- Acoustics, Air Conditioning, Van Nostrand Reinhold, 1992. .
- Kinsler and Fry, Hoboken, Fundamental of acoustics, NJ : Wiley, 2000
- Knudson and Harris, Acoustical Designing to Architecture, ‘American Institute of
- Physics for the Acoustical Society of America, 1978
- M. D. Egan , Architectural Acoustics, Mc Grawhill Inc., 1988.
- M. D. Egan, Concepts in Architectural Acoustics, 1972

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT 310	CULTURALLY RESPONSIVE BUILT ENVIRONMENT	2-0-0-0	2	2021

Course objectives:

To Introduce the concepts and theories of cultural discourse and its impact on Built Environment and appreciate built environment as a manifestation of a broader cultural and intellectual setting.

To develop an understanding of cultural expression in built environment as a resultant of the Socio-economic-political roots of the society.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Familiarizing culture and its significance in the development of Built Environment.	Understanding
CO-2	Responsive Built Environments –Theories and Concepts.	Understanding
CO-3	Dwellings, settlement and traditions -Cultural expressions, Contextual cues and their responses in the built environment.	Analyzing
CO-4	Determinants of built form - study of various Socio–political and Economic responses and case studies.	Analyzing
CO-5	Appreciation of the Physical manifestation of built form with respect time to understand the complexity and diversity of Built environments.	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Continuous assessment tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

An overview of the development of Responsive built Environment, concepts and theories of culture and built environment, place Identity, Different Cultural expressions, Cultural and contextual cues and their responses in the built environment, Determinants of built form, various Socio–political and Economic responses and various developments across landforms and analysis of specific cases through the complexity and diversity of Indian subcontinent.

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Introduction to Culture and Built Environment.** Definition of Culture and cultural discourse. Elements of culture and society, Tangible and intangible aspects of culture. Cosmopolitan Society- cultural diversity and multi-cultural mélange. Dwellings, settlements and traditions - Types and evolution of Built environments. Factors influencing the built form. Culture and context, their responses to built environment. Architecture of a Place- Identity and its Significance.	CO1	6
II	**Theories and concepts of Culture and built environments.** Different concepts and theories to study the cultural discourses in Architecture, Organization of space, Concepts of place and spaces. Identity of a place, Place making. Various Dimensions of culturally responsive built environments. Responsive Environments and various determining factors.	CO2	6
FIRST INTERNAL EXAMINATION			
III	**Architecture as a process and a product of Culture.** Vernacular architecture, Resource, materials and technology. Development of various cultural Expressions with case studies from different regions of the world. Understanding the Context -Variations in social-cultural Elements, economic, political and climatic influences and its effects in Built form. Dynamics of Urban and Rural setting, Cultural heritages, Relationship between people and places. Cultural disasters.	CO3	6
IV	**Determinants of Built Environments.** Built form and various elements of built form, Typology of built forms, factors influencing cultural and contextual determinants of built form. Contextual cues, mapping and analysing tools for exploring the built forms in a context and listing the contextual cues	CO4	6

	of a place. Cultural responsiveness from different civilizations/cultural contexts - Europe, Africa, America, Asia and Oceania.		
SECOND INTERNAL EXAMINATION			
V	**Perception of Built Environment- Regional context.** Understanding the Topographical, Climatic, cultural equilibriums in built environment. Appreciate the evolution of built environment as an outcome of various socio-political, economic influences with respect to the various cultural landscapes of India.Exploring the Parameters of user experience and spatial qualities to responsive built environments, Cultural responsiveness of the following regions: North east India cultural region, Dravidian- cultural region, Bengali cultural region, Sikh cultural region, Kashmiri Muslim cultural region, Ladaki-buddhist cultural region.	CO5	6
END SEMESTER EXAMINATION			

Reference Books

- Amos Rapoport, *Culture, Architecture and design*, (2005), Locke Science Publishing Company
- Amos Rapoport, *House, Form & Culture,* Prentice Hall Inc 1969.
- King A. (2004). *Spaces of Global cultures: Architecture urbanism identity. London*: Routledge.
- King A (ed) (1997) *Culture, Globalization and the world systems: Contemporary conditions for the representation of Identity*. Minneapolis: University of Minnesota.
- Bourdier J and Alsayyad N (eds) (1989). *Dwellings, settlement and Tradition*. Lanham, Maryland: University press of America.
- Leo Hansen, (2012), *Culture and Architecture, an integrated history*, Cognella Academic Pub.
- Adam Sharr, (2012), *Reading Architecture and Culture: Researching buildings, spaces and documents*, Routledge.
- Bryan Christiansen, Gülşah Koç, Marie-Thérèse Claes, (2016), *Cultural Influences on Architecture*, IGI Global.
- Kingston Heath, (2009), *Vernacular Architecture and Regional Design: Cultural process and Environmental Response*, Architecture press.
- Qian Yin, (2012), *When Culture Meets Architecture*, Design Media Pub.
- Paul Emmons, Jane Lomholt, John Shannon Hendrix, (2012), *The Cultural Role of Architecture, contemporary and historical perspectives*, Routledge.
- Castells M (1997), *The power of Identity*. Oxford: Blackwells.
- Ian Bently, Alan Alcock, Paul Murrain, Sue McGlynn, Graham Smith, (2013) *Responsive Environments- a manual for designers*, Taylor & Francis Ltd.

- Vellinga Marcel, Oliver Paul & Bridge Alexander, Atlas *of Vernacular Architecture of the World*, Taylor & Francis Ltd ,2008
- G.H.R. Tillotsum – *The tradition of Indian Architecture Continuity, Controversy – Change since 1850*, Oxford University Press, Delhi, 1989.
- Oliver, Paul (1987) *Dwellings: the house across the world.* (1987), University of Texas Press.
- Oliver (2006) *Built to meet needs: Cultural issues in Vernacular Architecture*. Oxford: Architectural Press.
- Lang, J Desai M (ed) (1997) *Architecture and Independence: the search for identity –India 1880 to 1980*, Oxford University press.
- Carmen Kagal, *VISTARA—the Architecture of India*, Pub: The Festival of India, 1986.
- Cooper, I. *Traditional buildings of India*. Thames and Hudson Ltd, London, 1998
- Kathleen Kuiper, *the Culture of India*, (2010), Britannica Educational Publishing.
- Dora P. Crouch, Professor Emerita Dora P Crouch, June Gwendolyn Johnson, (2001), *Traditions in Architecture: Africa, America, Asia and Oceania*, Oxford University Press.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT 314	THEORY OF DESIGN	2-0-0-0	2	2021

Course Objectives:

- To help students to understand the basics of language of architecture
- To make the students to understand substances of Architecture to develop visual language
- To equip students to understand the language of architecture which establishes relationship of space with user
- To do evaluation of Case Studies to effectively understand the poetics in the language of architecture.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To understand the basics of language of architecture	Understanding
CO2	To understand substances of Architecture to develop visual language	Understanding, analysing
CO3	To understand language of architecture that helps them to establish relationship with user	Understanding
CO4	To analyse and summarize the language of architecture through examples	Understanding Evaluating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Continuous assessment tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

Experiencing Architecture, Sensory Experience, Language of Architecture, Evaluation

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Introduce the essential elements one needs to develop a visual language and the skills for critical thinking**: Analysis, Concept, Representation **The elements of design process**: Program, Context, Environment	CO1 CO2	8
II	**Physical Substances of Architecture:** Mass, Structure, Surface, Materials **Ephemeral Substances of Architecture:** Space, Scale, Light, Movement	CO1 CO2	6
FIRST INTERNAL EXAMINATION			
III	**Conceptual devices that contribute to Poetics of Architecture:** Dialogue, Tropes, Defamiliarization, Transformation **Organisational devices that contribute to Poetics of Architecture:** Infrastructure, Datum, Order, Grid, Geometry	CO3	6
IV	**Considerations an architect might have for the implicit possibility of construction:** Fabrication, Prefabrication	CO3	4
SECOND INTERNAL EXAMINATION			
V	**Evaluation of Case Studies to effectively understand the Poetics in Language of Architecture**	CO4	6
END SEMESTER EXAMINATION			

Text Books:

1. Andrea Simitch, Val Warke - The Language of Architecture 26 Principles Every Architect Should Know (2014, Rockport Publishers)

Reference Books

1. Juhani Pallasmaa - The Eyes of the Skin - Architecture and the Senses (2012, Wiley)
2. Kate Nesbitt (editor) - Theorizing a new agenda for architecture - an anthology of architectural theory, 1965-1995- Princeton Architectural Press (1996)
3. Leon Krier - The Architecture of Community (2011, Island Press)
4. Steen Eiler Rasmussen - Experiencing Architecture (1964, MIT Press)
5. Anthony C. Antoniades- Poetics of Architecture: Theory of Design (Wiley, 1992)

Course materials, Guidance and Evaluation methods

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Representing architecture through drawing, painting, photography, sculpting, printing, physical models etc. can be given as class exercises
- The students can be encouraged to visit architecture through study tours and develop the skill of architectural appreciation by documenting. Each student should be encouraged to have a sketchbook with notes, graphical interpretations, sketches of all the topics covered

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT 316	APPROPRIATE BUILDING TECHNOLOGIES	2-0-0-0	2	2021

Course Objectives:

- To give exposure to the concepts of appropriate building technology and services suitable in global as well as Indian context, and its applicability in both rural and urban environment.
- To give exposure to techniques which encompass choice and application that is small-scale, affordable, decentralized, labor-intensive, energy-efficient, environmentally sustainable, and locally autonomous.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Understand use of appropriate technology and materials suited to the climate, socio-economic conditions and natural resources of an area	Understanding
CO - 2	Study alterative materials and construction techniques developed in recent past and vernacular setting	Understanding
CO - 3	Apply knowledge of science of materials and technology to building construction	Applying
CO - 4	Application of Technologies devised by Research Institutes in architectural design projects	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Continuous assessment tests (2 numbers) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

Study of appropriate technology and materials suited to the climate, socio-economic conditions and natural resources of an area, and which contribute to sustainable development. Study of alternative materials and construction techniques developed in the recent past.

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Introduction to appropriate technology and Materials-** Definition of appropriate technology, Need, Objectives, Selection of Technologies, Evaluation of appropriateness, Role of appropriate building technology in sustainable development, Types, Advantages, Limitations in use of Technologies	CO1	6
II	**Appropriate building materials and technology in vernacular architecture** Timber-frame construction, Wattle & daub walls, rammed earth walls, adobe walls, etc. Walls, vaults, domes using soil cement, compressed mud blocks, Nubian arch roof. Bamboo as building material, its properties.	CO2	6
FIRST INTERNAL EXAMINATION			
III	**Evolutionary trends in Appropriate building technologies** – for walls, floors,roofs, joinery- Precast building components- Prefab brick panel system, concrete panel system, jack-arch panel system, earthen construction techniques, pre-cast joists, 3D printing technology, Instant shelter for disaster relief	CO1, CO3	6
IV	**Evolutionary trends in Appropriate building materials** – for walls, floors, roofs, joinery- Fly ash- sand lime gypsum bricks, compressed earth bricks, ferrocement wall panels, coir polymer composite boards, Non-erodable mud plaster, Ferro cement plaster for mud walls and fire-retardent thatch roof, Ferro cement roofing channels, bamboo mat corrugated roofing sheet, GRP door shutters and frames, fly ash/red mud polymer doors and panel boards Utilisation of waste materials, construction and demolition waste, plastics, supplementary cementitious materials.	CO1, CO3	9

SECOND INTERNAL EXAMINATION			
V	**Material research, technologies and development by Research Institutes–** Latest advances in techniques in building construction - Central Building Research Institute (CSIR-CBRI), Structural Engineering Research Centre (CSIR-SERC), National Environmental Engineering Research Institute (CSIR-NEERI), Building Materials and Technology Promotion Council (BMTPC), Centre of Science and Technology For Rural Development (COSTFORD), Auroville Centre for Scientific Research (CSR), Centre for Sustainable Technologies (CST, Indian Institute of Science) and other State level Institutes. Application of these techniques in architectural design projects	CO4	9
END SEMESTER EXAMINATION			

Reference Books

- S K Duggal, Building Materials, New Age Publishers, 2019
- B C Punmia and Ashok Kumar Jain, Building Construction, Laxmi Publications, New Delhi,2005
- Henry J Cowan and Peter Smith, The Science and Technology of Building Materials,Van Nostrand Reinhold,1988.
- Kent A. Harries and Bhavna Sharma, Nonconventional and Vernacular Construction Materials – Characterisation, Properties and Applications, Woodhead Publishing, 2020
- Varis Bokalders and Maria Block, The Whole Building Handbook – How to Design Healthy, Efficient and Sustainable Buildings, Routledge, 2010.
- Gernot Minke, Building with Earth – Design and Technology of a Sustainable Architecture, Birkhäuser Basel, 2006
- Handbook on Energy Conscious Buildings by J.K. Nayak and J.A. Prajapati
- Nayak, J.K. and Prajapati, J.A. Handbook on Energy Conscious Buildings,2006

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ECT 318	TROPICAL ARCHITECTURE	2-0-0-0	2	2021

Course Objectives:

To introduce students to the regional, climatic, cultural features of the tropics and the resultant architecture in response to local characteristics.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Interpret the geographical and climatic influences in tropics.	Understanding
CO - 2	Identify the comfort factors for human bioclimatic needs in the tropics.	Understanding
CO - 3	Examine climate responsive passive design strategies in vernacular and modern buildings in tropical zones.	Analysing
CO - 4	Appraise climate responsive and culturally significant vernacular design strategies in shelters for tropical climates.	Evaluating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks
Continuous assessment tests (2 numbers) : 20 Marks
Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and Part B. Part A contain 5 questions from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question can have sub divisions and carry 8 marks.

Syllabus

Regional characteristics of the tropics. Relationship between nature and built form - Architecture in the tropics. Examples of climatic design. Vernacular influence and local architecture in various tropical countries, Warm humid Tropical climate with special reference to Kerala.

Course plan

Module	Contents	Course outcome	No. of Hours
I	**Introduction to Tropical regions** Tropics – definition based on geography and climates. The state of the tropics –Brief on region, ecosystems, environment, cultures, economic and infrastructure growth. Climate change in tropics and impacts, Tropical expansion. Urban growth trends in tropics, Heat effects and indicators, Urban Heat Island (UHI) phenomenon, UHI Classifications, Case studies.	CO1	9
II	**Climatic response and comfort perceptions.** Climate of the tropics and classification – Tropical wet climate, Tropical dry climate and Tropical monsoon climate zones. Physiological needs in tropical climatic conditions, Thermal comfort in the tropics – Bio climatic needs of humans Indoor comfort indices for the tropics: Effective temperature (ET), Standard effective temperature (SET), PMV, Comfort Temperature, Adaptive Comfort Model Thermal comfort in the urban outdoors, outdoor comfort indices: WBGT, PET, OUT-SET.	CO1	9
FIRST INTERNAL EXAMINATION			
III	**Examples of climatic design in various tropical countries** Vernacular and Contemporary Architecture in the tropics and Subtropical regions.	CO2	9
IV	**Warm humid tropical climate** Characteristics of climate, landscape, evolution of climate responsive built forms and architectural features, external and internal spaces. Passive strategies for comfort and energy efficiency. Design treatment of construction elements.	CO3	9

SECOND INTERNAL EXAMINATION			
V	Study of vernacular influence and local architecture as response to climatic conditions of Kerala. Field trip and Climate analysis through observation.	CO4	9
END SEMESTER EXAMINATION			

Reference Books

- Koenisberger O. H., Ingersoll T. G., Mayhew A., Szokolay S. V., Manual of Tropical Housing and Building, Orient Blackswan, 1975.
- Givoni B., Man, Climate and Architecture, Elsevier Publishing Company Limited, 1969.
- Olgyay V., Design with Climate, Princeton University Press, 2015.
- Krishan A., et al., Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, Tata McGraw-Hill Education, 2001.
- Fry, M. and Drew, J., Tropical Architecture in the Dry and Humid Zones. Londres:Bstford, 1964
- Barreneche, R. A. Tropical Modern Thames and Hudson, London 2003
- Lippsmeier, G., Building en the Tropics, Munich: Callwey, 1969
- Made Wijaya, Architecture of Bali-A Sourcebook of Traditional & Modern Forms,2011
- Hyde, Richard. Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates. 2013.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARD 302	ARCHITECTURAL DESIGN-V	0-0-10-0	10	2021

Course Objectives:

- To introduce the students, the design of multifunctional and multi-storied buildings having a complex array of activities.
- To design functionally complex buildings with an understanding of structural systems and the application of various building services and circulation systems.
- To understand advanced construction technology and latest building materials.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Understand and identify different residential typologies and how they relate to spatial use and experience Understand through data collection/literature study/case study, different typologies of multi-story, multi-functional buildings with integration of structural design and building services.	Understanding
CO-2	Application of knowledge to initiate architectural design process within the selected site context by using relevant space standards and building rules to formulate concepts and design. Visualize design concepts and make block and site models and arrive initial design	Applying
CO-3	Analysis and inference through data collection, case studies of projects related to the design project and developing skills so as to create a design programme	Analysing and evaluating
CO-4	Arriving at final site-specific design solution integrating the various requirements of the design programme	Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester Jury examination marks	End semester Jury examination duration
100	50	50	2-3 days

Continuous internal evaluation pattern:

Attendance : 5 Marks
Design Assignments/Reviews/Tests/ CAD Assignments : 45 Marks

Syllabus:

The studio involves the design of multi-functional and multi-storied buildings such as in healthcare (hospitals), hospitality (hotels), apartment complexes, mixed use commercial complexes, etc. The design studio focuses on building services, structural systems, building materials & technology. The studio encourages students to explore functionality, space optimization, conformity with standards & building rules, integration of structural systems and building services in architectural design.

