

West Bengal State Council of Technical &
Vocational Education and Skill
Development
(Technical Education Division)



Syllabus
of

Diploma in Architecture [ARCH]

Part-II (4th Semester)

Revised 2022

West Bengal State Council of Technical & Vocational Education and Skill Development (Technical Education Division)									
Teaching Scheme for Diploma in Engineering Courses: Branch- Architecture(4 th Semester)									
Sl no	Category	Code No	Course Title	Credits	periods			Contact hours per week	Marks
					L	TU	PR		
THEORY SUBJECTS									
1	Programme core course	ARPC 202	Theory of structure	2	2	0	0	2	100
2	Programme core course	ARPC 204	Materials and Methods of Construction-II	2	2	0	0	2	100
3	Programme core course	ARPC 206	History of Architecture-II	2	2	0	0	2	100
4	Programme core course	ARPC 208	Building services & Equipments-II	2	2	0	0	2	100
5	Programme core course	ARPC 210	Architectural Design –II	1	0	1	0	1	100
SESSIONAL SUBJECTS									
6	Programme core course	ARPC 212	Architectural Drawing-IV (Sessional)	2	0	0	4	4	100
7	Programme core course	ARPC 214	Architectural Design –II (Sessional)	2	0	0	4	4	100
8	Programme core course	ARPC 216	Working Drawing-II (Sessional)	3	0	1	4	5	100
9	Programme core course	ARPC 218	Computer Lab-II(Sessional)	2	0	0	4	4	100
10	Programme elective course	ARPE 202	(Elective-I)- (Sessional)	2	0	1	2	3	100
Total				20				29	1000
L:-Lecturer			TU:-Tutorial			PR:-Practical			

EVALUATION SCHEME:

A. For Theory Courses:

- (i) The weightage of internal assessment is 40% and for End Semester Examination is 60%
- (ii) The student has to obtain at least 40% marks individually both in internal assessment and endsemester examination to pass for the subject

Examination Scheme: Theoretical subject (Full Marks=100)

Sl No	Internal assessment		End Semester Exam	
	Type	Marks	Question Type	Marks
1	Mid Semester Tests (Two best out of three)	10x2=20	(a) MCQ type questions carrying 1 mark, Question to be set=15 and question to be answered=10 (b) Fill-in the blanks type questions carrying 1 mark. To be set=15 and to be answered=10 (c) Short answer type questions carrying 1 mark. To be set 15 and to be answered=6	1x30=30
2	Quizzes, viva-voce, Assignments	10	Subjective type Question carrying 2 marks. Question to be set=10 and Question to be answered=6	2x6=12
3	Class Attendance*	10	Subjective type Question carrying 6 marks. Question to be set=9(3 each for 3 modules) and Question to be answered=3	6x3=18
Total		40		60

Note: While setting the question papers it has to be ensured that there will be a mix-up of questions in the category route, application, understanding and analysis in equal proportion.

(b) For Sessional Courses:-

- (i) The weight age of internal assessment is 60% and for End Semester Exam is 40%.
- (ii) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass for each subject.

Marks Distribution: Full Marks =100

Sl No	Internal assessment		End Semester Exam	
	Type	Marks	Question Type	Marks
1	Continuous Evaluation	40	Assignments on the day of exam (by External Evaluator)	10
2	Class Attendance & class performance	10	Class work submission	20
3	Viva-voce	10	Viva-voce (by External Evaluator)	10
	Total	60		40

Allotment of attendance marks as follow:

Class Attendance (in %)	Marks to be awarded for class attendance
80% and above	10.0
75% to below 80%	8.0
70% to below 75%	6.0
65% to below 70%	4.0
60% to below 65%	2.0

Note: The internal assessment is based on the student's performance in mid semester tests (two best out of three), quizzes, assignments, class performance, attendance, viva-voce in practical, lab record etc.

Mapping of Marks to Grades

Each course (Theory/Practical) is to be assigned 100 marks, irrespective of the number of credits, and the mapping of marks to grades may be done as per the following table:

Range of marks	Assigned Grade
90 to 100	AA/A+
80 to below 90	AB/A
70 to below 80	BB/B+
60 to below 70	BC/B
50 to below 60	CC/C+
45 to below 50	CD/C
40 to below 45	DD/D
<40	FF/F(Fail due to less marks)
-	F ^R (fail due to shortage of attendance and therefore, to repeat the course)

THEORY SUBJECTS

Course Code	:	ARPC 202
Course Title	:	Theory of structure
Number of Classes	:	2(L-2,T-0,P-0)
Number of Credit	:	2
Prerequisites	:	1) Elementary knowledge on Strength of Material 2) Differential and integral calculus
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PC
Full Marks	:	100

Semester Examination Scheme:-

Module	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS							
	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
1	10	Any thirty	ONE	1 x 30 = 30	2	Any six	TWO	2x6=12	2	Any three	SIX	6x3=18
2	9				2				2			
3	10				2				2			
4	8				2				2			
5	8				2				1			

Course Objectives: - On satisfactory completion of the course, the students should be in a position to: —

- (i) Analyze simple pin-jointed frame & truss structures;
- (ii) Tackle simple problems of retaining walls regarding stress intensity at the base and its stability;
- (iii) Understand the load carrying criteria of columns with respect to length and shape;
- (iv) Draw Shear Force and Bending Moment diagrams of two-span continuous beams using Clapeyron's Theorem of Three Moments and Slope deflection method;
- (v) Solve the problems of cantilever as well as simply supported beams in simple loading conditions.

MODULAR DIVISION OF THE SYLLABUS

Unit	Topic	Lecture
1	Pin jointed structures	7
2	Columns & struts	6
3	Two span continuous beams	7
4	Fixed beams	5
5	Propped cantilever	5
	Total	30
CONTACT PERIODS:30		INTERNAL ASSESSMENT:4
TOTAL PERIODS:34		

DETAIL COURSE CONTENT

Unit No.	Topic	Contents	Number of Classes
Unit 1	Pin jointed structures	1.1 Concept of a Frame: Perfect, Redundant & Deficient — Plane frames & Space frames — Different types of end supports of frames — Concept of statically determinate & indeterminate structures 1.2 Assumptions made in finding the forces in the members of a perfect frame 1.3 Different methods of finding the forces in the members of perfect frames (cantilever and simply supported) subjected to loadings by: – (a) graphical method, (b) method of joints 1.4 Numerical problems	7
Unit 2	Columns & struts	2.1 Definitions of column & strut – Buckling of column, Concept of equivalent length as per different end conditions, Critical load/buckling load, safe load, Euler's Rankine's formulae for critical/buckling load for columns. Simple problem. 2.2) Problems for finding critical load by Euler's formula for various kinds of end conditions for columns of: rectangular, circular, symmetrical and asymmetrical sections	6
Unit 3	Two span continuous beams	3.1 To draw Shear Force and Bending Moment diagrams for two equal spans carrying – (a) uniformly distributed load over whole span, and, (b) equal point load at centre of each span; using Clapeyron's Theorem of Three Moments (no proof) . 3.2 Simple problems.	7
Unit 4	Fixed beams	4.1) To draw Shear Force and Bending Moment diagrams for – (a) uniformly distributed load over whole span, and, (b) point load at any intermediate point within the span	5
Unit 5	Propped cantilever	5.1) To find out prop reaction for rigid and elastic prop by – moment area method — To draw Shear Force and Bending Moment diagrams for – (a) uniformly distributed load (partly and fully throughout the span), and, (b) point load at any intermediate position in the span.	5

References Books

Name of Author	Name of Book	Name of Publisher
S. Ramamurtham & R. Narayanan	STRENGTH OF MATERIALS	Dhanpat Rai & Sons, Delhi
M. Chakraborty	STRENGTH OF MATERIALS	S. K. Kataria & Sons, Gurunanak Market, Delhi
R. S. Khurmi	STRENGTH OF MATERIALS	S. Chand & Co
S.P. Timoshenko, D.H. Young	Elements of Strength of materials	West Press Pvt. Ltd.
D. S. Prakash Rao	Strength of Materials – A Practical Approach	Universities Press
Egor P Popov	Engineering Mechanics of Solid	Prentice Hall of India

Course Code	:	ARPC 204
Course Title	:	Materials and Methods of Construction II
Number of Classes	:	2(L-2,T-0,P-0)
Number of Credit	:	2
Prerequisites	:	Knowledge on MMC-I
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PC
Full Marks	:	100

Semester Examination Scheme:-

Module	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS							
	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
1	10	Any thirty	ONE	1 x 30 = 30	2	Any six	TWO	2x6=12	2	Any three	SIX	6x3=18
2	9				2				2			
3	10				2				2			
4	8				2				2			
5	8				2				1			

Course Objectives: - On satisfactory completion of the course, the students will: —

- (i) understand the constituents, properties, defects & curing measures and applications of principal types of concrete, and, non-conventional concretes like pre-cast concrete, pre-stressed concrete, FRC and Ferro cement;
- (ii) understand the functions of different building types of building mortars;
- (iii) have clear concepts regarding the purpose of the foundation with special reference to different types of shallow foundation;
- (iv) have clear concepts regarding the purpose of the plinth and methods of its filling;
- (v) understand the causes of dampness to foundations & basements of buildings and methods of prevention from the same;
- (vi) understand different methods of spanning of openings using lintels and arches;
- (vii) have knowledge regarding different design considerations for a good stair with special reference to the RCC stairs;
- (viii) Understand the different constructional methodology of water proofing treatment to flat roofs & terraces, parapet wall and window sill in detail.

MODULAR DIVISION OF THE SYLLABUS

Unit	Topic	Lecture
1	CEMENT CONCRETE	4
2	NON-CONVENTIONAL CONCRETE	2
3	BUILDING MORTARS	4
4	FOUNDATION & PLINTH	4
5	DAMP PROOFING TREATMENT	4
6	SPANNING OF OPENINGS	4
7	STAIRS	4
8	WATER PROOFING TREATMENT	4
	Total	30
CONTACT PERIODS:30		INTERNAL ASSESSMENT:4
TOTAL PERIODS:34		