Course Plan:

Module	Topic	Course outcome	No. of hours
I	Study of different typologies in multi-functional, multi-storied buildings with emphasis on building services, structural systems, building materials & technology. They will also learn about site planning and landscaping in tight spatial context.	CO-1, CO-2, CO-3	30
II	Study of Space Standards and building codes for design of multi-functional, multi-storied buildings. Detailed study about various building services, structural systems, building materials & advanced construction technology used in multi-functional multi-storied buildings. Arriving at architectural design programme based on user requirements, literature studies, case studies & design standards.	CO-2	30

FIRST INTERNAL TEST			
III	Understanding the site, climate & context through site analysis. Application of knowledge to initiate architectural design process within the selected site context by using relevant space standards and building rules to formulate concepts and design. Visualize the design concepts in 3D and make block and site models and arrive initial design.	CO-1, CO-3	30
IV	Critical analysis of the effectiveness of initial design with respect to local context, climate, circulation within site & within building, structure, services, user behavioral patterns, etc. and revising the design accordingly.	CO-1, CO-3	30
SECOND INTERNAL TEST			
V	Detailed design development with integration of structural systems and building services in architectural layout and construction. Preparation of final presentation drawings including layout with parking & landscaping, architectural drawings with plans, section & elevations, detailed drawings of building services & structural systems, detailed 3D models, etc.	CO-4	30
END SEMESTER EXAMINATION/ JURY			

Reference Books

- Baiche, B. and Walliman, N. (2012). Neufert Architects Data, 4th Ed. Oxford: Wiley-Blackwell.
- Chiara, J. D. and Michael, J. C. 2001. Time Savers Standards for Building Types. Singapore: McGraw Hill Professional
- Geoffrey Broadbent `Design in Architecture' John Wiley and Sons, 1973.
- Neuferts' Architect's Data
- Roth, L. M. 'Understanding Architecture: Its Experience History and Meaning', 3rd Ed. Philadelphia: West-view press, 2013.
- Rudolf, A 'The dynamics of architectural form', Berkeley and Los Angeles: University of California Press,1977.
- Aouad.G, 'Computer Aided Design Guide for Architecture, Engineering and Construction', Taylor & Francis Publication, 2011
- Parker, D. And Wood, A. (2013). The Tall Buildings Reference Book. New York: Routledge.
- Wood, A. and Ruba, S. (2012). Guide to Natural Ventilation in High Rise Office Buildings. New York: Routledge.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARS 302	BUILDING MATERIALS, CONSTRUCTION TECHNIQUES AND WORKING DRAWING	1-0-0-3	4	2021

Course objectives :

The goal of this course is to expose the students to elementary building materials and their applications. It aims to familiarize students to contemporary as well as vernacular and traditional building materials. It will also introduce students to prevailing & relevant BIS specifications and detailed Architectural working drawings. After this course, the students will be able to recognize construction techniques, working drawings and materials in the market and use them in their design visualization.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	Identify the relevant BIS specifications.	Remembering
CO2	Introduce Architectural working drawings.	Understanding, Applying
CO3	Working drawings including detailed construction drawings	Understanding, Applying
CO4	Use the various building materials in their design processes appropriately	Applying
CO5	Understanding advanced concrete and prefabrications	Applying

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance	: 5 Marks
Continuous assessment tests (2 nos.)	:15 Marks
Portfolio presentation (15) / drawings(15)	: 30 Marks

End semester examination pattern:

There will be three parts; Part A, B and C. Part A will contain 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions. Part B will contain 2 questions from each module, of which the student should answer any one. Each question carries 4 marks. Part C will have one essay question which can have subdivisions, to assess the student's capacity for analysing the topics and linking it with other subjects studied. The question carries 15 marks.

Syllabus

Wall finishes: Types of Wall finishes. Plaster. Paints and Varnish and Wall cladding. Floor finishes: Types of floor finishes- selection criteria- Methods of fixing. Working Drawings: Detailed working drawings of plan,section and elevations- Construction Details like foundation, joinery etc. Advanced Structural concepts in Architecture : Study of advanced concrete: Light weight, high density, fibre reinforced, polymer concrete– Properties and uses- Admixtures: Pre stressed concrete structures: Precast pre stressed construction Tensile structures: Plate structures

Course plan

Module	Topic	Course outcome	No. of hours
I	**WALL FINISHES AND FLOOR FINISHES** **WALL FINISHES:** Plaster: Lime plaster and gypsum plaster. Fire resistant plaster, X-Ray shielding plaster and acoustic plaster. Paints and varnish: Characteristics of an ideal paint and varnish. Classification – various types of paints. Painting process. Defects in painting works. Process of varnish. Wall cladding: stone cladding, tile cladding, Wooden cladding and metal cladding. Stucco finish and other finishes. **FLOOR FINISHES:** Types of flooring, methods of laying, furnishing of floors with different floor finishes like cement, coloured cement, mosaic, terrazzo, tiles, wood, parquet flooring, stone, brick etc. Classification & properties of tiles used in flooring. Selection criteria & Methods of fixing various types of tiles Different type of resilient and vibration resistive floor like rubber, Linoleum and PVC flooring.	CO1, CO2, CO3, CO4	**10**
II	**WORKING DRAWINGS** Introduction to Architectural Drafting. Detailed working drawing of Plans, Elevations, and sections.	CO1, CO2, CO3, CO4	**15**

FIRST INTERNAL TEST			
III	**WORKING DRAWINGS** Construction Details- Foundation details, joinery details, structural plans etc.	CO1,CO2, CO3,CO4	**15**
IV	**ADVANCED STRUCTURAL CONCEPTS IN ARCHITECTURE** Pre stressed concrete structures: Precast pre stressed construction. Two-way waffle slab, Two-way flat plate, Pre tensioning, Post tensioning, Hollow core slabs, T beam and slab. Tensile structures: Concept of tensile structures, classification, uses, materials used. Application of cable structures in architecture. Plate structures: Definition, classification and application, folded plates, flat slab and coffered slab. Special Structures: Concept, Classification and Application of Pneumatic Structures, Kinetic Structures and Mobile Structures, Portal frames: Definition, and Application. *Sketches: folded pate, Post tensioned slab, Pre tensioned slab, Portal frame.*	CO1,CO2, CO3,CO4	**10**
SECOND INTERNAL TEST			
V	**STUDY OF ADVANCED CONCRETE** Lightweight, high density, fibre reinforced, polymer concrete, outline of manufacture, properties and uses of the above. Admixtures - Water repellent, waterproofing compounds, accelerators, air entraining agents, hardeners, plasticizer - Their properties and uses. **PRE-FABRICATION & MODULAR CO-ORDINATION** Introduction to concepts of Modular Coordination. Definition of Basic Module. Modular controlling dimensions, Planning Modules. Introduction to concepts of prefabrication. Advantages & disadvantages of onsite & off-site prefabrication. Methods of prefabrication. Process of prefabrication. Various issues related to prefabrication industry & Examples of	CO1,CO2 ,CO3,CO4	**10**

	prefabrication concepts.		
END SEMESTER EXAMINATION			

Text Book

- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005
- B C Punmia and Ashok Kumar Jain, Building Construction, Laxmi Publications, New Delhi,2005

Reference Books

- Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
- H Leslie Simmons, 'Construction – Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
- Relevant BIS codes.
- Rosen Harold J, Construction materials for Architecture, Krieger Pub Co, 1992
- Doran, David; Cather, Bob; Doran, D. K; Cather, R – Construction materials reference book, Routledge, 2013

B ARCH 2021

SEMESTER 7

SEMESTER VII

Course code	Course Name	L-T-S-P/D	Credits	Year of Introduction
ARD401	Internship or Practical Training	0-0-0-0	12	2021

Course Objectives

- To expose students to the different aspects of architectural profession and to acquaint themselves with the different facets of architectural projects from design to execution, which includes client discussions, obtaining building permits, preparation of working drawings and estimates, tendering processes, explaining the drawings on site, coordinating the construction with contractors/craftsperson's, discussions with other consultants, completion procedure etc.
- To empower students with management and administration of Architectural firms/offices, importance of teamwork, site visits, preparing presentations, meeting deadlines, handling personal management issues, the importance of soft skills, qualities like punctuality, professional ethics etc.
- To enable the students to develop a sense of responsibility to use their own initiative in making the best use of the opportunities they get during the training period and prepare themselves for the profession

Course Outcome

By the end of the course, the students are exposed to all aspects of architectural practice including the functioning of the office, project conceptualisation and realisation as well as emerging trends in design, materials, technology and construction practices.

a) Conditions of eligibility

As per the B. Arch. Curriculum, students shall undergo one semester of practical training immediately after the completion of the 6th semester B.Arch. examinations. Only those students who have passed the sixth-semester Architectural Design Jury shall be eligible to undergo practical training. The duration of training shall be a minimum of 100 working days.

b) Selection of firm for Practical Training

The training shall be under an architect registered with the COA, possessing experience of a minimum of five years and approved by the Department of Architecture of the teaching institution. The candidate shall select the Architect/ Architectural firm/ Govt. organisation/ Public sector undertaking for practical training with the approval of the Department of Architecture of the teaching institution, in advance before the commencement of the 6th semester University examination. The Architect under whom the practical training is done shall not be a regular/permanent faculty of the teaching institution or an immediate relative of the student.

Students can also select internationally recognised Architects practising outside India, with the approval of the Department of Architecture of the teaching Institution. Any change in the firm in which the student does his/her practical training shall be done with due permission of the teaching institution.

c) Type of work to be carried out during the training period

The students are expected to gain exposure in the following aspects:

- Involvement in the Design Process
- Site visit and Site Supervision
- Preparation of drawings for getting building permissions, working drawings, service drawings, etc.
- Preparation of estimates, specifications, contract documents, and tender documents
- Discussion with clients and other consultants
- General working of a firm
- Imbibe professional qualities

d) Joining Report

The joining report should be sent to the Department of Architecture of the teaching institution, within ten days of joining the firm for practical training.

e) Monthly work report

Upon completion of each month, students must submit monthly reports of their work to the faculty in charge of the teaching institution (in the format specified by the institution), duly signed by the trainer architect or an authorised person supervising the work. Within a week of each month's end, the department should receive the monthly work report. The teaching institution will determine the format for the monthly work report.

f) Documents to be submitted after the completion of training

The students are required to submit to the Department of Architecture of the teaching institution,

- A report including the details of their work, illustrated with sketches, prints and other documents connected with the projects on which he/she has worked both in the office and at the site. This shall include:
- A work diary
- Original Joining report
- Originals of monthly work reports
- Certificates of completion of successful training, conduct and performance of work at the office.
- This report shall be certified by the registered Architect under whom the candidate had undergone practical training.

g) Evaluation of Internship/ Practical Training will be as per Group V(iii) courses.

For the Practical Training, an evaluation shall be conducted at the end of the seventh semester based on the documents submitted and a viva voce conducted by a two-member jury appointed by the teaching institution.

The jury shall consist of an architecture faculty member from the institution and a senior architecture faculty member from any other CoA approved institution/ Architect with 5 years' experience.

Only those who have completed the practical training successfully and produce the certificate of completion of successful training, good conduct and satisfactory performance of work from the firm approved for training will be permitted to appear for the jury. The teaching institutions will publish the list of students who have appeared for the Jury and secured minimum 50% marks on or before the next working day after the Jury. Only the students declared as passed the

course ARD401 by the teaching institution are eligible to register for the eighth semester of the B. Arch Degree course.

Those students who fail to obtain a minimum of 50% in the Jury evaluation have to repeat Internship or Practical training course- ARD401, along with next regular batch.

SEMESTER VII

Course code	Course Name	L-T-S-P/D	Credits	Year of Introduction
ARD403	Critical Analysis, Material Study / Market Survey	0-0-0-0	3	2021

Course Objectives

- To equip students with essential information to make informed decisions regarding material selection, cost estimation, sustainability considerations etc.
- To familiarise the students with current market trends in the construction industry and key players in the market, including suppliers, manufacturers, and distributors, and also to analyse market dynamics, demand, supply, and pricing.
- To develop qualities to critique architecture of a building thorough analysis and evaluation of various aspects of its design, functionality, aesthetics, and impact.

Course Outcome

By the end of the course, the students will be equipped to undertake critical analysis of a building with respect to Concept and Design Intent, Site Context and Integration, Functionality and Space Planning, Spatial Composition and Layout, Form and Aesthetics, Materials and Construction, Environmental Considerations, Innovation and Creativity, Cultural and Contextual Relevance, User Experience and Comfort.

Type of work to be carried out during the training period

a) **A building material Study/Market survey:** involving a comprehensive analysis of the materials and market trends relevant to the construction industry.

-Identify any five contemporary building materials used in the architect's office and make a market survey of the different variations of the product available, material cost, manufacturing details, properties and measured drawings of fixing details.

b) **Critical Analysis:** Students are required to evaluate one of the buildings designed and completed in the architect's office with respect to-

- **Concept and Design Intent:** Analyse how well the design intent is expressed in the overall form, layout, and details.

- **Site Context and Integration:** Assess how the building interacts with its surroundings, taking into account factors like topography, climate, and neighbouring structures.
- **Functionality and Space Planning:** Analyse the organization of spaces, circulation patterns, and user experience.
- **Spatial Composition and Layout:** Examine the arrangement of spaces, volumes, and circulation paths within the building.
- **Form and Aesthetics:** Critique its visual impact, proportions, balance, and use of architectural elements.
- **Materials and Construction:** Assess the choice and use of materials in terms of durability, aesthetics, and sustainability.
- **Environmental Considerations:** Evaluate how the design responds to environmental factors such as sun, wind, rain, and temperature.
- **Innovation and Creativity:** Identify any innovative or unique design solutions that contribute to the building's character.
- **Cultural and Contextual Relevance:** Analyse how the building responds to cultural, historical, and social contexts
- **User Experience and Comfort:** Evaluate how the building caters to the needs and comfort of its occupants and users.

At the end of Semester 7, all students must submit a separate report on building material survey and critical analysis in the prescribed format provided by the teaching institution along with their Practical Training Report.

Teaching institution shall provide proper instructions, guidelines and format for documents to be submitted before proceeding to practical training.

Evaluation of Critical Analysis, Material study /Market Survey will be as per Group V(iii) courses.

An evaluation shall be conducted at the end of the Seventh semester along with the practical training jury based on the documents submitted and a viva voce conducted by a jury appointed by the teaching institution.

The jury shall consist of an architecture faculty member from the institution and a senior architecture faculty member from any other CoA approved institution / Architect with 5 years' experience.

Only those who have submitted all required documents on time will be permitted to appear for the Jury at the institution level. Those students who fail to obtain a minimum 50% marks have to repeat the course and submit the documents and appear for jury along with regular batches.

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

S8 CURRICULUM
&
SYLLABUS

BACHELOR OF ARCHITECTURE

2021

SEMESTER VIII

Slot	Group	Course Code	Course Name	Category	L-T-S-P/D	Hours	Credit
A	III	ART 402	HUMAN SETTLEMENTS PLANNING	AT	3-0-0-0	3	3
B	III	ART 404	RESEARCH METHODOLOGY	PE	2-1-0-0	3	3
C	III	ART 406	BUILDING ECONOMICS AND SOCIOLOGY	AT	3-0-0-0	3	3
D	III	AET 402	ENVIRONMENTAL SCIENCE FOR ARCHITECTURE	BS	3-0-0-0	3	3
E	III	ECT 4xx	ELECTIVE III	EC	3-0-0-0	3	3
S	I	ARD 402	ARCHITECTURAL DESIGN – VI	AD	0-0-10-0	10	10
T	II	ARS 402	INTERIOR DESIGN	AS	1-0-2-0	3	3
TOTAL						**28**	**28**

ELECTIVE III

ECT 410	ARCHITECTURAL CONSERVATION	3-0-0-0	3
ECT 414	CONTEMPORARY ARCHITECTURE AND DESIGN	3-0-0-0	3
ECT 416	GREEN BUILDINGS AND RATING SYSTEM	3-0-0-0	3
ECT 418	DISASTER MITIGATION, MANAGEMENT AND RECOVERY	3-0-0-0	3

NOTE:

ART 404 - Research Methodology is assigned 2 hours of lecture and 1 hour of tutorial in order to enable students to learn designing of research.

ARS 402 – Interior Design is assigned 1 hour of lecture and 2 hours of studio so that contents learnt can be applied to a design problem.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ART 402	**HUMAN SETTLEMENTS PLANNING**	**3-0-0-0**	**3**	**2021**

Course Objectives:

- To expose students to the basics of human settlement planning.
- To understand the process of urban and rural planning in India
- To analyze various concepts and interventions in the field of human settlement planning.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	Understand the concept of human settlement planning, its elements, and classification.	Understanding
CO-2	Differentiate factors influencing the growth and decay of human settlements	Analyze
CO-3	Understand the terms, processes, and programs involved in urban, rural, and regional planning in India.	Analyze
CO-4	Appreciate different concepts and current trends in human settlements planning in India.	Understanding, Analyzing, and Evaluating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks

Continuous assessment tests (2 nos.) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts: Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4 = 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus:

Introduction, Forms of human settlements, Rural and regional development in India, Urban Planning and urban Renewal: Aspects in Contemporary Urban Planning in India.

Course Plan:

Module	Contents	Course outcome	No. of hours
I	Definition of Human Settlements, Brief discussion of evolution of settlements. Elements of human settlements—Nature, Man, Society, Shells and Networks- their functions and linkages. Anatomy and classification of human settlements—locational, resource-based, population size, and occupational structure.	CO1	8
II	Structure and form of human settlements—linear, non-linear and circular, Combinations—reasons for development-advantages and disadvantages. Factors influencing the growth and decay of human settlements—urbanization and its impacts	CO2	8
FIRST INTERNAL TEST			

III	Introduction to planning as a discipline: - Need, issues, and potentials. Census classification of towns in India. Urban, Rural and Regional Planning in India with examples. Planning machinery in India—levels of planning, Development control regulations.	CO3	8
IV	Types of plans and planning process. Master Plan, Structure Plan, DDP, planned unit development. Urban renewal, redevelopment, rehabilitation, and conservation. Urban Development projects—case studies.	CO3	9
SECOND INTERNAL TEST			
V	Globalization and its impact on cities. Sustainable planning concepts. New forms of development, to include self-sustained communities, SEZ, transit-oriented development, (TOD), integrated townships, and smart cities. Case studies.	CO4	12
END SEMESTER EXAMINATION			

Textbooks:

1. C.L. Doxiadis, Ekistics, 'An Introduction to the Science of Human Settlements', Hutchinson, London, 1968.
2. Thooyavan K R, 'Human Settlements: A Planning Guide to Beginners', M.A. Publications, 2005.
3. Ministry of Urban Affairs and Employment, Government of India, New Delhi, Urban Development Plans: Formulation and Implementation-Guidelines, 1996.
4. Andrew D. Thomas, Housing and Urban Renewal', Harper Collins, 1986.

Reference books:

1. S. B. Golahit, 'Rural Development Programmes in India', Neha Publishers and Distributors, 2010.
2. V. Nath, 'Regional Development and Planning in India', Concept Publishing Company, 2011.
3. Government of India, 'Report of the National Commission on Urbanisation', 1988.

4. Hansen N., ‘Regional Policy and Regional Integration’, Edward Elgar, UK, 1996
5. Giuseppe T. Cirella, ‘Human Settlements: Urbanization, Smart Sector Development, and Future Outlook’. Singapore: Springer Nature Singapore, 2021.
6. Astrid Ley, Josefine Fokdal, Md Ashiq Ur Rahman, ‘Housing and Human Settlements in a World of Change’, Germany: transcript Verlag, 2020.
7. United Nations Human Settlements Programme, ‘Planning Sustainable Cities: Global Report on Human Settlements 2009’. United Kingdom: Earthscan, 2009.
8. Bowen, William M, Gleeson, Robert E. ‘The Evolution of Human Settlements: From Pleistocene Origins to Anthropocene Prospects’. Germany: Springer International Publishing, 2018.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ART 404	**RESEARCH METHODOLOGY**	**2-1-0-0**	**3**	**2021**

Course Objectives:

- The students will be equipped with the knowledge to formulate the basic framework of the research process
- To apply the research strategies to prepare and present a comprehensive research proposal.

Course Outcomes: After completion of this course, the students will be able

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	To develop a foundational understanding of research methodologies in architecture.	Understanding
CO-2	To do critical thinking and analysis in the evaluation of architectural literature.	Understanding, Analyzing
CO-3	To acquire hands-on experience in conducting literature reviews and case studies.	Analyzing, Evaluating
CO-4	To be equipped with the skills to structure and write a research paper.	Analyzing, Creating
CO-5	To develop and present a well-structured research proposal for an architecture dissertation.	Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance	:	4 Marks
Continuous assessment tests (2 nos.)	:	20 Marks
Assignment/Quiz/Course project	:	16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4 = 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus:

Introduction, Aims, Types of research, Ethics in research, Research methods and process, Significant areas of research in architecture, Structure of a Research Paper and Research, Research proposal writing

Course Plan:

Module	Content	Course outcomes	No. of hours
I	**Introduction to research:** Introduction to "research" and its significance in architecture, Aims and characteristics of research; Criteria of good research; Research paradigms; Basic types of research; Role of the researcher; Ethics in research: quality criteria, Plagiarism, ways to tackle plagiarism, ethical use of AI tools	CO1	5
II	**Research Design and areas of research in architecture:** Research Design: Components of research design – formulating the research questions, and hypothesis. Defining the scope and limitations of a research plan, significance of the research outcome. Various areas of research-Interpretative research, historical	CO1	10

	research, Qualitative Research, Correlational Research, Experimental and Quasi-Experimental Research, Simulation, and Modelling Research, Logical Argumentation.		
FIRST INTERNAL TEST			
III	**Literature Study and Research** Significance of literature study in research, different sources of information such as books, journals, newspapers, internet, magazines, audio recordings, etc. Referencing and documenting the bibliography. Assignment: After faculty consultation, students identify a topic/literature in architecture/design or related domains. They need to write a review of a minimum of five standard peer-reviewed articles, concluding with their observations.	CO2, CO3	8
IV	**Methods of Research in Architecture**: Data Documentation and Analysis: Understanding the nature of data collected and methods of analysis suitable for that data (graphical / numerical / descriptive). Converting data into numerical form for data analysis. Interview Techniques: Questionnaires /Face to face Interviews / Internet survey. Designing a Questionnaire / Interview schedule. Visual Techniques: Observations (participant / nonparticipant / direct), activity mapping, accession/erosion trace observations, cognitive maps, etc. Content Analysis: Secondary data analysis. Understanding the relative advantages, disadvantages and application of various methods mentioned above and choosing a method appropriate for research to achieve its objectives. Introduction to the simple statistical methods of analysing numerical data and statistical software.	CO4	10
SECOND INTERNAL TEST			

V	**Structure of a Research Paper and Research Proposal:** Introduction; Method section, Result, and Discussion. Different styles: APA, MLA, Chicago, etc. Citation: cross-citation, in-text citation, reference list, use of any one tool for citation (Google Scholar, Mendeley, Zotero, Endnote, etc.). *Project:* Preparation and Structure of the Research Proposal for an Architecture Dissertation, including Introduction, Literature Review, Proposed Methodology, Expected Results/Outcomes, and Deadlines.	CO4, CO5	12
END SEMESTER EXAMINATION			

References:

1. Dawson, Catherine, Practical Research Methods, New Delhi, UBS Publishers 'Distributors, 2002.
2. Groat L and Wang D, Architectural research methods, John Wiley & Sons Ltd., 2002.
3. Knight A and Ruddock L, Advanced research methods in the built environment, Wiley Blackwell publishers, 2008.
4. Kothari, C.R., Research Methodology: Methods and Techniques, New Delhi, Wiley Eastern Limited, 1985.
5. Kumar, Ranjit, Research Methodology-A Step-by-Step Guide for Beginners (2nd.ed.), Singapore, Pearson Education, 2005.
6. Lucas R., Research Methods for Architecture, Lawrence King Publishing, 2016.
7. Sanoff H., Visual research methods in design, New York, Routledge Publications, 2016.
8. Van den Brink, A., Bruns, D., Tobi, H., & Bell, S. (Eds.) Research in landscape architecture: methods and methodology. Routledge, 2016.
9. Niezabitowska, E. D. Research methods and techniques in architecture. Routledge, 2018.
10. Kamalipour, H., Aelbrecht, P., & Peimani, N. (Eds.). The Routledge handbook of urban design research methods. Routledge, 2024.
11. Pallasmaa, J. The eyes of the skin: Architecture and the senses. John Wiley & Sons 2024.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ART406	BUILDING ECONOMICS AND SOCIOLOGY	3-0-0-0	3	2021

Course Objectives:

- To understand the relevance of sociology and economics in architecture
- To analyse the internal and external factors that affect the economics of a project
- To analyse the role of communities in shaping built environment and architecture

Course Outcomes: After completion of this course, the students will be able

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	To understand the basic concepts in economics that find application in architecture	Understand
CO-2	To analyse economic implications of land, building and project costs	Understand Analyse
CO-3	To understand the basic concepts of sociology that is relevant to the built environment	Understand
CO-4	To analyse the role of communities in shaping environment and architecture and vice versa	Understand Analyse Evaluate
CO-5	To discern the differences in urban and rural communities and the issues related to various classes and densities of people living there.	Apply Analyse Evaluate

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance	:	4 Marks
Continuous assessment tests (2 nos.)	:	20 Marks
Assignment/Quiz/Course project	:	16 Mark

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4 = 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Introduction to Economics, Economics and the Market, Concepts of Economics, Urban Land Values, Building Economics, Project Economics of building construction projects, Economic Analyses of Projects Cost, Introduction to Sociology, Communities, Urban and Rural Communities, Cities and Society

Module	Contents	Course outcome	No. of hours
I	**Introduction to Economics** Definition of economics: Definitions of terms: – Goods, Utility, Value, Price and Wealth, micro and macroeconomics. Economics and the market: Consumption, characteristics of wants and needs Concepts of Economics: Theory of supply and demand, Opportunity cost	CO-1	6
II	**Urban Land Values** Factors affecting the value of urban land. **Building Economics** Building efficiency and cost reduction through planning and design of building components. Total cost of building, initial cost, operational cost, maintenance cost. Life cycle cost.	CO-2	12

	Project Economics of Building Construction Projects: Land, labour, capital and Material. Labour-intensive v/s capital intensive projects. Financing for projects, sources of capital, Agencies and Institutions influencing project economics, public private participation.		
FIRST INTERNAL TEST			
III	**Economic Analyses of Projects Cost** – Control, Cash - Flow Analyses, Cost – Projection, Cost – Benefit, Feasibility, Estate Investments & returns, Valuation, Law relating to properties and buildings – undivided share, super built up area, carpet area.	CO-2	9
IV	**Introduction To Sociology** Definition of sociology, Nature and scope and utility in architecture and the built environment Definitions of sociological terms: society, community, family, culture. Relation between culture and built form.	CO-3 CO-4	9
SECOND INTERNAL TEST			
V	**Communities:** Origin, growth, and nature of settlements and communities. Their characteristics and spatial patterns. Urban and Rural Communities: Definitions of the terms “urban” and “rural”. The social, economic and spatial characteristics associated with urban and rural settlements Cities and Society: Urbanization— definition; causes. Effects of urbanization on rural areas. Impact of growing urbanization on urban life, viz. health, housing, and transportation. The origin and characteristics of slums in Indian cities. Governmental and non-governmental approaches to engaging with issues regarding spatial issues in slums of Indian cities with the following examples: Aranya Housing Project, Indore; slum rehabilitation housing in Mumbai, India. Role of KSHB and TNSCB in up-lifting the quality of life in slums	CO-5	9

Text Books:

1. Danny Myers, 'Construction Economics – A new Approach', Taylor and Francis Publication, 2022.
2. C N Shankar Rao – 'Sociology- Principles of Sociology with an Introduction to Social Thought', S Chand and Company Ltd ,1990.

Reference Books:

1. Panneerselvam, 'Engineering Economics', Prentice Hall India Learning Private Limited, 2013.
2. Paul B Horton and Chester L Hunt –Sociology, Tata Mc Graw Hill, 2004.
3. Vikram Bhatt et.al., 'How the Other Half Builds', Centre for Minimum Cost Housing, McGill University, 1984.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
AET 402	**ENVIRONMENTAL SCIENCE FOR ARCHITECTURE**	**3-0-0-0**	**3**	**2021**

Course Objectives:

- To provide students with the knowledge and understanding necessary to design and construct environmentally responsible buildings.
- To impart basic knowledge about the environment and its allied problems.

Course Outcomes:

After the completion of the course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO-1	Define and explain the key concepts related to environmental science and architecture	Understanding
CO-2	Analyze the environmental, economic, and social benefits of environmentally responsible buildings and policies and critically assess the environmental impact of real-world projects.	Analyzing and evaluating
CO-3	Critically assess emerging and existing sustainable building materials and technologies with respect to their suitability for different contexts	Analyzing and applying
CO-4	Evaluate the performance of an existing building using various simulation software	Analyzing, applying and evaluating

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End Semester Examination Marks	End Semester Examination Duration
100	40	60	3 Hours

Continuous internal evaluation pattern:

Attendance	:	4 Marks
Continuous assessment tests (2 nos.)	:	20 Marks
Assignment/Quiz/Course project	:	16 Marks

End Semester Examination Pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4 20marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus:

Introduction to Environmental Science, Environmental Regulations and Policies in Architecture: Environmental Impact Assessment, Sustainability and related concepts, Building Modelling (BEM) and Simulation for environment-responsive designs

Module	Contents	Course outcome	No. of Hours
I	**Introduction to Environmental Science** Definition, scope, and relevance of environmental science in architecture, Historical perspective and evolution of environmental awareness in architecture, global and local environmental challenges affecting the built environment (Climate Change, Resource Depletion, Pollution, Biodiversity Loss), architectural projects that exemplify environmental consciousness. Historical and Contemporary examples	CO-1	5

II	**Environmental Regulations and Policies in Architecture:** National and international environmental regulations, Compliance and legal responsibilities of architects Implementation of environmental policies in different countries: Germany's Energiewende (energy transition) policy, India's National Clean Air Program, Australia's Murray-Darling Basin Plan Introduction to green building certifications (LEED, IGBC, GRIHA, BREEAM etc.), Case studies of relevant environmentally certified buildings	CO-1, CO-2	10
FIRST INTERNAL TEST			
III	**Environmental Impact Assessment** Definition and purpose of EIA, Understanding the EIA process and its stages, Components of an EIA report EIA procedures: screening, Scoping, Impact Prediction, Mitigation, Reporting, Public Hearing, Monitoring Methods for conducting EIA, Live/Literature case study of real-world architectural projects and their EIA processes.	CO-2, CO-3	10
IV	**Sustainability and related concepts** Definition of sustainability, Overview of the three pillars of sustainability: environmental, social, and economic; Conceptual understanding of embodied energy and embodied carbon, Life cycle analysis, Cradle to cradle design, Practical Applications.	CO-3	10
SECOND INTERNAL TEST			
V	**Building Energy Modelling (BEM) and Simulation for environment-responsive designs** Energy Simulation-Suggested Tools: Energy Plus, EQuest, Open Studio, Daylighting, and Shading Simulation - Suggested Tools: Ecotect, Design Builder, Ladybug. Exercise: Each student can choose a previously done design or any design of a space of their choice and assess its energy performance using simulation software.	CO-3, CO-4	10
END SEMESTER EXAM			

References:

1. Isenberg, Andrew C. The Oxford Handbook of Environmental History, Oxford Handbooks, (2014; online edn, Oxford Academic, 2 Oct. 2014.
2. Saksida, Lisa M. Sustainable Built Environments: Principles and Practice. Oxford: Wiley, 2016.
3. Peter Wathern "Environmental Impact Assessment: Theory and Practice", 1st Edition - 14 June 1990.
4. "Our Common Future (The Brundtland Report)" by the World Commission on Environment and Development (WCED)
5. David MacKay "Sustainable Energy – Without the Hot Air", (Cambridge, England: UIT Cambridge Ltd., 2009.
6. William McDonough and Michael Braungart "Cradle to Cradle: Remaking the Way We Make Things", New York, North Point Press, 2002.
7. Joseph Clarke, "Energy Simulation in Building Design" 1st Edition – 1, January 1985.
8. "ASHRAE Handbook - HVAC Applications" 2019.
9. LEED Reference Guide for Building Design and Construction, Edition by U.S. Green Building Council, 2023.
10. BREEAM Manual SD207: Code for Sustainable Homes, Edition by BRE Global, 2023.
11. GRIHA Version 5: Green Rating for Integrated Habitat Assessment, Edition by GRIHA Council, 2023.
12. Francis D. K. Ching, Ian M. Shapiro, 'Green Building Illustrated' (PDF), 2014.

Academic Papers:

1. Ali M. Malkawi and Godfried Augenbroe, 'Environmental Science and Sustainable Design: An Overview for the Built Environment', 2004.
2. Anshu Sharma and S. K. Goyal, "Assessment of Urban Environmental Issues in India", 2007.
3. "Global Status Report for Buildings and Construction" by UN Environment Program (UNEP), 2022.

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
ARD 402	ARCHITECTURAL DESIGN - VI	0-0-10-0	10	2021

Course Objectives:

- To develop a master plan with a focus on the vision of the campus and include architectural character, composition, typology of future buildings, groups of buildings, and exterior spaces on campus.
- To evolve a campus design in terms of universal design, sustainability, function, aesthetic value, and microclimate.

Course Outcomes:

- After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO-1	To understand campus planning principles	Understanding
CO-2	To perform in-depth analysis of the campuses studied. To develop a deep understanding of campus planning principles.	Analysing
CO-3	To evolve a master plan for a large campus.	Applying
CO-4	To design a campus with considerations of universal design principles and sustainability aspects.	Creating

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End Semester Jury Examination Marks	End Semester Jury Examination Duration
100	50	50	2-3 days

Continuous internal evaluation pattern:

Attendance : 5 Marks

Design Assignments/Reviews/Tests : 45 Marks

Syllabus:

Study campus planning principles – study large campuses that are present all over India – Analyse the campuses with respect to campus planning principles – evolve a vision for the campuses – Evolve master plans with future growth also considered - Propose interventions/ design for campuses based on sustainability, accessibility, aesthetics and functional requirements.