DETAIL COURSE CONTENT			
Unit No.	Topic	Contents	Number of Classes
Group A: MATERIALS			
Unit 1:	CEMENT CONCRETE	1.1 CONCRETE: Definition and grades of concrete (M10, M15, M20) 1.2 CONCRETE MAKING MATERIALS: CEMENT – Portland cement – Types of Portland Cement: Pozzolona Cement – White Cement – Blast furnace slag cement (properties and uses only) – Storage of cement — AGGREGATES – Grading of aggregates: Fine & Coarse aggregate (definition & function) — WATER – Properties of water to be mixed with cement – Functions of water 1.3 PROPERTIES OF CONCRETE: Strength – Durability – Water-cement ratio – Workability 1.4 DEFECTS OF CONCRETE and their CURING MEASURES 1.5 PRINCIPAL TYPES OF CONCRETE: Plain Cement Concrete (PCC) & Reinforced Cement Concrete (RCC) — advantages & properties – Concrete admixtures (Concepts only)	4 Periods
Unit 2:	NON-CONVENTIONAL CONCRETE	Pre-cast concrete – Pre-stressed concrete – Fibred Reinforced Concrete(FRC) – Ferro cement (definitions and applications only)	2 Periods
Unit 3:	BUILDING MORTARS	Classification of mortars on the basis of materials used and their functions: Cement mortar – Lime mortar – Mud mortar – Composite mortars (Lime-Cement mortar, Surki-Lime mortar) – Gypsum mortar – Polymer modified mortar	4 Periods
Group B: CONSTRUCTION			
Unit 4:	FOUNDATION & PLINTH	4.1 FOUNDATION: Definition – Purpose 4.2 CLASSIFICATION OF FOUNDATION: Shallow Foundation & Deep Foundation 4.3 SPREAD FOOTINGS: Wall Footings – Reinforced Concrete Footings – Inverted Arch Footings – Isolated Column Footings — COMBINED FOOTING — MAT OR RAFT FOUNDATION (Concepts with sketches) 4.4 TYPICAL DETAILS OF FOUNDATION: (i) Brick wall foundation & (ii) Isolated RCC column foundation 4.5 PLINTH: Definition – Purpose 4.6 FILLING OF PLINTH: Materials used – Methods of filling – Purpose of filling	4 Periods
Unit 5:	DAMP PROOFING TREATMENT	5.1 DAMPNES — CAUSES of dampness — DEFECTS caused by dampness 5.2 METHODS OF PREVENTION OF DAMPNES: Membrane Damp Proofing – Integral Damp Proofing – Surface Treatment – Guniting – Cavity Wall Construction 5.3 DAMP PROOFING TREATMENT TO: (i) Foundation & plinth & (ii) Basement	4 Periods
Unit 6:	SPANNING OF OPENINGS	6.1 Post & Lintel openings — Limitations of material — Arched openings 6.2 LINTEL AND ARCH: Definitions – Typical detail of a masonry window opening showing sill, lintel & chajja projection – Typical detail of an arched opening showing various parts 6.3 TYPES OF LINTEL: Brick lintel — RCC lintel — Precast concrete lintel (Methods of erection) 6.4 TYPES OF ARCHES: Semi-Circular Arches — Segmental Arches — Flat Arches 6.5 RELIEVING ARCHES	4 Periods
Unit 7:	STAIRS	7.1 STAIRS: Definition – Technical terms used in stairs construction 7.2 LOCATION of Stairs 7.3 REQUIREMENT of a good stair 7.4 RISER & TREAD RELATIONSHIP 7.5 SPAN of Stairs 7.6 CLASSIFICATION of stairs on the basis of their forms 7.7 RCC STAIRS: Advantages of RCC stairs – Design Principle of RCC stairs 7.8 FIXING DETAILS: (i) Balusters (metal & wood) & (ii) Nosing to steps	4 Periods

Unit 8:	WATER PROOFING TREATMENT	8.1 Water proofing treatment to FLAT ROOFS & TERRACES: (a) Grading of Bitumen: Four course treatment – Six course treatment — (b) Grading of other materials: Grading of lime concrete – Grading of lime concrete with tiles – Grading of mud pushka with tiles (brief description with detail sketch) – (c) Roof heat insulation treatment (Concepts only) 8.2 Water proofing treatment to PARAPET WALL: Detail of Coping, Drip course / Mould 8.3 Water proofing treatment to WINDOW SILL & CHAJJA: Detail of Drip course / Mould.	4 Periods
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Learning Outcome:

- (i) Developing the skill of applying cement concrete and non-conventional concrete in building construction.
- (ii) Application process of mortars in construction work.
- (iii) Ability to construct different types of foundation and plinth for various types of buildings.
- (iv) Gaining the skill to do damp proofing treatment in building.
- (v) Application capability of different type of arches, lintel and stairs in buildings.
- (vi) Gaining the skill to do water proofing treatment in building.

REFERENCE BOOKS

1. Building Construction Volume I, II, III & IV (Metric Ed.) / J. K. MCKay & W. B. MCKay / Orient Longman
2. The Construction of Buildings Volume 1, 2, 3, 4 & 5 / R. Barry / English Language Book Society
3. A Text Book of Materials and Construction / TTTI
4. A Text Book of Building Construction / S. P. Aurora & S. P. Bindra /
5. Building Construction / Sushil Kumar / Standards Publishers Distributors, Delhi
6. Building Construction / Varghese/ PHI Learning Pvt. Ltd.