Course Plan:

Module	Contents	Course outcome	No. of hours
I	**Introduction to campus planning** Campus planning principles, Study/presentation of campus planning principles. Students may be assigned topics related to the same and make detailed reports and presentations.	CO1	20
II	Case studies on designed campus projects all over India and analysis based on campus planning principles.	CO2	40
FIRST INTERNAL TEST			
III	**Introduction to the project:** Preparation of a master plan focusing on architectural vocabulary, composition, functionality, groups of buildings and exterior spaces, services, typology of future buildings on campus. Examples: Hospital, Educational institutions, sports facility buildings, housing projects, hotel and hospitality projects etc.	CO3, CO4	30

IV	Development of the design based on site planning principles, Context, Infrastructure, Services and Aesthetics.	CO3, CO4	30
SECOND INTERNAL TEST			
V	Preparation of detailed architectural drawings and models.	CO4	30
END SEMESTER EXAM/JURY			

References

1. Jonathan Coulson, Paul Roberts, Isabelle Taylor, "University Planning and Architecture: The Search for Perfection", Published by Routledge, 2010
2. Mitchell WJ, "Imagining MIT: Designing a campus for the 21st century", MIT Press, 2007.
3. Richard P. Dober, "Campus Architecture: Building in the Groves of Academe", New York:
   McGraw-Hill, 1996.
4. Scott Van Dyke, "Form, Line to Design", Publisher-Van Nostrand Reinhold, 1990
5. Ernst Neufert and Peter Neufert, "Neufert Architect's data", 4th ed, Wiley-Blackwell Publication, 2012
6. Michael J. Crosbie and John Hancock Callender, "Time Saver Standards for Architectural Design Data", 8th ed, New York : McGraw-Hill, 2005
7. James Steele, "Sustainable Architecture Principles, Paradigms and Case Studies", Mc Graw- Hill Education, 1997.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ARS 402	INTERIOR DESIGN	1-0-2-0	3	2021

Course objectives:

- To introduce students to the design of interior spaces and provide a basic understanding of the various realms of interior design and the specific skill sets required.
- To develop interior design skills in students and introduce to the construction and fabrication systems employed in the contemporary interior design profession
- To make students aware of the relevance of sustainable best practices in Interior design

Course Outcomes:

After the completion of this course, the students will be able

Course Outcome	Description of Course Outcome	Prescribed learning level
CO1	To comprehend the relationship between spaces, design elements, and human perception in terms of volume, form, colour and texture.	Understanding
CO2	To gain knowledge on the importance of ergonomics in interior design and equip them to design furniture using ergonomic principles.	Understanding, Creating
CO3	To understand the importance of sustainability and environment control in interiors	Understanding Analysing
CO4	To involve in an interior design project which has simple space planning, understanding the functional aspects of good design, and be sensitized to intelligent planning responsive to the principles of sustainability in interior design	Analysing Creating

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	50	50	3 hours

Continuous internal evaluation pattern:

Attendance : 5 Marks

Continuous assessment tests (2 nos.) : 15 Marks

Assignment/Quiz/Course project : 30 Marks

End Semester examination pattern:

There will be three parts; Part A, B, and C. Part A will contain 5 questions with 1 question from each module, having 3 marks for each question. Students should answer all the questions. Part B will contain 2 questions from each module, of which the student should answer any one. Each question carries 4 marks. Part C will have one schematic drawing question either from the 2nd module or the 5th module which can be answered in a normal answer booklet. The question carries 15marks

Syllabus:

Fundamentals in Interior Design–Materials, Construction & Fabrication, Sustainability

Course plan:

Module	Contents	Course outcome	No. of Hours
I	**Interior Design Theory:** Interior design spaces, Materials, Colour, Light, Texture: Space as raw material. Surfaces- Functions of surfaces. Floors, walls, ceiling, dividers. Various materials like wood, stone, fabric, and finishes like paint, wall paper, murals etc and their properties and application Interior lighting. Various functions of lighting. Human factors and relationship between colour, finish/texture and	CO1	9

	lighting		
II	**Introduction to role of Furniture in Interior Design** Furniture: types of furniture based on function, design and materials. Introduction to ergonomics Furnishings: Soft furnishings: textiles & fabrics, various furnishings-types and functions. Types and various design variations in furnishing item: bed, sofa, cushion, curtains & trimmings, carpets, rugs, etc. Designing furniture based on understanding of anthropometrics, ergonomics and human scale	CO1 CO2	12
FIRST INTERNAL TEST			
III	**Introduction to natural elements** Incorporating natural elements in interiors—use of water, air & natural light in interiors. Interior plant scapes and current trends.	CO3	3
IV	**Sustainable Best Practices in interior Design through case studies** Environmental design & sustainable design practices. Reduce, reuse, & recycle in interior design. Innovation and research in materials and technology.	CO3 CO4	6
SECOND INTERNAL TEST			
V	**Typical presentation & rendering techniques** Mood-boards, finishes' boards, interior perspectives and sketches Interior design of a simple architectural space (Kitchen/Office/workstations, etc) incorporating natural elements in interiors— use of water, air & natural light. Lighting design & furnishings experiencing spatial quality with all required drawings - Working drawings & Shop drawings	CO4	15
END SEMESTER EXAMINATION			

Text Books:

1. Andrea Simitch, Val Warke, "The Language of Architecture 26 Principles Every Architect Should Know", Rockport Publishers, 2014.
2. Francis D. K. Ching, Corky Binggeli, "Interior Design Illustrated", John Wiley & Sons,

2018.

Reference Books

1. Juhani Pallasmaa, “The Eyes of the Skin- Architecture and the Senses”, Wiley, 2012.
2. Kate Nesbitt (editor), “Theorizing a new agenda for architecture - an anthology of architectural theory, 1965-1995, Princeton Architectural Press, 1996.
3. Sian Moxon, “Sustainability in Interior Design “, Laurence King Publishing, 2012.
4. Leon Krier, “The Architecture of Community”, Island Press, 2011.
5. Steen Eiler, “Rasmussen - Experiencing Architecture”, MIT Press, 1964.
6. Anthony C. Antoniades, “Poetics of Architecture: Theory of Design”, Wiley, 1992.

Recommended Pedagogic Engagements

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Representing architecture through drawing, painting, photography, sculpting, printing, physical models etc. can be given as class exercises
- The students can be encouraged to visit architecture through study tours and develop the skill of architectural appreciation by documenting. Each student should be encouraged to have a sketchbook with notes, graphical interpretations, and sketches of all the topics cover

Course No.	Course Name	L-S-T-P/D	Credits	Year of introduction
ECT- 410	**ARCHITECTURAL CONSERVATION**	**3-0-0-0**	**3**	**2021**

Course Objectives:

- To familiarize with architectural conservation philosophy, theory and its history.
- To introduce the process of conservation of heritage structures and best practices through case studies and on-site work.
- Develop sensitivity to heritage and interventions in heritage structures and precincts.

Course Outcomes:

At the end of the course the student will be able

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	To understand the philosophy and science of architectural conservation	Understanding
CO-2	To conduct the process of methodical study of a historic building through documentation and assessment	Applying, Analysing
CO-3	To distinguish and comprehend the appropriate methods of intervention in a historic building and context	Evaluating
CO-4	To comprehend the concept of Urban heritage	Analysing, Evaluating

Mark Distribution:

Total Marks	Continuous Internal Evaluation marks	End Semester Examination marks	End Semester Examination Duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks

Marks Tests (2 numbers) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions. Part B contains 2 questions from each module, of which the student should answer any one. Each question carries 8 marks. One or two questions can have subdivisions. Some questions can be framed in such a manner to assess the student's capacity for analyzing the topics and linking it with other courses.

Syllabus:

Introduction to Conservation, Key concepts, Process of Conservation, Need for Conservation, Urban conservation

Module	Contents	Course Outcome	No of Hours
I	**Introduction to Conservation** Heritage – Definitions and Classification of Heritage Conservation – Need, scope and meaning. Meaning of Heritage and conservation in the Indian Context, Principles and Ethics of Conservation Development of the theories of conservation: an overview of the history of conservation in the west and Indian Context Various International (UNESCO, ICOMOS, ICROM) and National Agencies (ASI, INTACH) involved in conservation and their roles AMASR ACT, National Monuments Authority	CO-1	9

II	**Key Concepts** Approach to conservation: Changes in approach through an overview of milestone Charters like the Venice Charter, Florence Charter, Burra Charter, Nara Document Concept of Values, Significance, Authenticity and Integrity World heritage: Nomination process and listing through case studies of World heritage sites. Examples of World heritage sites in India and other countries.	CO-1	6
FIRST INTERNAL TEST			
III	**Process of Conservation** Overview of the process of conservation Importance of Research in Conservation, Sources of information like archival material, books, Photographs, maps, oral traditions and memories. Buildings as sources of information- styles, character. Documentation of Historic buildings: Surveys, Inventory and listing. Tools and techniques for measured drawings for historic structures (latest techniques like Photogrammetry, Laser Scanning to be introduced). Drawing and presentation for historic structures. Condition assessment of Historic structures: Causes of Decay including climate, biological, natural disasters and manmade causes. Methods for condition assessment.	CO-1, CO- 2	15
IV	**Degrees of Intervention** Degrees of Intervention in Historic structures: Prevention, Preservation, Consolidation, Restoration, Rehabilitation, Reproduction and reconstruction. Case studies of the above. Guidelines for Adaptive reuse of historic structures. Research and analyze a historic building, record its	CO-1, CO- 3	9

	issues, and identify the appropriate intervention for conservation		
SECOND INTERNAL TEST			
V	**Urban Conservation** Historic precincts: Meaning; character of Historic precincts; various layers in a precinct; Issues in historic precincts; Case studies of historic precincts Concepts of Historic precincts, Cultural Landscapes, Historic Urban Landscapes through case studies Concepts of Imitation, Inspiration, Innovation, Influence, Evolution, New Design through case studies.	CO- 3, CO-4	6

Reference books:

1. Bernard M. Fielden- 'Conservation of Historic Buildings' –, Architectural Press, 2003.
2. Jukka Jokilehto, Butterworth - Heinemann – 'A History of Architectural Conservation', 1999.
3. Letellier, Robin, "Recording, Documentation, and Information Management for the Conservation of Heritage Places- Guiding Principles" by Getty Conservation Institute, Los Angeles, 2007.
4. Salvador Munoz-Vinas, "Contemporary Theory of Conservation", Elsevier, 2005.
5. Orbasli, A., "Architectural Conservation: Principles and Practice", Wiley Blackwell. 2007.

Further reading:

1. Asian Heritage Management - Contexts, Concerns, and Prospects, 1st Edition, Edited by Kapila D. Silva, Neel Kamal Chapagain, Routledge Contemporary Asia Series, Taylor & Francis Group New York, USA, 2013
2. Robert E. Stipe, 'A Richer Heritage: Historic Preservation in the Twenty-First Century, University of North Carolina Press, 2003.
3. John H. Stubbs and Emily G Makas; Architectural Conservation in Europe and the Americas, John Wiley & Sons, 2011.
4. ICOMOS, ICCROM and Getty websites have resources on conservation theory and practice.

Recommended Pedagogic Engagements.

- A case study-based approach is recommended for this course, where students can be encouraged to look at reports, videos or documentaries on various aspects.
- A historic building from the area can be chosen for documentation and condition assessment exercises. The students can also be encouraged to suggest appropriate adaptive re-use of the structure and submit as an assignment at the end of the course.
- Preparing a list of heritage buildings in a historic area within the city can be taken up as an exercise. Students can also be encouraged to plan heritage walks within the historic area.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ECT 414	CONTEMPORARY ARCHITECTURE AND DESIGN	3-0-0-0	3	2021

Course Objectives:

- To introduce the large-scale changes from 1960s as context for new thought in architecture and
  provide exposure to the critiques of modern architecture.
- To introduce architectural approaches across the world from late 20th century
- To provide understanding of the trajectory of the post-independence architecture of India till the present.

Course Outcome

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

Course Outcome	Description of Course Outcome	Prescribed learning level
CO-1	To create an awareness of the spread influence of modern architecture across the world.	Understand, Analyse
CO-2	To understand of architectural production from the 1960s as driven by large scale changes across the world.	Understand, Analyse
CO-3	To create familiarity with contemporary forces and directions in architecture across the world.	Understand, Analyse
CO-4	To evaluate & understand post-independence architecture in India contemporaneous with the rest of the world, along with its own particular influences.	Understand, Analyse and evaluate

Mark distribution:

Total marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance	:	4 Marks
Continuous assessment tests (2 nos.)	:	20 Marks
Assignment/Quiz/Course project	:	16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all 5 questions (5x4 = 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus:

The Postmodern World: Critique and Theories, Technology and Architecture, Postmodernism and Deconstructivism, Context and Modern Architecture, Contemporary Architecture.

Course Plan:

Module	Contents	Course outcome	No. of hours
I	**The postmodern world: critique and theories** Introduction to Contemporary architecture, Contemporary architecture in terms of history, culture and geography Postmodern world and multiple world views—to include the realms of literature, economics, technology, culture, society, and environment. Poststructuralism, Deconstructivism and Phenomenology Neo rationalism, Semiology. Critique of modernist cities by Jane Jacobs. Theories and works of Christopher Alexander, Charles Jencks, Denise Scott Brown. Aldo Rossi's ideas on the city Writings of Robert Venturi and Umberto Eco	CO-1, CO-2, CO-3	8
	Technology and Architecture Urban ideas/works of Soleri Archigram and Metabolism. High Tech architecture, works of	CO-1, CO-2,	

II	Frei Otto, James Stirling, Richard Rogers and Renzo Piano	CO-3	6
FIRST INTERNAL TEST			
III	**Postmodernism and deconstructivism** Postmodernism. Works of Venturi Scott Brown, Michael Graves, and Charles Moore. Deconstructivism as new architectural movement. Ideas and works of Peter Eisenman, Zaha Hadid, Frank Gehry, Daniel Libeskind, Bernard Tschumi	CO-1, CO-2, CO-3	9
IV	**Context and modern architecture** Critical regionalism as a category of architecture. Ideas and works of Hassan Fathy, Tadao Ando, Geoffrey Bawa, Luis Barragan, Álvaro Siza. Evolution of the architecture of Anant Raje, B V Doshi, Charles Correa, Raj Rewal. Philosophy and works of Nari Gandhi, Laurie Baker. Outline of contextual approaches in Indian architecture after the 60s.	CO-1, CO-2, CO-3, CO-4	10
SECOND INTERNAL TEST			
V	**Recent developments in contemporary Architecture** Nature of contemporary society. Architectural responses and movements today -parametric design and digital processes, sustainability, globalization, phenomenology, complexity. Women in contemporary architecture practice- Anne Lacaton, Yvonne Farrell, Shelley McNamara, Carme Pigem, Kazuyo Sejima, Zaha Hadid, Lina Bo Bardi. Bjarke Ingels and BIG, OMA and Rem Koolhaas, Steven Holl, William McDonough, Ken Yeang, Peter Zumthor, Juhani Pallasmaa, Glenn Murcutt Outline of contemporary architecture in the non-Western world. Outline of post 1990s architecture of India.	CO-1, CO-2, CO-3, CO-4	12
END SEMESTER EXAMINATION			

Text Books:

1. Bahga, Bahga and Bahga, “Modern Architecture in India”, Galgotia Pub. Co, 1993.
2. Kenneth Frampton, 'Modern Architecture: A Critical History', Thames and Hudson, London, 2007.
3. William J. Curtis, 'Modern Architecture since 1900', Phaidon Press, 1996.
4. Diane Ghirardo , 'Architecture after Modernism', Thames and Hudson, London, 1996.
5. Elie G. Haddad, David Rifkind, 'A Critical History of Contemporary Architecture: 1960-2010’, Routledge, 2016.
6. Bhatt and Scriver, 'Contemporary Indian Architecture- After the Masters', Grantha Corporation, 1999.
7. Miki Desai et. al., 'Architecture and Independence', Oxford University Press, 2000.
8. Harrry Francis Malgrave and David Goodman, 'An Introduction to Architectural Theory 1968 to the Present', Wiley Blackwell, 2011.
9. Rahul Mehrotra, 'Architecture in India since 1990', Hatje Cantz, 2011.
10. Morgan, Ann Lee & Taylor Colin, “Contemporary Architecture”, 2nd Edition, St.James Press, 2009.

Reference Books:

1. Jane Jacobs, 'Deaths and Life of Great American Cities', Modern Library, 2011.
2. Robert Venturi, 'Complexity and Contradiction in Architecture', 1977.
3. Kate Nesbitt, Ed, 'Theorising a New Agenda for Architecture', Princeton University Press, 1996.
4. Jagan Shah, 'Contemporary Indian Architecture', Lustre, 2008.
5. Francis D. K. Ching, Mark M. Jarzombek, Vikramaditya Prakash, 'A Global History of Architecture', John Wiley and Sons, 2017.
6. K.R.Sitalakshmi, 'Architecture of Indian Modernity- The Case of Madras', Palaniappa Brothers, 2015.
7. Bipin Chandra et al, 'India After Independence', Penguin, 2017.

Recommended Pedagogic Engagements.

- Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
- Book Reviews are to be part of assignments.
- Students are to be encouraged to watch movies and documentaries which give information about culture and architecture and prepare reviews/ reports and have discussions in class.
- Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ECT416	**GREEN BUILDINGS AND RATING SYSTEM**	**3-0-0-0**	**3**	**2021**

Course Objectives

- To provide students with the knowledge and skills necessary to design and construct sustainable buildings.
- To create awareness by providing a comprehensive assessment of the environmental performance of buildings, thus limiting the negative impact on the environment.
- To inform about the need to use alternative sources of energy in view of the depleting resources and climate change and get awareness on the rating system.