Course Code	:	ARPC 206
Course Title	:	HISTORY OF ARCHITECTURE — II
Number of Classes	:	2(L-2,T-0,P-0)
Number of Credit	:	2
Prerequisites	:	Knowledge on HOA-I
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PC
Full Marks	:	100

Semester Examination Scheme:-

Group	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS							
	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TOTAL	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	5	Any thirty	ONE	1 x 30 = 30	1	Any six	TWO	2x6=12	1	Any three	SIX	6x3=18
B	10				2				2			
C	15				3				3			
D	15				4				3			

Course Objectives: On satisfactory completion of the course, the students should be in a position to understand the typical features of the: —

- (i) Architecture of ancient Indus Valley Civilization and Vedic Culture;
- (ii) Stupa Architecture in India;
- (iii) Rock-cut architecture in India from the Pillars through the Early Rock-cut, the Hinayana, the Orissan Group (Jain), the Mahayana to the Final Brahminical phases;
- (iv) evolution of temple architecture of southern India (Dravidian style) pertaining to the Pallava, Chola, Pandya, Vijaynagar and Madura dynasties;
- (v) Evolution of temple architecture of northern India (Indo-Aryan style) pertaining to the Orissa & Khajuraho groups, the provincial style of Bengal and, the Jain temples;
- (vi) Islamic architecture in India pertaining to the architecture of Delhi or Imperial style (through the Slave, Tughlaq and Sayyid & Lodi Dynasties); the architecture of Sher-Shah-Sur, provincial style of Bengal and that of the Mughal period (through the sandstone & marble phase)

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	Topic	Lecture
A	1	ARCHITECTURE OF THE INDUS VALLEY CIVILIZATION	2
		ARCHITECTURE OF THE VEDIC CULTURE	
B	2	<i>STUPA</i> ARCHITECTURE	1
	3	ROCK-CUT ARCHITECTURE	5
C	4	THE EVOLUTION OF TEMPLE ARCHITECTURE	11
D	5	ISLAMIC ARCHITECTURE IN INDIA	11
		Total	30
		CONTACT PERIODS:30	INTERNAL ASSESSMENT:4
		TOTAL PERIODS:34	

DETAIL COURSE CONTENT

Module	Topic	Contents	Number of Classes
GROUP - A		THE ANCIENT INDIA	2 PERIODS
Module 1	ARCHITECTURE OF THE ANCIENT INDIA	1.1 ARCHITECTURE OF THE INDUS VALLEY CIVILIZATION: Architecture and building typology of Harappa civilization such as towns of Harappa and MohenjoDaro. 1.2 ARCHITECTURE OF THE VEDIC CULTURE Understanding of Vedic architecture and settlements of Vedic Architecture—Elementary type of forest dwelling leading to TIMBER CONSTRUCTION – GRAMA (little collection of huts) protected by bamboo railing: THABA (post), SUCHI (needle), GAMADVARA (entrance), TORANA (gateway)	2PERIODS
GROUP - B		STUPA & ROCK – CUT ARCHITECTURE	6 PERIODS
Module 2	<i>STUPA</i> ARCHITECTURE	Supreme sacred monument of Buddhism – Basic form & features of stupa — Detailed study of the GREAT STUPA (STUPA 1), SANCHI.	1 PERIOD
Module 3	ROCK-CUT ARCHITECTURE	3.1 EARLY ROCK-CUT ARCHITECTURE: Simple woodwork imitating forms –Architectural examples of the LOMASH RISHI CAVES, BARABAR HILLS, BIHAR 3.2 MAHAYANA AND HINAYANA BUDDHISM: Architectural examples of Mahayana and Hinayana Buddhism. Study of Chaitya halls, Viharas of places like Karle, Ajanta etc. 3.3 Architectural examples of Medieval Jain architecture in Eastern India- Study of the RANI GUMPHA, UDAYAGIRI 3.4 FINAL PHASE (BRAHMINICAL): Study of Architectural features of this era along with basic Study of the KAILASA TEMPLES, ELLORA	5 PERIODS

GROUP – C		THE EVOLUTION OF TEMPLE ARCHITECTURE	11 PERIODS
Module 4	TEMPLE ARCHITECTURE	<p>4.1 Architectural characteristics of early temple architecture with examples of monolithic and rock-cut architecture of South India (Study of the monolithic RATHAS, Mammallapuram)</p> <p>4.2 Evolution of structural temples: (Study of LAD KHAN TEMPLE-AIHOLE)</p> <p>4.3 Development and Characteristic features of Dravidian style temple architecture with examples under different dynasties such as PALLAVA, CHOLA, PANDYA, VIJAYNAGAR, MADURA</p> <p>4.4 Development and Characteristic features of NAGARA style temple architecture with examples under different dynasties such as ORISSA GROUP (Study of the LINGARAJA TEMPLE, BHUBANESWARA), KHAJURAHU GROUP (Study of the KANDARYA MAHADEVA TEMPLE)</p> <p>4.5 Development of PROVINCIAL STYLES OF BENGAL temple architecture in BISHNUPUR (Study of the JOR-BANGLA TEMPLE, BISHNUPUR)</p> <p>4.6 Development of JAIN ARCHITECTURE of MOUNT ABU in western India (Study of the DILWARA TEMPLE, MOUNT ABU)</p>	11 PERIOD
GROUP - D		ISLAMIC ARCHITECTURE IN INDIA	11 PERIODS
Module 5	ISLAMIC ARCHITECTURE	<p>5.1 Introduction early Islamic architecture in India</p> <p>5.2 Characteristic features of Islamic architecture; minarets, domes, gardens, geometrical and calligraphic decorations.</p> <p>5.3 Development of IMPERIAL STYLE architecture under different dynasties such as SLAVE, TUGHLAQ, SAYYID, LODI, SHER SHAH SUR – (Study of the QUTB MINAR AND THE TOMB OF SHER SHAH)</p> <p>5.4 Development of PROVINCIAL STYLES OF BENGAL (Study of Adina Masjid- in PANDUA)</p> <p>5.5 Development of Mughal architecture with examples under different rulers such as HUMAYUN, AKBAR, JAHANGIR, SHAHJAHAN: (Study of the HUMAYUN'S TOMB; FATEHPUR SIKRI with (a) BULAND DARWAJA, (b) JAMI MASJID, and, (c) TOMB OF SALIM CHISTI; TOMB OF IT-MAD-ULLAH and TAJ MAHAL emphasizing on both tomb and garden)</p>	11 PERIODS

Learning Outcomes of History of Architecture II :

- An understanding of the complex factors that condition the built environment through design analysis, theory and history
- Critical and analytical skills through a study of history, theory and design studios
- An ability to communicate ideas through written, graphic and oral means in an organized and articulate fashion through presenting history papers, design critiques, and presentation booklets
- An ability for creative problem-solving in the design studio
- An ability to visualize in spatial and three-dimensional terms

REFERENCE BOOKS:

1. Indian Architecture Vol. 1 (Buddhist & Hindu) / Percy Brown / D.B. Taraporevala Sons & Co. Pvt. Ltd.
2. Indian Architecture Vol. 2 (Islamic Period) / Percy Brown / D.B. Taraporevala Sons & Co. Pvt. Ltd.
3. Buddhist and Hindu Architecture in India / Satish Grover / CBS
4. Islamic Architecture in India / Satish Grover / Galgotia Publishing Company, New Delhi
5. A History of Architecture / Sir Banister Fletcher / Butterworth Heinemann (Hb), CBS (Pb)
6. The Great Ages of World Architecture / G. H. Hiraskar / Dhanpat Rai Co. Pvt. Ltd., Delhi

Course Code	:	ARPC 208
Course Title	:	Building services & Equipments-II
Number of Classes	:	2(L-2,T-0,P-0)
Number of Credit	:	2
Prerequisites	:	Knowledge on BSE-I
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PC
Full Marks	:	100

Course Objectives: On satisfactory completion of the course, the students should be in a position to:—

- (i) establish the ideas of natural and mechanical ventilation with respect to the orientation of building in order to achieve desirable comfort conditions;
- (ii) understand the principles of lighting, day lighting and artificial lighting;
- (iii) understand the considerations for the design & planning of an electrical installation in a building with respect to the substation & distribution of supply;
- (iv) IDEA REGARDING SOME ACCESSORIES and ARCHITECTURAL SYMBOLS FOR ELECTRICAL INSTALLATION IN BUILDINGS
- (v) understand the principles of acoustics and establish the constructional measures for sound insulation of buildings;
- (vi) understand the design considerations for lift installation;
- (vii) Understand the general requirements of fire protection with emphasis to the exit requirements.

MODULAR DIVISION OF THE SYLLABUS

GROUP	MODULE	TOPIC	CONTACT PERIODS
A	1	VENTILATION	5
	2	LIGHTING	5
B	3	ELECTRICAL INSTALLATION	4
	4	ACOUSTICS, SOUND INSULATION AND NOISE CONTROL	6
C	5	INSTALLATION OF LIFTS	4
	6	FIRE PROTECTION	6
CONTACT PERIODS: 30			INTERNAL ASSESSMENT: 4
			TOTAL PERIODS: 34

Semester Examination Scheme:-

Module	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS							
	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
1,2	10	Any thirty	ONE	1 x 30 = 30	3	Any six	TWO	2x6=12	3	Any three	SIX	6x3=18
3,4	15				3				3			
5,6	20				4				3			