Course Outcome

After the completion of the course, the students will be able to

Course Outcome	**Description of Course Outcome**	**Prescribed Learning Level**
CO-1	Define and explain the key concepts related to green buildings and rating systems	Understanding
CO-2	Analyze the environmental, economic, and social benefits of green buildings.	Analysing
CO-3	Critically assess emerging and existing green building technologies and practices with respect to their suitability for different contexts	Analysing and applying
CO-4	Evaluate the performance of an existing building using green rating systems**.**	Analysing and evaluating

Mark Distribution

Total Marks	Continuous Internal Evaluation Marks	End Semester Examination Marks	End Semester Examination Duration
100	**40**	**60**	**3 Hours**

Continuous internal evaluation pattern:

Attendance	:	4 Marks
Continuous assessment tests (2 nos.)	:	20 Marks
Assignment/Quiz/Course project	:	16 Marks

End Semester Examination Pattern

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4 = 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Introduction to Green Buildings, Concepts related to green buildings, Green Building Rating Systems, Application of Rating Systems

Module	Contents	Course outcome	No. of Hours
I	**Introduction to Green Buildings:** Introduction: Why Green Buildings: Climate Change, Energy Demand, Sustainable Development Goals, India's National Action Plan on Climate Change (NAPCC); Convention on Climate Change (COP) 25 to 28	CO-1	5
II	**Concepts related to green buildings:** Conceptual Understanding of Embodied energy and	CO-2, CO-3	5

	embodied carbon, Life cycle cost, Cradle to cradle design Practical application of Context-specific resource mapping of environmentally preferable materials and construction techniques		
FIRST INTERNAL TEST			
III	**Green Building Rating Systems:** Introduction to green rating systems and certifications: Need and use of green rating systems; - Structure of the rating systems; Design parameters that affect green building: LEED, IGBC, GRIHA	CO-3, CO-4	10
IV	**Application of Rating Systems:** Overview of Energy Conservation Building Code (ECBC) Live/Literature case study of an existing green-rated building from the Indian Context and comparative analysis based on ECBC and LEED/GRIHA	CO-2, CO-3	10
SECOND INTERNAL TEST			
V	**Green Building Design Project:** Retrofit of the chosen field study case: Green Retrofit solutions based on cost-benefit analysis using an energy modelling software. Each Student can choose the research areas listed and develop retrofit solutions: - Resource Mapping; Sustainable Site Design and Management; Rainwater Management; Water Efficiency; Energy Efficiency; Indoor Environmental Quality, Waste Management; Lifecycle Analysis; Building Modeling and energy Analysis; Cost Benefit Analysis	CO-3, CO-4	15
END SEMESTER EXAMINATION			

References

1. Arvind Krishnan: Climate responsive architecture: a design handbook for energy efficient buildings, Tata McGraw-Hill Pub. Co, 2001.
2. Energy conservation building codes – BEE star rating systems
3. Majumdar M, 'Energy efficient building in India', TERI Press, 2000.
4. TERI, Sustainable design manual – Volume 2, TERI Press, 2004.
5. Ljubomir Jankovic, Designing Zero Carbon Buildings Using Dynamic Simulation Methods, Taylor & Francis, 2017.
6. LEED Reference Guide for Building Design and Construction, Edition by U.S. Green Building Council, 2023.
7. BREEAM Manual SD207: Code for Sustainable Homes, Edition by BRE Global, 2023.
8. GRIHA Version 5: Green Rating for Integrated Habitat Assessment, Edition by GRIHA Council, 2023.
9. Francis D. K. Ching, Ian M. Shapiro ,"Green Building Illustrated" (PDF), 2013.
10. McDonough, W. and M. Braungart, "Cradle to Cradle: Remaking the Way We Make Things", New York: Farrar, Straus and Giroux, 2002.
11. Kibert, C, "Sustainable Construction: Green Building Design and Delivery", Hoboken, NJ: John Wiley & Sons, 2007.
12. Ken Yeang, "Building for Sustainability: A Guide to Green Design, Construction, and Operation", 2009.
13. Linda Reeder, "Green Buildings and Sustainable Environments: Assessment, Strategies, and Examples" John Wiley & Sons, Inc , 2010.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ECT418	**DISASTER MITIGATION, MANAGEMENT AND RECOVERY**	**3-0-0--0**	**3**	**2021**

Course Objectives

- To make the students aware about various disasters and its impacts
- To understand the relevance of disaster preparedness and management
- To familiarize the strategies for recovery and rehabilitation

Course Outcome

At the end of successful completion of the course students will be able

Course outcome	Description of course outcome	Prescribed learning level
CO1	To define terms associated with Disaster management	Understand
CO2	To identify various phases of disaster management and current practices in building construction	Understand and evaluate
CO3	To analyse disaster mitigation strategies and preventive measures	Understand and Analyse
CO4	To assess Disaster preparedness and understand tools for prediction	Understand, Analyse and Evaluate

Mark Distribution

Total Marks	Continuous internal evaluation marks	End semester examination marks	End semester examination duration
100	40	60	3 hours

Continuous internal evaluation pattern:

Attendance : 4 Marks

Continuous assessment tests (2 nos.) : 20 Marks

Assignment/Quiz/Course project : 16 Marks

End semester examination pattern:

There will be two parts; Part A and B. Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions (5x4 = 20 marks). Part B contains 2 questions from each of the 5 modules, of which the student should answer any one. Each question carries 8 marks (Total 5x8=40). Part B questions can have subdivisions.

Syllabus

Definition and typology of disasters, Behaviour of structures during disasters and measures, Disaster Mitigation and Management, Disaster Response & Recovery, Disaster Preparedness and Prediction

Module	Contents	Course outcome	No. of Hours
I	**Definition and typology of disasters** *Natural Disasters:* Earthquakes, Cyclones, Floods, Drought, Landslides, Land subsidence, Volcanoes, Tsunami, Storm, Hurricane, Avalanches, Global climate extremes. *Man made disasters:* Terrorism, Toxic waste disposal, Oil spills, nuclear explosions, Leakage of gas and radiations, Forest fires, Bio hazards, building structural collapse Cause-and- effect relationships between various human, natural, and climatic factors that impinge upon ecological systems and their linkages. Understanding of global climate change and impacts with respect to rural/urban communities; increased risk/ vulnerabilities.	CO1	5
II	**Behaviour of structures during disasters and measures** General planning/design considerations, Norms and Standards for wind storms & cyclones; Design wind speed; Coastal zoning regulation for construction & reconstruction phase in the coastal areas; innovative construction materials & techniques; traditional construction techniques in coastal areas.	CO2, CO3	10

	Cyclonic retrofitting: strengthening of structures and adaptive sustainable reconstruction; Life–line structures such as temporary cyclone shelter. *Seismic retrofitting:* - Weakness in existing buildings, concepts in repair, restoration, and seismic strengthening. Various types and construction details - Foundations, retaining walls, plinth fill, flooring, walls, openings, roofs and boundary walls. Innovative construction materials and techniques, traditional regional practices		
	FIRST INTERNAL TEST		
III	**Disaster Mitigation and Management** Basic principles of disaster management, Disaster management cycle, Disaster management Policy, Disaster Management Act 2005 Role of International, national and state level bodies in disaster management, Role of NGOs in disaster management Disaster Mitigation Measures: Structural and Nonstructural mitigation measures, Nature-Based Solutions (NbS) for Disaster Risk Reduction	CO3 CO4	10
IV	**Disaster Response & Recovery** Response and recovery for various typology of disasters, Search and Rescue operations, Evacuation and relief measures Restoration of critical infrastructure, Rehabilitation & Reconstruction, post-disaster Disaster Damage and Need Assessment, post-disaster Disaster Recovery and rehabilitation of 2004 Indian Ocean Tsunami and 2018 Kerala Floods	CO3 CO4	10
	SECOND INTERNAL TEST		
	Disaster Preparedness and Prediction Forecasting and Warning of Disasters: Early Warning System (EWS) for earthquake, flood, and tsunami. Usage of Remote sensing, GIS, Artificial Intelligence,		10

V	drones, Mobile Apps in Disaster preparedness, prediction and monitoring. Mini-project on disaster risk assessment and preparedness for disaster with reference to Kerala state	CO4 CO5	
END SEMESTER EXAMINATION			

References

1. Pradeep K. Goyal, Anil Kumar Gupta, “Disaster Management”, All India Council for Technical Education (AICTE), 2023.
2. Rajib Shaw, R.R. Krishnamurthy, 'Disaster Management Global Challenges and Local Solutions', Universities Press (India) Private Limited, New Delhi, 2009.
3. Bruce C.Glavovic, Mick Kelly, Robert Kay, Ailbhe Travers, 'Climate Change and the Coast- Building Resilient Communities', CRC Press, Taylor & Francis Group, 2015.
4. Rajib Shaw, 'Community based Disaster Risk Reduction, Volume 10', Emerald Publishing, March 2012.
5. Damon Coppola, 'Introduction to International Disaster Management', Butterworth Heinemann, September 2020.
6. David A.McEntire, 'Disaster Response and Recovery- Strategies and tactics for Resilience', third edition, John Wiley & Sons, 2022.
7. Brenda D.Philips, David M.Neal, Gary R.Webb, 'Introduction to Emergency Management and Disaster Science', Taylor & Francis Group, December 2021.
8. Himanshu Grover, Tanveer Islam, Jean Slick, 'Case studies in Disaster Mitigation and Prevention', first edition, Elsevier, 2022.
9. State Action Plan on Climate Change (2023-2030), Directorate of Environment and Climate Change, Department of Environment, Government of India, 2022.
10. Agarwal, P. and Shrikhande, M. Earthquake Resistant Design of Structures. New Delhi: PHI Learning, 2009.
11. Singh, P. P. and Sharma, S. Modern dictionary of natural disaster. Deep & Deep Publications, 2006.
12. Simiu E. and Scanlan R. H. Wind Effects on Structures-Fundamentals and Applications to Design. 3rd Edn., John Wiley,1996.
13. Sinha, P. C. Disaster Mitigation, preparedness, recovery and Response. New Delhi: SBS Publishers, 2006.
14. Talwar, A. K. and Juneja, S. Cyclone Disaster Management. Commonwealth Publishers, 2009.

15. Taranath, B. S. Wind and Earthquake Resistant Buildings: Structural Analysis and Design. CRC Press, 2004.
16. U.N.D.P. Reducing Disaster Risk: A Challenge for Development. New York : UNDP, 2004.
17. World Bank. Handbook for Reconstructing after Natural Disasters,2009.
18. Disaster Management Act, 2005
19. National Policy on Disaster Management,2009
20. National Disaster Management Plan, 2019
21. Kerala State Disaster management policy,2010
22. Kerala State Disaster Management Plan,2016

SEMESTER 9

B ARCH 2021 SCHEME

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ART 501	Urban Design	2-0-1-0	3	2021

Course Objectives:

- To introduce students to the relevance of urban design as a discipline interfaced with architecture and urban planning

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Understand urban design terminologies and the relevance of their studies to the architecture profession.	Understanding
CO - 2	Analyse historical background of urban design and explore the various forces that have played a crucial role in the evolution of cities.	Analysing
CO - 3	Decode various urban design theories and explore their current applications in the field of urban design	Analysing and applying
CO - 4	Explore the different urban design dimensions, methods, and techniques involved in determining the project definition of a large-scale public architecture project.	Analysing and applying
CO-5	Research and Analyse information through case studies, essential for the development of urban design projects, with a focus on architectural and built components	Analysing and evaluating

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End semester Examination Marks	End semester examination duration
100	40	60	3 Hours

Continuous Internal Evaluation Pattern:

Attendance	:	4 Marks
Continuous Assessment Tests (2 Nos.)	:	20 Marks
Assignments/Quiz/Course Project	:	16 Marks

End Semester Examination Pattern:

Part A: 5 questions (one from each module) with 4 marks each. (5 x 4 = 20 Marks)

Part B: 2 questions from Modules I–V. Answer anyone. Each question carries 8 marks. Part B questions may have subdivisions. (5 x 8 = 40 Marks)

Syllabus:

Introduction to urban design & terminology, Introduction to urban form & cities, Cities And Urbanism Through Theories, Introduction to the various dimensions of urban design, Understanding the various urban design layers through selected case studies for architectural public projects both global and Indian context.

Module	Contents	Course Outcome	No. of hours
I	**Introduction to urban design & terminology** Definition of urban design and its evolution as a discipline. Relationship between Architecture, Urban design and Urban Planning. Scope and objective, Elements of urban design and relevance of urban design in current scenario. Understanding the various urban design terminology used in the field such as urban form, figure ground, scale, skyline, enclosure, mass, typology etc. Identify and map the urban design terminologies from your city	CO1, CO2	6
II	**Introduction to urban form & cities** Broad understanding of urban forms and spaces at various spatial scales through examples from historic cities. World context: -Urbanism of river valley civilizations.		

	Morphology of prehistoric cities – Greek, Roman, Medieval, Renaissance and post-industrial ideal cities Indian context: -. Temple town and Mughal city form, colonial cities, Modern and post-modern Indian cities Comparative analysis of the spatial layout of cities, focusing on both global and Indian perspectives.	CO2	8
FIRST INTERNAL TEST			
III	**Cities And Urbanism Through Theories** Brief Introduction and discussion of theories of cities and urbanism World context: - Pattern language and Christopher Alexander, Image ability and Lynch, Townscape and Cullen, Historic city and Rossi, Social aspects of urbanism and the works of Jane Jacobs, William Whyte, Jan Gehl Indian context – (the students have to study at least 2 theories from Indian context) some suggestions as follows: - Vedic town planning principles like Vastu Shastra, Sthapatya Veda etc. The complexity of Indian urbanism (A G Krishna Menon, Amita Baviskar, Rahul Mehrotra's writings) Select any one urban design theory and explore its application through the analysis of a specific real-world case study.	CO3	8
IV	**Introduction to the various dimensions of urban design,** such as the morphological, perceptual, social, visual, and functional dimensions, and understand different urban design methods and techniques to develop the project definition of a public architecture project Data sources and collection methods: - Secondary and	CO4, CO5	13

	primary sources Survey techniques: - Historical, imageability, Permeability and Visual analysis Mapping techniques- Heat maps, Dot density maps, Mental maps, activity maps, figure ground maps. Analysis tools – SWOT, Sieve mapping, STEEP analysis and Ped shed Analysis: Study the detailed project report (DPR) of any Urban Public Architecture project to identify the various layers used to develop project definition		
SECOND INTERNAL TEST			
V	**Understanding the various urban design layers through selected case studies for architectural public projects, both global and Indian context.** Global context: -Urban Design projects – Highline, Hudson Yards NY, Potsdammer Platz Berlin, Superkilen, The Line etc. Architecture works of Jan Gehl, Oscar Niemeyer, Louis khan, Norman Foster, Bjarke Ingels etc Indian context: - Public Architecture Works of Le Corbusier Charles chorea, B. Doshi, Bimal Patel, Rahul Mehrotra etc. Students are required to select the case study of any urban Public architectural project for the S9 design studio and perform a critical appraisal of the project	CO4, CO5	10
END SEMESTER EXAMINATION			

References:

1. Spreiregen Paul D, 'Urban Design: The Architecture of Town and Cities', McGraw-Hill Book Company, New York,1965
2. Moughtin, C, 'Urban Design – methods and techniques', Architectural press

3. Mc.Harg, I.L, ‘Design with Nature’, Natural History Press for the American Museum of Natural History,1969.
4. Philip Black, ‘Urban design process (Concise Guides to Planning)’, Lund Humphries Publishers Ltd, 2019.
5. Kevin A. Lynch, ‘The Image of the City’, Cambridge MIT Press MA, 1960
6. Larice Michael and Macdonan Elizabeth, ‘The Urban Design Reader’, Routledge, NY, 2013
7. Christopher Alexander, ‘A Pattern Language: Towns, Buildings, Construction’, Oxford University Press,1977
8. Gordon Cullen, ‘Concise Townscape’, Architectural Press; 1st edition (1 December 1961)
9. Bacon, Edmund. N, ‘Design of Cities’, Thames & Hudson, 1967
10. Carmona, M., Heath, T., Oc, T., and Tiesdell, S., ‘Public Places Urban Spaces: The Dimensions of Urban Design’, Oxford Architectural Press, 2010

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ART 503	Housing	3-0-0-0	3	2021

Course Objectives:

- The goal of this course is to help students understand the housing problems in India and the importance of housing and related infrastructure at a unit level to a National level.
- The students will be introduced to different housing issues, schemes, policies, finance, acts, and design standards.
- The students will be made aware of the role of an architect in society and increase their social responsibility by exposing the social realities around them.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed learning level
CO - 1	Understand the issues and problems, and the importance of housing in the development of a nation.	Understanding
CO - 2	Understand the historical context and evolution of housing acts, policies, and schemes around the world and in India.	Understanding
CO - 3	Analyse the role of the various housing-related institutions in the state, national, and global level.	Analysing
CO - 4	Investigate interdisciplinary perspectives on housing, including sociology and economics.	Analysing
CO - 5	Engage with case studies and precedents of innovative housing projects.	Applying

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End semester Examination Marks	End semester examination duration
100	40	60	3 hours

Continuous Internal Evaluation Pattern:

Attendance : 4 Marks

Continuous Assessment Tests (2 Nos.) : 20 Marks

Assignments/Quiz/Course Project : 16 Marks

End Semester Examination Pattern:

Part A: 5 questions (one from each module) with 4 marks each. (5 x 4 = 20 Marks)

Part B: 2 questions from Modules I–V. Answer any one.Each question carries 8 marks.

Part B questions may have subdivisions. (5 x 8 = 40 Marks)

Syllabus:

Housing Problem and Policies, Importance of Housing in socio-cultural & economic Development, Housing Programs, Schemes and Projects, Housing the poor, Institutional Framework and Housing Finance, Housing Typology and Considerations, Housing Design.