DETAIL COURSE CONTENT

Module	Topic	Contents	Number of Classes
GROUP - A			10 PERIODS
Module -1	VENTILATION	1.1-CLIMATE & WEATHER — BASIC CLIMATIC ZONES: Hot & Arid, Hot / Warm & Humid, Cold — CLIMATIC FACTORS: Solar Radiation & Temperature, Clouds, Relative Humidity, Prevailing wind; — PLANTATION OF TREES-Orientation of building form with respect to solar radiation and local wind flow.	1 PERIOD
		1.2-COMFORT: THE DESIRABLE CONDITIONS REQUIREMENT OF VENTILATION — HEAT BALANCE OF BODY— AIR CHANGE PER HOUR — RECOMMENDED VALUES OF AIR CHANGES for ‘bed rooms/ living rooms’, ‘bath rooms/ toilets’, ‘cafes/ restaurants’, ‘cinemas/ theatres (non-smoking)’, ‘class rooms’, ‘garages’, ‘hospital wards’, ‘kitchens (common)’, ‘kitchens (domestic)’, ‘laboratories’ and ‘offices’ [values only]— METHODS OF VENTILATION.	1 PERIOD
		1.3-NATURAL VENTILATION WIND ACTION: $Q = KAV$ — STACK EFFECT: $Q = 7.0A\sqrt{h(tr - t0)}$ — CROSS-VENTILATION — POSITION OF OPENINGS – SIZE OF OPENINGS — CONTROL OF OPENINGS: sashes, canopies, louvers — WIND SHADOW — guideline for designing airy building- HUMIDITY CONTROL: wind scoop	2 PERIODS
		1.4-MECHANICAL VENTILATION FAN: propeller & centrifugal — INSTALLATION OF FANS: local & central — SYSTEMS OF VENTILATION: exhaust, plenum (positive ventilation) & combined —Mechanical cooling (Heat pump circuit)-refrigerant,compressor,condenser,pressurereleasevalve,evaporator (refrigerator-air cooler)-SIMPLE AIR-CONDITIONER: propelling, filtering, washing, humidifying, cooling, dehumidifying, heating or re-heating-Ton of refrigeration	2 PERIODS
Module -2	LIGHTING	2.1-PRINCIPLES OF LIGHTING AIMS OF GOOD LIGHTING and realization of the same — GLARE: direct, reflected & veiling — RECOMMENDED VALUES OF ILLUMINATION LEVEL for ‘homes’, ‘restaurants’, ‘cinemas’, ‘theatres’, ‘schools & colleges’, ‘hospitals’, ‘offices’ [values only].	1 PERIOD
		2.2-DAYLIGHTING SOURCES OF LIGHT OF A POINT INSIDE A BUILDING: skylight, externally reflected light, internally reflectedlight, direct sunlight — WORKING PLANE — DAYLIGHT FACTOR-Concept of shading devices.	1 PERIOD
		2.3-ARTIFICIAL LIGHTING NECESSITY OF ARTIFICIAL LIGHTING —TYPES OF LUMINAIRES: direct, indirect, diffused-DISCHARGE LAMPS: Incandescent, high & low pressure lamp, CFLs & LEDs— ARRANGEMENT OF LUMINAIRES.	2 PERIODS
GROUP - B			10 PERIODS
Module 3	ELECTRICAL INSTALLATION	3.1-CONSIDERATIONS FOR DESIGN & PLANNING OF AN ELECTRICAL INSTALLATION	1 PERIOD
		3.2-SUBSTATION LOCATION — LAYOUT — ROOM / SPACES required for supply company’s switchgear room, high voltageswitchgear room (HT), transformer room, low voltage switchgear room (LT), standby generator room.	1 PERIOD
		3.3-DISTRIBUTION OF SUPPLY IDEA REGARDING SOME ACCESSORIES: cables – cleat; circuit – circuit breaker; fuse – fuse-element – fuse- switch; distribution board; energy meters; switch – switchboard; socket-outlet – schedule of socket- outlets in a residential building- Difference between three phase and single phase wiring.	1 PERIOD
		3.4-ARCHITECTURAL SYMBOLS FOR ELECTRICAL INSTALLATION IN BUILDINGS Wiring, Fuse Boards, Switches & Switch-outlets, Socket-outlets, Lamps & Lighting Apparatus, ElectricalAppliances, Bells, Buzzers & Sirens, Fans, Telecommunication Apparatus, Fire Alarms, Earthing.	1 PERIOD

Module 4	ACOUSTICS, SOUND INSULATION AND NOISE CONTROL	4.1-NOISE & TRANSMISSION OF SOUND AUDIBLE RANGE OF SOUND — EFFECTS OF NOISE — NOISE IN FREE FIELD: effect of wind velocity & temperature gradient, acoustic shadow & diffraction at respectively high & low frequencies —INCIDENCE OF SOUND: $a + t + r = 1$ — TRANSMISSION LOSS (TL) — NOISE IN ENCLOSED SPACE: direct & reverberant components — SOUND TRANSMISSION: air-borne & impact (structure-borne) sound	2 PERIODS
		4.2-NOISE CONTROL DISTANCING & SCREENING — SOUND ABSORBENTS: porous absorbents, membrane absorbents, resonant absorbers (Helmholz resonators), perforated panel absorbents — ACCEPTABLE INDOOR NOISE LEVELS for ‘apartments, hotels & homes’, ‘restaurants’, ‘hospitals & cinema theatres’, ‘class rooms’, ‘conference rooms, small offices & libraries’, ‘large public offices, banks & stores’ [values only].	2 PERIODS
		4.3-CONSTRUCTIONAL MEASURES FOR SOUND INSULATION OF BUILDINGS HOLLOW & COMPOSITE WALL CONSTRUCTION — SOUND INSULATION OF FLOORS & CEILINGS: Using a resilient surface material on floors; Providing a floating floor construction – (a) Concrete floors, (b) Wooden Floors; Using a suspended ceiling with air-space — SOUND INSULATION OF SKIRTING — TREATMENT OF WINDOWS & VENTILATORS	2 PERIODS
GROUP – C		10 PERIODS	
Module 5	INSTALLATION OF LIFTS	5.1-LIFT: ESSENTIAL PARTS Lift – Lift Floor – Mezzanine – Mezzanine Floor – Lift Landing – Storey – Subsidiary Storey(s) – Basement Storey – Nomenclature of Floors and Storeys – Total Headroom – Lift Travel – Lift Landing Call Push – Lift Landing Door – Lift Car – Lift Door – Call Indicator – Lift Suspension Ropes – Lift Guides – Lift Well – Lift Pit – Lift Well Enclosure – Lift Rated Load – Lift Rated Speed – Lift Contract Speed – Lift Machine – Lift Overhead Beam- MRL(Machine room less)lift motor [definitions only].	1 PERIOD
		5.2-CLASSIFICATION OF LIFT Passenger Lift – Goods Lift – Hospital Lift – Service Lift (Dumb waiter) – Fireman’s Lift-Car Lift	1 PERIOD
		5.3-DESIGN CONSIDERATIONS NUMBER OF LIFTS & CAPACITY: Occupant load, Quantity of service, Quality of service, Car speed — POSITIONING OF LIFTS — SHAPE & SIZE OF LIFT CAR — ACCESS TO MACHINE ROOM & LIFT PITS — SAFETY MEASURES	1 PERIOD
		5.4-INFORMATION TO BE PROVIDED IN DRAWING (S)	1 PERIOD
Module 6	FIRE PROTECTION	6.1-GENERAL CLASSIFICATION OF BUILDINGS BASED ON OCCUPANCY Criteria of Fire Resistance — Combustible Material — OCCUPANCY or Use Group — TYPES OF CONSTRUCTION	1 PERIOD
		6.2-GENERAL REQUIREMENTS OF FIRE PROTECTION MAXIMUM HEIGHT — FAR — OPEN SPACES: additional provisions for high rise buildings above 24m height, MIXED OCCUPANCY — FIRE WALL, FIRE STOP OR ENCLOSURE of all openings — AUTOMATIC FIRE DETECTION & ALARM SYSTEM — FIXED FIRE FIGHTING INSTALLATIONS/ REQUIREMENTS for A, B & C occupancy buildings:Wet riser,Wet riser-cum-down comer, Automatic sprinkler installation, Static reservoir, Dry riser.	2 PERIODS
		6.3-EXIT REQUIREMENTS TYPES OF FIRE EXITS — GENERAL EXIT REQUIREMENTS — OCCUPANT LOAD — CAPACITY OF EXITS — ARRANGEMENT OF EXITS: travel distance — DOORWAYS — CORRIDORS & PASSAGEWAYS — INTERNAL STAIRCASES — FIRE ESCAPES OR EXTERNAL STAIRS — ROOF EXIT — HORIZONTAL EXITS — FIRE TOWER — RAMPS	3 PERIODS
REFERENCE BOOKS <ol style="list-style-type: none"> SP 7 (4) : 2005 NATIONAL BUILDING CODE OF INDIA GROUP 4 – PART VIII BUILDING SERVICES /Bureau Of Indian Standards Manual of Tropical Housing and Building Part 1 Climatic Design / O. H. Koenigsberger, T. G. Ingersoll, A. Mayhew, S. V. Szokolay / Orient Longman. 			

Course Code	:	ARPC 210
Course Title	:	Architectural Design –II
Number of Classes	:	1(L-0,T-1,P-0)
Number of Credit	:	1
Prerequisites	:	Knowledge of 3 rd Semester ADD-I
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PC
Full Marks	:	100
Note: A six-hour end semester examination with a Tiffin break for thirty minutes is to be held during end of 4 th Semester on the syllabus of “Architectural Design – II” for 60 marks The Municipal Building Rules and the National Building Code of India are allowed during the examinations.		

Course Objectives: - On successful completion of the course,

- (i) Understand the standards of individual units of housing schemes for the EWS, the LIG, MIG and HIG;
- (ii) Understand the definitions of different parts of a residential apartment building;
- (iii) Develop the architectural design of a ‘G + 4’ residential apartment building in sketch-wise phases;
- (iv) Draw the developed architectural design.

Modular Division of Syllabus:

UNIT	TOPIC	Tutorial
1	INTRODUCTION	9
2	ARCHITECTURAL DESIGN PROCESS	6
	Total	15
CONTACT PERIODS:15 INTERNAL ASSESSMENT:2		TOTAL PERIODS:17

Semester Examination Scheme:-

Module	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
1	10	Any ten	ONE	1 x 10 = 10	2	Any one	50	50
2	10							

DETAIL COURSE CONTENT

UNIT 1: INTRODUCTION

I. STUDY SHEETS OF HOUSING UNITS

2 Periods

Preparing study sheets of individual units of some standard housing designs for Economically Weaker Sections (EWS), Lower Income Groups (LIG), Middle Income Groups (MIG) and Higher Income Groups (HIG).