Course Plan

Module	Contents	Course Outcome	No. of hours
I	**Housing Problem and Policies** Magnitude of Housing Problem. Housing challenges due to Urbanization. Relationship with city planning; Role of architect in housing. Housing stock – Census - Quantitative & Qualitative, Housing shortage in Urban and Rural settlements: reasons for housing shortage. Importance of Housing in socio-cultural & economic Development. Maslow's hierarchy of needs. International declarations - IYSH, Habitat Agenda, MDGs and SDGs, New Urban Agenda. Housing Policies and	CO1 CO2	10

	programs introduced in the various Five-Year Plans, Niti Aayog. National Housing policy, National Urban Housing & Habitat Policy (2007), National Rural Housing & Habitat Policy.		
II	**Housing Programs, Schemes, and Projects** The nature and types of housing development programmes in India. Important housing schemes in India for various economic categories, e.g., RAY, PMAY, IHSDP, VAMBAY, schemes under JNNURM, etc. Slums- Causes and effects, characteristics and magnitude of the problem, Policies & Strategies for Slum improvement. Slum-free cities. Housing the poor - Incremental housing, Core housing, Site, and services, Concept of aided self-help, Affordable housing, and Inclusive housing. International case studies - Alejandro Aravena, Shigeru Ban, etc.	CO2 C04	8
III	**Institutional Framework and Housing Finance** Objectives and role of Agencies like HUDCO, NHB, NBO, TCPO, BMTPC, State Housing Boards, Cooperatives, NGO's and other agencies in housing. Role of Private Sector in Housing. Co-operative housing in India. Importance and characteristics of housing finance. Sources of housing finance and essential characteristics, Formal and Informal systems of finance. Major housing finance agencies at the national and state levels, such as the NHB, HDFC, LICHF, GIC, etc.	CO3	7
IV	**Housing Typology and Considerations** Housing Typology - Characteristics of Housing in different regions and their typology - traditional houses, detached housing, row housing, cluster housing, plotted development,	CO4 CO5	8

	multi-storied housing, service apartments, etc. Residential Satisfaction. Emerging trends in housing types. Housing density- net density & gross density.The sociology of housing.		
V	**Housing Design:** Importance of standards, regulations, and laws on contemporary practices for housing and habitat development- KMBR, NBC, URDPFI etc. Principles of neighborhood planning & case studies - Physical and Social infrastructure. Planning and design considerations for rehabilitation housing.	CO4 CO5	12

Textbooks:

1. Housing in the Third World - analyses and solutions – edited by Harjinder Singh, Leslie Kilmartin, 1992
2. A. K. Jain 'Urban Housing and Slums', 2009
3. The Sociology of Housing: How Homes Shape Our Social Lives, Edited by Brian J. McCabe and Eva Rosen (2023)
4. Amos Rapaport, 'House Form and Culture', 1969
5. Arthur Gallion, 'Urban Pattern', 1953

Reference books:

1. Allen, W.A., Happold, E., Word, A.M., & Courtney (Ed.) "A Global strategy for Housing in the third millennium E & FN Spon, London, 1992.
2. The Affordable Housing Market in India: Institutional Constraints, Informal Sector and Privatisation, Padmini Ram and Malcolm Harper (2020)
3. Introduction to Housing, HERA (Author) Prentice Hall (2005)
4. Innovative Approaches to Housing for the Poor – K. Thomas Poulose, 1988.
5. National Building Organisation, Slums in India-A Statistical Compendium, 2011
6. Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines, 2015
7. National Building Code of India, 2005
8. Kerala Municipality Building Rules, 2019

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ART 505	Professional Practice	2-1-0-0	3	2021

Course Objectives:

- To familiarize Architecture as a profession and its role in moulding society, understand duties, liabilities, responsibilities & ethics as a professional.
- To familiarize office administration, schedule of drawings/deliverables, office & client engagement, and design documentation.
- To impart knowledge of tenders, contracts, building permits, project management & scope of Professional services.
- To introduce the legal and regulatory framework with regards to Architectural practice, banking, taxation & other procedures of the office along with the laws applicable to architects.
- To discuss and apprise the scope & avenues of professional architectural services and the demands & mode of professional practice field for setting up an architectural practice.

Course Outcomes:

After the completion of this course, the students will be able to familiarise with established norms of a professional practice by appreciating Architecture as a profession, scope of architectural services, setting up an architecture firm, office management, regulatory framework & demands & mode of Professional Practice field in line with the industry.

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO-1	Familiarizing Architecture as a profession and its role in molding the society.	Understanding
CO-2	Familiarizing of office administration, Schedule of drawings/deliverables, office management, client	Understanding

	engagement and design documentation.	
CO-3	Knowledge of building permits, regulations, Development authority & scope of Professional services.	Understanding
CO-4	Develop a knowledge on legal and regulatory framework with regards to Architectural practice.	Analysing
CO-5	Appreciation of various Architectural practices and develop a knowledge for setting up an office.	Applying

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End semester Examination Marks	End semester examination duration
100	40	60	3 hours

Continuous Internal Evaluation Pattern:

Attendance : 4 Marks
Continuous Assessment Tests (2 Nos.) : 20 Marks
Assignments/Quiz/Course Project : 16 Marks

End Semester Examination Pattern:

Part A: 5 questions (one from each module) with 4 marks each. (5 x 4 = 20 Marks)

Part B: 2 questions from Modules I–V. Answer any one. Each question carries 8 marks. Part B questions may have subdivisions. (5 x 8 = 40 Marks)

Syllabus:

An overview of the Architecture profession and its role in moulding the society, Ethics of architectural practice, office management, design documentation, scope of professional practice in the context of today's rapidly evolving building construction industry. The syllabus also discusses about scope of professional services, fees, project management, staging of a project with client engagement from commencement to execution, regulatory frameworks and appreciation of various architectural practices for setting up a professional architectural

practice.

Course Plan:

Module	Contents	Course Outcome	No. of hours
I	**Architectural profession** Architects' Act-1972, Council of Architecture, Graduation to the registration process. Ethics and code of Practice, social responsibility and sustainability, UN Sustainable Development Goals, professional development associations - COA, IIA, IIID, IUDI, ITPI, ISOLA, AIA, RIBA.	CO1	5
II	**Architectural practice** Architecture Studio/company registration, Skillset for Practice, Software Expertise, office management, client engagement and communication, Schedule of drawings/deliverables, Scope of comprehensive design Services, Scale of Fees, and Site supervision, Documentation, design standards, Architectural coemptions, Feasibility of Site and projects, Various consultancy services & International practice.	CO2	8
FIRST INTERNAL TEST			
III	**Building permits, regulations and development authority** Types of Building permits, Building Bylaws/Regulations, Fire regulations, NBC, Various IS codes for construction practices, Occupancy of buildings, Access width, Occupant load FAR/FSI, Coverage, Setbacks, TDR in Real estate and construction. Height of the building, Development Authority, RERA, Joint development Power of Attorney, Various NOC's-Fire, Aviation, Railway authority NOC, MOU or	CO3	10

	development agreement NOC, Pollution control board NOC, PWD NOC, Heritage NOC, Forest NOC, Environmental clearance rules, Rules for Building in Hilly areas, Sustainable building practice. Safety Provisions for High Rise Buildings, Completion certificate, Occupancy certificate, Development certificate, Introduction to Tendering, Contracts and Project management to staging/phasing a project.		
IV	**Legal and regulatory framework** Arbitration, Indian Arbitration act, Duties and responsibilities of Arbitrator, revoking authority, Umpire and Award, Legislation and registration, banking, insurances and Taxation (Income tax, GST), Valuation, factors affecting value, value classification, ownership, methods of valuation, valuation reports, Easements, types and essential conditions of Easements, valuation of easements. Role and Legal duties of Architects in Arbitration and Valuation.	CO4	10
SECOND INTERNAL TEST			
V	**Appreciation of architectural practice** Identifying and Analyse various successful architectural practices. Appreciate different types of Architectural projects, design standards and approaches in design. Architectural competitions, Intellectual property Rights/IPR, Start-up Eco system, Entrepreneurship, social commitment and service. Application of AR and VR in Architecture, Parametrc tools in Architecture, Architecture of metaverse, Specialization in Architecture, Engage with Emerging technologies and platforms in AI-Midjourney, Vitras.ai, stable diffusion, robotics, social networking, Alternative business models.	CO5	12

	Exercise: *The students may be encouraged to visit in groups to an established Architects firm, interact with them, understand the office functioning and prepare a presentation of their firm visit.*		
END SEMESTER EXAMINATION			

Reference books:

1. Dr Roshan H Namavati, *Professional Practice: With Elements of Estimating, Valuation, Contract and Arbitration,* (2016, Lakhani Book Depot).
2. Council of Architecture, Manual *of Architecture practice-2022.*
3. Hand book of Professional Documents, COA Publications.
4. Paul Segal, *Professional Practice: A Guide to Turning Designs into Buildings,* (2006, W W Norton & Co Inc).
5. Robert F. Dr Roshan H Namavati Herrmann, Menaker & Herrmann LLP Attorneys, *Law for Architects: What You Need to Know***,** (2012, W W Norton & Co Inc).
6. Krishnamurthy K.G, *Professional Practice,* (2014, Prentice Hall India Learning Private Limited).
7. Kerala Municipal building Regulations -2019 (KMBR), *KERALA GAZETTE, Local Self Government (RD) Department, GOVERNMENT OF KERALA.*
8. AIA, *The Architect's Handbook of Professional Practice***,** (2014, Wiley-Blackwell).
9. Wiley, *The Architecture Student's Handbook of Professional Practice* (Fifteenth Edition, John Wiley & Sons Inc).
10. R Klein, *The Architect's Guide to Small Firm Management: Making Chaos Work for Your Small Firm***,** (2010, John Wiley & Sons Inc).
11. Jan Knikker, *How to Win Work: The architect's guide to business development and marketing*, (2021, RIBA Publishing).
12. Patrick MacLeamy, *Designing a World-Class Architecture Firm: The People, Stories, and Strategies Behind HOK,* (2020, John Wiley & Sons Inc).
13. Eric W. Reinholdt*, Architect + Entrepreneur: A How-to Guide for Innovating Practice: Tactics, Strategies, and Case Studies in Passive Income: 2 (Architect and Entrepreneur),* (2015, CreateSpace Independent Pub).
14. Harold Koontz, Heinz Weihrich, Mark V. Cannice, *Essentials of Managment|11th Edition,*

(2020, McGraw Hill; Eleventh edition).

15. Dr Roshan H Namavati, *Theory & Practice of Valuation, (land & Buildings) for Architects, Engineers, Surveyors, Advocates, & Income Tax Practitioners*, (1968, Universal Book Corporation).
16. *Architects Reference manual-workshops professional practice for architects by IIA Kerala chapter and Trivandrum centre, Novemner-1996.*
17. Stefano Brusaporci*, Handbook of Research on Emerging Digital Tools for Architectural Surveying, Modelling, and Representation,* Esr - June 2015.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ART 507	Project management	2-0-0-1	3	2021

Course Objectives:

- To introduce students to the skills essential for managing projects, with an emphasis on construction project management. This can equip students with the skill set to manage projects while addressing organizational, technical, financial, human resource, safety, and quality concerns.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO-1	Summarize the project management procedures of project initiating phase.	Understanding
CO-2	Explain the procedure of awarding construction contracts and its legal aspects.	Understanding
CO-3	Demonstrate the use of project scheduling techniques in construction management.	Apply
CO-4	Discuss how to plan the project's resources and inculcate safety culture in construction projects.	Understanding
CO-5	Demonstrate the use of modern tools and techniques in construction project management.	Apply

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End semester Examination Marks	End semester examination duration
100	40	60	3 hours

Continuous Internal Evaluation Pattern:

Attendance : 4 Marks
Continuous Assessment Tests (2 Nos.) : 20 Marks
Assignments/Quiz/Course Project : 16 Marks

End Semester Examination Pattern:

Part A: 5 questions (one from each module) with 4 marks each. (5 x 4 = 20 Marks)

Part B: 2 questions from Modules I–V. Answer any one. Each question carries 8 marks. Part B questions may have subdivisions. (5 x 8 = 40 Marks)

Syllabus:

- Introduction to Project Management, Legal Aspects of Construction Contracts, Planning and Scheduling Construction Projects, Resource Management, Safety management in construction projects, and Modern tools and methods.

Course Plan:

Module	Contents	Course Outcome	No. of hours
I	**Introduction to Project Management:** Overview of project management, including its purpose, scope, and goals. Project stakeholders, project phases, project organization. Scientific approach to project management. The objectives and responsibilities of the construction management team and the construction managers. Summary of scheduling, monitoring, and controlling the phases of the project management cycle. Conducting feasibility	CO1	6

	assessments for projects.		
II	**Legal Aspects of Construction Contracts:** Definition and types of construction contracts, their purpose, merits, and demerits. Essentials of an executable contract. Tendering and contract awarding procedures. Basics of Contract Law and other relevant acts. Alternate Dispute Resolution procedures being used in construction projects	CO2	6
FIRST INTERNAL TEST			
III	**Planning and Scheduling Construction Projects:** An overview of time management. Basics of Work breakdown structure (WBS). Introduction to construction scheduling techniques - Bar chart / Gantt chart, Critical Path Methods (CPM) - creation of network, network analysis, and findings. Fundamentals and application of PERT.	CO3	9
IV	**Resource Management:** An overview of the five resources for planning and scheduling. Allocation of resources – resource smoothing and levelling. Concept of materials management – planning and control of inventory. Planning of machinery for construction projects. Project cost and budget. Cost – benefit analysis of construction projects. Time – cost trade-offs. Project Crashing or accelerating a project and its downstream effects. Safety management in construction projects.	CO4	12
SECOND INTERNAL TEST			
V	**Modern tools and methods:** Computerization and its advantages. Integrated Project management information system. Project management software like Project Libre or Microsoft Project or similar	CO5	12

	ones and their use. Application of BIM in project management. Role of AI in project management. Digital twin and its application in project management. Students are expected to do any one project management task using modern tools and methods under the guidance of experts from the industry.		
END SEMESTER EXAMINATION			

Reference books:

1. Harris, R. B. (1978). Precedence and Arrow Networking Techniques for Construction. John Wiley & Sons, INC.
2. Krishnamurthy, & Ravindra. (2017). Construction and Project Management (Second). CBS Publishers and Distributors Pvt Ltd.
3. Punmia, B., & Khandelwal, K. (2019). Project Planning and Control with PERT and CPM (Fourth). Trinity Press.
4. Singh, H. (2017). Construction Project Management (Second). Abhishek Publications.
5. Srinath, L. (2015). PERT and CPM Principles and Applications. (Third). Affiliated East-West Press Pvt Ltd.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ECT 511	Earthquake Resistant Architecture	2-0-0-0	2	2021

Course Objectives:

- To give an insight to the students about understanding the behaviour of an earthquake and to provide foundational knowledge of seismology and the impact of earthquakes on structures.
- To understand the behaviour of different building types during seismic activity and to familiarize students with earthquake-resistant design principles and relevant seismic codes.
- To explore techniques for assessing damage and improving the seismic performance of buildings.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO-1	Recall fundamental concepts of seismology and key terminologies related to earthquakes. Understand the principles of earthquake	Understanding
CO-2	Explain the impact of seismic forces on different building types and structural components	Understanding
CO-3	Interpret seismic design codes and understand basic Methods for improving earthquake resistance in buildings.	Analysing
CO-4	Analyse and evaluate structural systems for seismic resilience. Earthquake resistant methods and techniques.	Applying

CO-5	Design of buildings for earthquake resistance, Damage assessment of buildings: Apply advanced technologies and design techniques to create earthquake-resistant architecture.	Applying

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End semester Examination Marks	End semester examination duration
100	40	60	3 hours

Continuous Internal Evaluation Pattern:

Continuous Assessment Tests (2 Nos.) : 20 Marks

Assignments/Quiz/Course Project : 20 Marks

End Semester Examination Pattern:

Part A: 5 questions (one from each module) with 4 marks each. (5 x 4 = 20 Marks)

Part B: 2 questions from Modules I–V. Answer any one. Each question carries 8 marks. Part B questions may have subdivisions. (5 x 8 = 40 Marks)

Syllabus:

Introduction to seismology, Impact of earthquake on various structures, masonry and R.C.C. buildings, Design of building for earthquake resistance using seismic design Code provision, Earthquake resistance methods and techniques, Tools and techniques for damage assessment of building, Improvement of seismic performance of building

Course Plan:

Module	Contents	Course Outcome	No. of hours
I	**Introduction to seismology:** Basic Terminologies of Earthquake: plate tectonics, focus, epicenter, epicenter distance, fault line, magnitude of	CO1	5

	earthquake, intensity of earthquake, frequency, isoseismic lines. Causes of Earthquake: How the ground shaking occurs and cause soil liquefaction. Types of Earthquakes: Inter-plate earthquake, intra- plate earthquake, examples. Different types of seismic waves: p-waves, s-waves, Rayleigh waves, differentiate surface waves and body waves. Working of seismograph, Richter scale, MMI scale. Seismic zones in India, National Seismic Zone map, Prominent past earthquake in India.		
II	**Impact of earthquake on buildings:** Behaviour of brick and masonry building in earthquake. Case examples. Effect of earthquake on R.C.C. buildings. Behaviour of beams in earthquake, behaviour of columns in earthquake at column-beam joints and column-footing joints, localized failure in R.C.C. structures. Case examples. Effect of earthquake on Open- Ground storey building, soft storey effect.Seismic Effects on structures: effects on architectural features on buildings, twisting of buildings, Torsion effect, effects due to irregularities in building, Re-entrant corners, Short- Column effect, Inverted pendulum effect, Pounding effect.	CO2 CO3	5
FIRST INTERNAL TEST			
III	**Design of buildings for earthquake resistance:** Seismic design philosophy for building. Principles and objectives. Importance of seismic design code, Indian seismic codes, IS:1893 and IS:4326, significance and interpretation.	CO4, CO2	6

	Seismic design code provisions: basic terms used in seismic codes and their meaning, horizontal design seismic coefficient, base shear of buildings and vertical distribution of loading. Factors affecting seismic loading: Mass, Natural period, Resonance, damping, ductility.		
IV	**Earthquake resistant methods and techniques:** Relevance of building configuration: scale of the building- size in horizontal plane, size in vertical plane, Building proportions, symmetry of building Importance of simple structural configuration for masonry building. Necessity of horizontal bands, vertical bands, gable bands, through stones and corner stones in brick and stone masonry buildings. Ductility and flexibility of buildings as solution to earthquake effects. Structural redundancy Role of shear wall in R.C.C. building with open-ground storey. Ductile design of shear walls. Introduction to performance based seismic engineering: Overview of advanced modelling tools (Softwares like ETABS, SAP2000 or STAAD). Emerging technologies: Use of smart materials and sensors for earthquake resistance. AI and IoT in seismic monitoring and design.	CO4	6
SECOND INTERNAL TEST			
V	**Damage assessment of buildings:** Causes of distress in buildings, Types and classification of damages due to earthquake. Various tools and techniques for damage assessment. Condition assessment of building, methodology of condition	CO2, CO5	8

	assessment, Detailed investigations required for assessment, Partially Destructive tests, investigation of soil profile, geological and geotechnical investigation, Shake table tests. **Improvement of seismic performance of buildings:** Seismic retrofitting of old and new buildings, various techniques, materials, components and methods. Techniques to reduce earthquake effects: base isolation technique, supplemental energy dissipation devices, different types of seismic dampers. Case examples		
END SEMESTER EXAMINATION			

Text Books:

1. Murty, C.V.R., 'Earthquake Tips- Learning Earthquake Design and Construction', 2005, National information Centre for Earthquake Engineering, IITK, Kanpur

2. Joshua Pwavodi, The role of artificial intelligence and IoT in prediction of earthquakes: Review. 2024, Journal - ScienceDirect, KeAi.

3. Lagario, H.J: Earthquakes: An architect's guide for non-structural seismic hazards, John Wiley and sons, New York, USA.

4. Dowrick, D.J: Earthquake resistant design for Engineers and Architects, 1987, Second edition, John Wiley, New York,USA

5. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006

Reference books:

1. IS:1893 – Indian Standard Criteria for Earthquake Resistant Design of Structures, Bureau of Indian Standards, New Delhi. Part1-2002, Part 6 2022.

2. IS:13935 – Repair and Seismic Strengthening of Buildings – Guidelines, 2009.

3. Priestley, J.N. (2010). "Performance-Based Seismic Design." IIT Kanpur.

4. Bhavikatti, S.S. (2010). "Seismic Analysis of Structures." I.K. International Publishing

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ECT 513	**Sustainable cities and communities**	**2-0-0-0**	**2**	**2021**

Course Objectives:

- To provide students with a robust understanding of sustainable urbanism by integrating theoretical frameworks, policy analysis, and practical applications.
- To equip students with the knowledge and skills to address challenges in urban systems, infrastructure, and governance, with an emphasis on sustainability, urban ecology and sustainable planning. Students are introduced to decision-making and resource-planning technologies.
- To foster critical thinking through the evaluation of global and local case studies, enabling students to propose innovative solutions for sustainable development. By the end of the course, students will be capable of applying interdisciplinary approaches, engaging communities effectively, and formulating strategies to design and manage sustainable cities and communities, aligned with contemporary global and national sustainability goals.

Course Outcomes:
After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO- 1	Define and explain the key concepts related to sustainable development, sustainable communities and urban ecology.	Remembering and Understanding
CO- 2	Familiarise with Sustainable Development Goals related to Sustainable cities and communities.	Understanding and Analysing
CO- 3	Understand the objectives and approaches of sustainable urban planning and analyse the concepts.	Understanding and Analysing
CO- 4	Evaluation and application of policies and initiatives promoting sustainable urban development in Urban Design studio.	Evaluating and Applying

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End semester Examination Marks	End semester examination duration
100	40	60	3 hours

Continuous Internal Evaluation Pattern:

Attendance : 4 Marks
Continuous Assessment Tests (2 Nos.) : 20 Marks
Assignments/Quiz/Course Project : 16 Marks

End Semester Examination Pattern:

Part A: 5 questions (one from each module) with 4 marks each. (5 x 4 = 20 Marks)

Part B: 2 questions from Modules I–V. Answer any one. Each question carries 8 marks. Part B questions may have subdivisions. (5 x 8 = 40 Marks)

Syllabus:

Foundations of Sustainable communities, Policy Frameworks and Governance, Sustainable Urban Planning, Sustainable Cities, Sustainable Urban Planning in Practice

Module	Contents	Course Outcome	No. of hours
I	**Foundations of Sustainable communities** **Key Concepts –**Definitions and principles of sustainability, sustainable development and sustainable communities. Ecosystem services and their importance in urban areas, Blue green infrastructure and nature based solutions, Urban ecology and its principles. Liveable communities. Community Capital –Role in sustainable community development. Community Empowerment -Strategies for participatory governance and grassroots action.	CO- 1	5

II	**Policy Frameworks and Governance** Global Policies - Sustainable Development Goals (SDGs) and their relevance to urban planning. Sustainable Development Goal 11 targets in India. National Frameworks – Smart Cities Mission under the Ministry of Urban Development, including principles of waste management, water management, energy management, and urban mobility.	CO- 2	5
FIRST INTERNAL TEST			
III	**Sustainable Urban Planning** Sustainable Urban Development - Objectives and approaches Sustainable Neighborhood Planning: Five principles, Public Participation, Smart Grid concepts, Integrated resource planning. Case Studies: Indian examples like Ahmedabad (energy, water supply, sewerage) and ecologically sensitive zones in urban contexts.	CO- 1 CO- 3	5
IV	**Sustainable Cities** Eco-Cities: Concepts and principles, with examples of eco-city planning frameworks globally and in India. Cultural and Social Sustainability - Role of heritage and inclusivity in urban planning.	CO- 1 CO- 3	5
SECOND INTERNAL TEST			
	Sustainable Urban Planning in Practice: Case Studies Project-Based Learning – Students shall identify case studies on sustainable cities and communities, analyse, and evaluate the sustainable principles implemented.		

V	Literature Case Studies- Sustainable Urban Planning-Rio Nuevo Master Plan, Uttah City. Sustainable community case study-Hakka Tulou community settlements in Hezhou, China, Ralegan-Siddhi, Maharashtra, Mawlynnong Village, Meghalaya. Application to Architectural Design Studio-Critical evaluation and application of policies and initiatives promoting sustainable urban development in Architectural Design studio.	CO- 4	10
END SEMESTER EXAMINATION			

Textbooks:

1. David Thompson, "Sustainable Communities: Creating a Durable Local Economy", McGraw-Hill, 2015.
2. Dennis N. H. Lee "Planning and Urban Design Standards", John Wiley & Sons, 2006.
3. J. Nicholas & A. J. Dragan "Introduction to Sustainable Development", Pearson Education, 2009.
4. Peter Calthorpe, "Urban Design for Sustainability: A Guide to Creating Sustainable Communities", Island Press, 2010.
5. Peter Roberts and Jonatan Pinkse, "Urban Sustainability: A Global Perspective", Routledge, 2016.
6. Philip Berke, "Urban Planning and Sustainable Development", John Wiley & Sons, 2013.
7. Prugh, Robert Costanza, and Herman Daly, "Sustainable Development: Principles, Frameworks, and Case Studies" Thomas, Island Press, 2016.
8. Rob Kitchin "Smart Cities: A Spatialized Intelligence", SAGE Publications, 2014.
9. Roberto Rocco and Frank Behrendt "Sustainable Cities: A Global Perspective", Routledge, 2017.

Reference Books:

1. Banister, D., Planning Sustainable Cities and Regions: Towards More Equitable Development, Routledge, 2015.
2. Block, P., The Power of Community: How to Build a Resilient Society, Berrett-Koehler Publishers, 2008.

3. Brundtland, G.H., Our Common Future, World Commission on Environment and Development, 1987.
4. Eizenberg, E., The Resilient City, Rockefeller Foundation and Arup, 2014.
5. Farr, D., Sustainable Urbanism: Urban Design With Nature, John Wiley & Sons, 2007.
6. Kibert, C.J, Sustainable Architecture: Principles and Practice,
7. Longley, P. A., GIS for Sustainable Development, Taylor & Francis, 2005.
8. MacKay, D. J. C., Energy Efficiency in the Urban Environment, Earthscan, 2011.
9. McHarg, I., Design with Nature, John Wiley & Sons, 1969.
10. McHarg, I.L, The Ecology of Cities, 1963.
11. Moore, S. A., The Sustainable City, Island Press, 2007.
12. Rao, C.V, Sustainable Cities: Concepts and Case Studies, 2014.
13. Sioshansi, F. P., Energy Efficiency: Towards the End of Demand Growth, Elsevier, 2017.
14. United Nations, Sustainable Development Goals: A Blueprint for Transforming Our World, United Nations, 2015.
15. Wheeler, S. M., & Beatley, T., Sustainable Urban Development Reader, Routledge, 2014.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ECT 515	**Furniture Design**	**2-0-0-0**	**2**	**2021**

Course Objectives:

- To understand the historical evolution and cultural significance of furniture design
- To provide students with a comprehensive understanding of furniture design and its relevance and its impact towards architecture and interior design.
- To introduce ergonomic and anthropometric principles for designing user-friendly furniture.
- To explore materials, techniques, and technologies used in furniture manufacturing.
- To integrate sustainability and design thinking methodologies into the furniture design process.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO-1	Understand the history and evolution of furniture design, its cultural significance, and its relevance to contemporary design practices	Understanding
CO-2	Analyse ergonomic principles and their application in furniture Design	Analysing
CO-3	Explore materials, manufacturing techniques, and furnishing methods for Furniture production.	Applying and Evaluating
CO-4	Develop creative solutions to furniture design challenges using design thinking methodologies	Creating
CO-5	Integrate sustainability into the design process by considering material lifecycle and user needs.	Evaluating

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End semester Examination Marks	End semester examination duration
100	40	60	3 hours

Continuous Internal Evaluation Pattern:

- Attendance: 4 Marks
- Continuous Assessment Tests (2 Nos.): 20 Marks
- Assignments/Quiz/Course Project: 16 Marks

End Semester Examination Pattern:

- Part A: 5 questions (one from each module) with 4 marks each. (5 x 4 = 20 Marks)
- Part B: 2 questions from Modules I–V. Answer any one. Each question carries 8 marks. Part B questions may have subdivisions. (5 x 8 = 40 Marks)

Syllabus:

Introduction to Furniture Design, Materials and Manufacturing Processes, Ergonomics and Human Factors in furniture design for social needs, Design Thinking and methodology in Furniture design, Sustainability in Furniture Design.

Course Plan:

Module	Contents	Course Outcome	No. of hours
I	Definition and evolution of furniture design. Cultural and historical significance. Overview of furniture styles and their impact on modern design. Understanding key terminologies in furniture design. Case studies of iconic furniture pieces: Panton Chair by Verner Panton, Barcelona Chair by Ludwig Mies van der Rohe, and Eames Lounge Chair by Charles and Ray Eames. Introduction to vernacular furniture styles in India: Examples from Kerala, Gujarat, and Rajasthan.	CO-1	4

II	Exploration of materials: wood, metal, composites, and sustainable alternatives. Introduction to manufacturing techniques: joinery, bending, carving, and modern CNC methods. Finishing techniques and understanding material properties. Case studies from furniture design studios: Herman Miller and IKEA's approach to mass production and sustainability. Discussion on new-age technologies: 3D printing, generative design, and smart materials in furniture manufacturing.	CO-3, CO-5	6
FIRST INTERNAL TEST			
III	Principles of ergonomics and anthropometry. User-centered design applications for functionality and comfort. Case studies on ergonomic successes and failures in furniture design. Discussion on award-winning designs: Red Dot Design Award winners in furniture.	CO-2, CO-4	6
IV	Introduction to design thinking and problem-solving. Research, concept development, prototyping, and testing. Integration of design principles such as balance, symmetry, rhythm, and scale. Discussion on current design trends: Minimalist, modular, and multi-functional furniture. Inclusion of Indian vernacular methods in furniture making.	CO-4, CO-5	8
SECOND INTERNAL TEST			
V	Principles of sustainable design. Life Cycle analysis of materials. Designing for disassembly, recyclability, and eco-friendliness. Case studies in sustainable furniture. Recognition of notable awards: Wood Awards and Furniture Design of the Year by Dezeen.	CO-5	6
END SEMESTER EXAMINATION			

Textbooks::

1. Jim Postell, Furniture Design, John Wiley & Sons, Inc., Hoboken, New Jersey, 2012
2. Mark Hinch man, History of Furniture design- A global view, Fairchild Publications; First Edition, 2009
3. Will Holman,Guerilla Furniture Design : How to build Lean, Modern Furniture with salvaged materials, Storey Publishing, LLC, 2015
4. Don Norman, The Design of Everyday Things, Basic Books publishers, 2013.
5. Anna Yudina, Furnitecture: Furniture that transforms Space, Thames and Hudson, 2015
6. Julius Panero & Martin Zelnik, Human Dimension and Interior Space, Watson-Guptill Publishing, 1979

References

1. Fiell Charlotte and Peter Fiell, Modern Furniture Classics, Thames & Hudson Publishing, 1991
2 Judith Miller, Furniture: World Styles from Classical to Contemporary, DK Publishing, 1991
3. Penny Sparke, An Introduction to Design and Culture: 1900 to the Present. Routledge Publishing, 2019
4. Edward Lucie-Smith, Furniture: A Concise History. Thames & Hudson Publishing, 1985
5. Mario Dal Fabbro, Modern Furniture: Its Design and Construction, Reinhold Publishing, 1950.
6. Mel Byars, The Design Encyclopedia, The Museum of Modern Art, New York, 2004.
7. Anne Massey, World Of Art Interior Design Of The 20th Century, Thames & Hudson Publishing, 2001

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Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ECT 517	**Building Systems Integration and Management**	**2-0-0-0**	**2**	**2021**

Course Objectives:

- To introduce the concept of building systems, sub-systems, and their interrelationships.
- To familiarize students with the integration of building systems in diverse building typologies.
- To equip students with knowledge of control systems and their applications in building services.
- To explore advancements in integrated building management systems (IBMS) and remote monitoring technologies.
- To enable students to evaluate and incorporate emerging technologies in building systems.

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO- 1	Understand the role of systems and sub-systems in buildings and their interdependencies	Understanding
CO- 2	Identify building systems for different typologies and suggest optimization methods.	Understanding, Evaluating
CO- 3	Analyse and integrate smart technologies in building management systems for efficient operation	Analysing, Applying
CO- 4	Explore advancements in service control technologies and their applications in sustainable building design.	Understanding, Applying

Mark Distribution:

Total Marks	Continuous Internal Evaluation Marks	End semester Examination Marks	End semester examination duration
100	40	60	3 hours

Continuous Internal Evaluation Pattern:

Attendance	:	4 Marks
Continuous Assessment Tests (2 Nos.)	:	20 Marks
Assignments/Quiz/Course Project	:	16 Marks

End Semester Examination Pattern:

Part A: 5 questions (one from each module) with 4 marks each. (5 x 4 = 20 Marks)

Part B: 2 questions from Modules I–V. Answer any one. Each question carries 8 marks. Part B questions may have subdivisions. (5 x 8 = 40 Marks)

Syllabus:

System and Sub-systems in buildings, relationship and analysis of sub-systems; Building systems for different building typologies, Optimization and sub-system; Control systems for various building services, Types of controllers, Integrated building management systems, Remote monitoring and management, home automation, Developments in service control systems.

Course Plan

Module	Contents	Course Outcome	No. of hours
I	**System and Sub-systems in buildings** Introduction to Building systems*:* Structural system & Non-structural Systems. Sub-systems*:* Subsystems of Structural system- Building elements, Subsystems of Non-structural - Enclosure & Protection System, Mechanical systems (MEP, Fire fighting, Waste disposal, recycling systems, etc.), Mechanical transportation systems. Interrelationships and dependencies among various systems (structural, HVAC, plumbing, electrical, etc.) and their role in building performance. Factors affecting selection, assembly and integration of building systems.	CO- 1	6
II	**Building Systems for various Building Typologies and Optimization** Variations in building systems based on typology (residential, commercial, industrial, healthcare, institutional, etc.). Optimization of building systems for energy, cost, and operational efficiency. Space and resource optimization in integrated systems, Use of tools like Building Information Modeling (BIM) for system coordination	CO- 2	6
FIRST INTERNAL TEST			

III	**Control Systems for Buildings Services** Introduction to Control systems and its significance. Components: Sensors, Actuators, controllers Types of controllers: On-off, PID and their applications in HVAC, Lighting and Security. Preparation of control system drawings: Schematics and layouts using BIM software.	CO- 3	6
IV	**Integrated Building Management System** Introduction to IBMS: Components, functionalities and its benefits. Home automation and smart systems: lighting, security, HVAC, and plumbing. Remote monitoring and management of building services. Case studies of buildings with IBMS/Automation	CO- 3	6
SECOND INTERNAL TEST			
V	**Developments in Service Control Systems** Emerging trends: IoT, artificial intelligence, and machine learning in building services. Energy-efficient technologies and green building systems. Case studies on buildings with advanced service control systems.	CO- 4	6
END SEMESTER EXAMINATION			

Reference Books:

1. Ching, F. D. K. (2014). Building Construction Illustrated (5th ed.). Wiley.
2. Wujek, J. B., & Dagostino, F. R. (2010). Mechanical and Electrical Systems in Architecture, Engineering, and Construction (5th ed.). Pearson.

3. Grondzik, W. T., & Kwok, A. G. (2019). Mechanical and Electrical Equipment for Buildings (13th ed.). Wiley.
4. Watson, R., & Collins, B. L. (1993). Building Systems Design Handbook. McGraw-Hill.
5. Casini, M. (2016). Smart Buildings: Advanced Materials and Nanotechnology to Improve Energy-Efficiency and Sustainability. Woodhead Publishing.
6. Ahuja, A. (2013). Integrated M/E Design: Building Systems Engineering. Springer.
7. Bell, M. J., & Schmid, F. A. (2009). Building Control Systems (2nd ed.). Wiley-Blackwell.
8. Smith, P. R. (2007). Energy and Environmental Issues for the Practicing Architect. Charles C. Thomas Publisher.
9. Krarti, M. (2020). Energy Audit of Building Systems: An Engineering Approach (3rd ed.). CRC Press.
10. Thumann, A., & Younger, W. J. (2020). Handbook of Energy Audits (10th ed.). Fairmont Press.
11. Sinopoli, J. (2009). Smart Building Systems for Architects, Owners, and Builders. Butterworth-Heinemann.
12. Binggeli, C. (2016). Building Systems for Interior Designers (3rd ed.). Wiley.
13. McDowall, R. (2008). Fundamentals of HVAC Systems. Elsevier.
14. Stein, B., Reynolds, J. S., Grondzik, W. T., & Kwok, A. G. (2006). Mechanical and Electrical Equipment for Buildings (10th ed.). John Wiley & Sons.
15. CIBSE (Chartered Institution of Building Services Engineers). (2012). CIBSE Guide H: Building Control Systems. CIBSE Publications.
16. Levermore, G. J. (2013). Building Energy Management Systems: Applications to Low-Energy HVAC and Renewable Energy. Routledge.
17. Smart Building Alliance for Smart Cities (SBASC). (2020). Smart Buildings: A Convergence of Technology and Sustainability. SBASC Press.
18. ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers). (2021). ASHRAE Handbook – Fundamentals. ASHRAE.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ARD 501	**Architectural Design VII**	**0-0-12-0**	**12**	**2021**

Course Objectives:

- To situate architecture and placemaking within its ecological, historical, social, cultural, economic, infrastructural and political context and the legal and administrative framework of an urban/rural setting
- To use research and analytical tools to formulate a detailed design program

Course Outcomes:

After the completion of this course, the students will be able to

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO-1	Understand tools and techniques used to collect and collate data from the context through primary and secondary research	Understanding/ Analysing/ Applying
CO-2	Analyse the data and make inferences that aids formulation of a project brief based on the intent of the studio.	Applying
CO-3	Devise a design programme for the project that addresses key issues with respect to the context/site.	Analysing/ Applying
CO-4	Represent the architectural scheme through drawings, renderings, multimedia and models	Creating

Mark Distribution:

Continuous Internal Evaluation marks	End semester jury marks	Total marks	Duration of end semester jury
50	50	100	2-3 days

Continuous internal evaluation pattern:

Attendance: 5 Marks

Design Assignments/Reviews/Tests: 45 Marks

Syllabus:

The architectural design studio focuses on public projects situated in urban and rural environments. These public buildings are integrated into and influenced by the intricate systems (Ecology, History, Infrastructure networks, cultural dimensions, legal and administrative frame works etc) of their respective contexts. Additionally, it's essential to consider a wide range of stakeholders, from the general public to decision makers.

Students are engaged in an architectural design exercise focused on the design/redesign of public built environments in an urban/ rural setting that would have a significant influence on the people and the context. This exercise encompasses both research and design components.

Example of Projects: Transportation Terminals, Shopping Complex, Art galleries, Cultural centre, Administration buildings, Sports complexes, Performing Arts Centre, Condominiums etc.

Course Plan

Module	Content	Course outcome	No. of hours	Marks
I	Literature review to understand parameters for studying relationships between architecture and context. Case studies of designed public architecture from India and other parts of the world with an analysis of relationships to context	CO1	18	10%
II	Primary study of a public project based on the parameters arrived at from the literature. The output of the study can be in the form of multimedia presentations	CO1, CO2	18	10%
FIRST INTERNAL TEST				

III	Introduction of the public project and studies at both secondary and primary levels including case studies of the project introduced	CO1	36	15%
IV	Analysis/inferences, formulation of design programme and area statements. Conceptual schemes and Site design based on the contextual studies and future vision of the place (the vision can be taken from the existing master plan/documents for the chosen area).	CO2, CO3, CO4	24	15%
SECOND INTERNAL TEST				
V	Architectural design and detailing for the project including service drawings and landscape details	CO4	84	50%
END SEMESTER JURY				

References:

1 Gordon Cullen. (1961). The Concise Townscape. Architectural Press, London

2 William H. Whyte (1980), The Social Life of Small Urban Spaces, Conservation Foundation, University of Michigan

3 Christian Norberg-Schulz. (1980). Genius Loci: Towards a Phenomenology of Architecture. New York: Rizzoli.

4 Kevin Lynch. (1984). Good City Form. Cambridge, MA: MIT Press.

5 Jon Lang (2005). Urban Design: A Typology of Procedures and Products (1st ed.). Routledge.

6 Dell Upton (2002), Architecture in Everyday Life, New Literary History

7 Jan Gehl (2011). Life Between Buildings: Using Public Space. Washington, DC: Island Press.

8 Cliff Moughtin et al (2003) Urban Design Methods and Techniques. Architectural Press

9 Eric Parry 2015. Context: Architecture and the Genius of Place. Wiley

10 Herman Hertzberger (2017). Lessons for Students in Architecture. Rotterdam: Nai010 Publishers.

11 Bill Hillier, Julienne Hanson (1989) The Social Logic of Space. Cambridge University Press

12 Rob Krier and Colin Rowe. (1979) Urban Space. Academy Editions, London.

13 Allan B Jacobs, 1993. "Great Streets," University of California Transportation Centre

14 Matthew Carmona (2021) Public Places- Urban Spaces the Dimensions of Urban Design, Routledge

15 Philip Thalis, Peter John Cantrill (2013) Public Sydney: drawing the city. Historic Houses Trust of New South Wales and the University of New South Wales

16 Ingels, B., Brorman Jensen, B. (Ed.), Ginsberg, E., Pahhota, D., Zahle, D., Johansson, H., Pedersen, A., & Bergman, K.-U. (2009). *Yes is More: An Archicomic on Architectural Evolution*. (1st ed.) BIG Aps.

17 Charles Correa (2010). A Place in the Shade The New Landscape & Other Essays. Penguin Books India

18 All the relevant Building Codes, KMBR, URDPFI guidelines etc.

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ARQ 501	Dissertation	0 – 0 – 2 – 0	2	2021

Course Objectives:

●To provide the students with an opportunity to carry out independent, objective research work on a topic of their choice which is directly related to the built environment.

Course Outcomes:

Course Outcome	Description of Course Outcome	Prescribed Learning Level
CO-1	Introducing the background, identifying the problem and establishing the need for the study	Understanding Analysing
CO-2	Forming extensive theoretical and methodological framework of reading and writing on literature related to the area of research	Understanding Analysing
CO-3	Systematically abstracting, Analysing and interpreting the data from different perspectives to build evidence-based, convincing, and clear analysis or answers.	Understanding Analysing Evaluating Applying
CO-4	Presenting the research output in standardized and systematic academic formats.	Analysing Evaluating Applying Creating

Guidelines:

1. **Dissertation committee:** Dissertation committee will be formed to monitor the research work which includes the dissertation coordinator and two senior faculty members of the institute. The committee will be responsible for constituting the evaluation panels and publishing marks.

2. **Area of research:** The students will carry out the research work under the guidance of their guides on topics directly related to the built environment. They may be encouraged to choose topics that eventually culminate in their final semester design thesis. To establish the need for the study, adequate background research needs to be conducted and a research gap needs to be found.
3. **Topic selection:** The students need to submit research proposals related to built environment in the 8th semester. The topics will be approved by the dissertation committee. The committee will ensure that the chosen topic falls within the scale and scope of architecture design and students will be able to complete the research work in the given timeframe.
4. **Allotment of guides:** The head of the department will allot faculty members of the institution as guides to students to supervise their research work.
5. **Schedule and conduct of work:** The synopsis finalization will be completed by the end of the 8th semester and the department can schedule the deadlines according to the 8th semester academic calendar. The dissertation will be an independent subject in the 9th semester and the schedule for the same will be published in the beginning of the semester. The schedule will include the details of different stages of reviews and the mode of presentation.
6. **Deliverables:** At the end of the dissertation, students shall submit a well written technical paper of max. 4000 words having publishable quality. The department shall collate the papers into a compendium for future reference.

Technical paper-

- Word limit- 4000 words (single side printing)
- Content- Font- Times New Roman, Size-12
- Spacing- 1.5
- Referencing style: As per the department
- Header: Topic name (Font- Times New Roman, size 10, Italics)
- Footer: Name and Register number with page number at right bottom corner- (Font- Times New Roman, Size- 10, Italics)

The institution can create their own format adhering to the minimum requirements given above.

7. **Plagiarism:** Plagiarism should be avoided and should be checked using any institution

approved software. The institute can use soft wares like DrillBit, Turnitin, Urkund etc.

8. Evaluation: The dissertation committee will monitor the internal and external evaluations. A total of 100 marks will be awarded for the course.

i) Internal Reviews- 40 marks

Total marks will be 40 and it will be awarded in the following manner.

Stage	CO	Deliverables	Guide marks	Panel marks	Total marks
Preliminary (Beginning of 9th semester)	CO1 CO2	- Background studies/ need for the project/ research gap - Aim, objectives, scope, limitations etc. and methodology - Literature review/ Data collection reflecting the methodology which is adopted or framed by the student	5	15	20
Intermediate (During 9th semester)	CO3 CO4	- Results and discussion - Analysing and inferring the findings - Concluding and stating further scope	5	10	20
	CO1 CO2 CO3 CO4	- Draft Paper	5		
				Total	**40**

ii) External Jury - 60 marks

The external jury evaluation will be conducted by the dissertation assessment board having 3 members. The board can conduct the evaluation on a convenient date before the deadline stated in the academic calendar. The chairperson of the board will be a senior faculty member from

the institute. The board will have dissertation coordinator/ a faculty member from the institute as internal member and a CoA registered architect with minimum 5 years of experience, preferably from academic/ research institutes, as external member.

Submission requirements:

The following mandatory requirements need to be fulfilled to attend the external evaluation.

- A minimum of 2 hard copies of the technical paper signed by the guide and head of the department/institution, needs to be submitted either on the previous working day of the jury or any other date prior to the jury after the completion of the semester, as announced by the dissertation committee.
- Soft copies of the same can be collected by the institution, prior to submission for checking plagiarism.
- The final presentation can be set as a slideshow.
- Joint author paper in conference proceedings and journals is encouraged in consultation with the guide. The primary author of the paper will be the student author.

Stage	CO	Deliverables	Panel marks
Final	CO1 CO2 CO3 CO4	**Technical paper** Structure of the paper • Abstract- The abstract is a brief, accurate, and comprehensive summary (max 200 words) • Introduction - introduction is the true start of the paper- - Background studies/ need for the project • Main body - This is the main part, or "core" of the paper and includes the methods through which the work's been done, -Aim, objectives, scope, limitations, methodology, results, analysis, and discussion sections • Conclusion. • References	60
		Total marks	60

9. **Publication of marks:** The marks for each stage need to be published within 2 working days after the review. Those students who fail to obtain 50% marks (internal and external evaluation marks put together) can work forward and reappear for the external jury on a date specified by the institution not earlier than one month of the regular jury evaluation.

Reference books:

1. Borden, I. and Ray, K. R. (2006). The Dissertation: An Architecture Student's Handbook. 2nd Ed. Oxford Architectural Press.
2. Fink, A. (1998). Conducting Research Literature Reviews: From Paper to the Internet. Thousand Oaks Sage.
3. Luca, R. (2016). Research Methods for Architecture. Lawrance King Publishing.
4. Groat L.& Wang D. (2002). Architectural Research Methods, John Wiley and Sons Inc.
5. Kothari C. R. (1990). Research Methodology Sultan Chand & Sons, New Delhi.
6. Creswell, John W. (2003). Research Design: Qualitative, Quantitative and Mixed Methods Approach Sage Publications.
7. Day, R. A. (2012). How to Write and Publish a Scientific Paper. Cambridge University Press.
8. Yin, R. K. (2003). Case Study Research: Design and Methods. SAGE Publications.

SEMESTER 10

B ARCH 2021 SCHEME

Course No.	Course Name	L-T-S-P/D	Credits	Year of Introduction
ARD 502	**Architectural Design Thesis**	**NA**	**18**	**2021**

Course Objectives:

- To equip students with the skills to provide creative design solutions for complex architectural projects.
- To enable students to develop a design program based on the specific domain of the selected project.

Students in the B.Arch. degree program are required to prepare an Architectural Design Thesis during the tenth semester under the guidance of faculty appointed by the department. A departmental Thesis Committee, consisting of the Head of the Department, Staff Advisor, Thesis Coordinator, and senior faculty members, shall be formed to oversee the proper conduct of the thesis within the department. This committee shall be independent of the Thesis Evaluation Committee.

Mark distribution:

Total Marks	Continuous Internal Evaluation Marks	End Semester Jury Examination Marks	End Semester Jury Examination Duration
100	50	50	2-3 days

Selection of Thesis Topic:

The student must obtain prior approval for the thesis topic from the department's Thesis Committee. The primary areas of study and research shall include advanced architectural design for public/private projects. However, particular emphasis should be placed on selecting topics that lead to substantial architectural design components.

The student shall be assigned a faculty member from the department as a guide. The project and its specific topic shall be developed by the student under the guidance of the assigned faculty member. The scale of the project, its research context, and the area of architectural intervention shall be decided by the Thesis Committee, based on the requirements of the individual project.

Thesis course work:

The thesis work shall include a detailed study of the project, its spatial requirements, research components, and a comprehensive site study addressing topography, climate, context, and the suitability of the site for the project. An integrated process shall be reflected in the design approach adopted for the selected topic and in the preparation of drawings, models, and the written report.

Students are required to maintain a work diary for the thesis, which must be endorsed weekly by the guide and submitted for progress evaluation along with the thesis work.

The research should be selected based on the design challenge it presents and should offer sufficient scope to complement the architectural design scheme.

Internal Evaluation of thesis:

The department shall establish an internal evaluation committee consisting of the guide and a minimum of two members other than the guide for conducting internal reviews. The jury members are to be selected either from the faculty of the Architecture department of the Teaching College and/or from among Architects registered with the Council of Architecture, incorporated under the Architects' Act of 1972, with no less than ten years of experience.

The progress of the thesis work shall be assessed periodically by the internal evaluation committee through four reviews, the dates of which shall be published by the department and approved by the Thesis Committee. The student is required to orally present the thesis work, supported by architectural drawings (hand-drawn sheets/printouts), a design process model, and the work diary.

The scope for each review:

Review-1

Introduction to the thesis topic, justification for architectural intervention in context, identification of the research premise, basic data, space standards, and relevant primary and secondary case studies. Develop a design program derived from the research conducted. Case studies should include content, context, and spatial analysis. Based on research and case studies, create the project brief and area statement. Justification for the identified site. Site analysis should include relevant bylaws and regulations.

Review-2

Detailed site study and analysis, including climatic and environmental conditions, site context, and specific site features. Detailed design development process, including concept development, zoning at the site and building levels, development of the layout plan, and the formation of a form-based understanding for the project. The students should submit the first draft report. The goal is to evolve a design based on the research, case studies, and site-level understanding.

Review-3

Detailed layout plan with sketch designs for various building blocks, including all floor plans, sections, elevations, views, and block models, along with the second draft report.

Review-4

Detailed site layout with landscape and service details; detailed plans of all floors; sections, elevations, and views; drawings demonstrating the application of the research; building-level service drawings; block model; and the final draft report.

Continuous internal evaluation pattern:

Review Stages	Continuous Progress	Stage Review	
	Guide Marks (%)	Guide Marks (%)	Jury
Review 1	5%	5%	20%
Review 2	5%	5%	20%
Review 3	5%	5%	20%
Review 4	2%	2%	6%

Eligibility to appear for the Final External Evaluation:

The student must present the thesis work for all the four progress evaluations and the mock review and obtain a minimum of 40% combined marks from the four progress evaluations and guide marks in order to be eligible to appear for the final evaluation by a committee appointed by the University.

Documents to be submitted for the Final External Evaluation:

The student shall submit all of the following documents at the teaching institution for the final external evaluation, on the date and time announced by the University:

1. Architectural drawings, not exceeding 30 A1-size sheets, prepared in the format prescribed by the thesis committee. These should be submitted at the teaching institution on the working day before the date of the final external evaluation.
2. One copy of the research report for the thesis project, compiled and presented along with the final submission in A3 size.
3. Final sheets and two copies of the final report, prepared in the format prescribed by the Thesis Committee shall be submitted at the teaching institution on the working day prior to the date of the final External Evaluation.
4. Models to be submitted on the date of the final External Evaluation, at or before 9 a.m.

Any additional instructions regarding the schedule of reviews, preparation of bound volumes of data collection, final report, final sheets, models, etc., will be announced by the teaching institution.

Final External Evaluation:

A committee appointed by the University shall conduct the final external jury examination of the thesis work. The committee shall consist of one faculty member from the institute as the internal examiner and an expert from the industry/institute, having valid CoA registration and a minimum of ten years of experience after registration with CoA, as the external examiner.

Students must secure a minimum of 40% in the Continuous Internal Evaluation (CIE) and External Jury separately, and 50% combined from the CIE and final jury assessment marks to successfully complete the architectural thesis