II. DESIGN GUIDELINE

2 Periods

CLIMATIC FACTORS: Solar Radiation & Temperature, Clouds, Relative Humidity, Prevailing wind; ASPECTS OF DAYLIGHTING — Sunpath Diagram — building orientation as per sunpath diagram and prevailing wind. Effects of shade and shadow on building design — Location Site with surrounding & connectivity

III. UNDERSTANDING PARTS OF A RESIDENTIAL BUILDING

5 periods

Introduction of Codes and Bylaws, Introduction to Codes followed by National Building Code of India, Introduction to by-laws followed by Kolkata Municipal Corporation Act, Definitions of the terms “apartment” and “means of access” as per the Kolkata bye-laws; definitions of the terms Open Spaces, Ground Coverage Area and Height Limitations, FAR calculation, “BUILDING, HEIGHT OF”, “CARPET AREA”, “HABITABLE ROOM”, “KITCHEN”, “PANTRY”, “DINING AREA”, “TOILET”, “WC” “LEDGE OR TAND”, “LIFT”, “LOFT” and “MEZZANINE FLOOR”, “DUCTS” as per the Bylaws, Parking, Loading and Unloading Space [excluding Mercantile (retail), Industrial or Storage or Hazardous or Mercantile (wholesale), Fire Protection and Exit Requirements, Building and Plumbing Services

UNIT 1I: ARCHITECTURAL DESIGN PROCESS

ARCHITECTURAL DESIGN

6 periods

Architectural design of a 'G + 4' residential apartment building *having 2nos of HIG or 4nos of MIG flat in each floor* in sketch-wise phases keeping in mind the provisions of bye-laws regarding "Height Limitations"; and, minimum floor area, minimum width & minimum height of designed spaces. The size & shape of site along with location of site may be varying student to student for better evaluation.

Standards, Codes & Regulation (By- laws) study of theselected topic (KMC/ West Bengal by-laws).Literature study, Site study, Case study, Area programming and development of the design concept.

SESSIONAL SUBJECTS

Course Code	:	ARPC 212
Course Title	:	Architectural Drawing-IV (Sessional)
Number of Classes	:	4(L-0,T-0,P-4)
Number of Credit	:	2
Prerequisites	:	Knowledge of 3 rd Semester Architectural Drawing-III
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PC
Full Marks	:	100
Distribution of Marks:-Continuous internal assessment of 60 marks is to be carried out by the teacher throughout the semester. Distribution of marks:-Drawing Sheets – 40 marks, Attendance & Class performance-10 marks and Viva- voce-10 marks. External assessment of 40 marks shall be held at the end of the semester. Distribution of marks:- Assignments on the day of exam (by External)- 10 marks, Drawing sheet-20 marks, viva-voce-10 marks		

Course Objectives:-

On satisfactory completion of the course, the students will be able to: —

- (i) understand the Basic Principles of Perspective Projection;
- (ii) draw one- & two-point perspective projections of simple interior spaces like a living room, an office interior, a kitchen, a toilet etc. with showing all furniture & fixtures; draw two-point perspective projections of exteriors of buildings showing its surroundings & sciography, landscaping elements, human figures & cars

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	SESSIONAL PERIODS
1	TWO-POINT PERSPECTIVE PROJECTIONS OF COMBINATION OF SOLIDS	10
2	TWO-POINT PERSPECTIVE PROJECTIONS OF COMBINATION OF SOLIDS WITH SCIOGRAPHY	10
3	ONE-POINT PERSPECTIVE PROJECTION OF INTERIORS	10
4	TWO-POINT PERSPECTIVE PROJECTION OF INTERIORS	10
5	PERSPECTIVE VIEW OF EXTERIORS	20

CONTACT PERIODS: 60

INTERNAL ASSESSMENTS: 8

TOTAL PERIODS: 68

DETAIL COURSE CONTENT			
Module	Topic	Contents	Number of Classes
Module 1	TWO-POINT PERSPECTIVE PROJECTIONS OF COMBINATION OF SOLIDS	Any two or three SOLIDS MENTIONED ABOVE IN COMBINATION, the solids being positioned concentrically and in isolation	10 Periods
Module 2	TWO-POINT PERSPECTIVE PROJECTIONS OF COMBINATION OF SOLIDS WITH SCIOGRAPHY	Sciography on any two or three SOLIDS MENTIONED ABOVE IN COMBINATION, the solids being positioned concentrically and in isolation	10 Periods
Module 3	ONE POINT PERSPECTIVE PROJECTIONS OF INTERIORS	At least one projection of a simple interior space* showing all furniture and fixtures <i>* N.B. The interior spaces (Modules 3) may be living room, a bed room, a kitchen, a toilet etc. Necessary plans(s), elevation(s), section(s) etc. shall be provided by the teacher concerned.</i>	10 Periods
Module 4	TWO POINT PERSPECTIVE PROJECTIONS OF INTERIORS	At least one projection of a simple interior space* showing all furniture and fixtures <i>* N.B. The interior spaces (Modules 3) may be living room, a bed room, a kitchen, a toilet etc. Necessary plans(s), elevation(s), section(s) etc. shall be provided by the teacher concerned.</i> <i>NOTE:-The interior spaces for one point and two point perspective projection should be of two different spaces.</i>	10 Periods
Module 5	PERSPECTIVE VIEW OF EXTERIORS	5.1-A two-point perspective projection of the exterior of any one building designed by the student in the subject ARCHITECTURAL DESIGN– I or may be supplied by the teacher concerned.	12 Periods
		5.2-A perspective view of the above with sciography showing landscaping elements and human figures in a different sheet (opaque/ transparency/ photocopy) in colour.	8 Periods

SCHEDULE OF PLATES

SHEETNO.	TITLE OF SHEET	SHEETSIZE
1.	TWO-POINT PERSPECTIVE PROJECTIONS OF COMBINATION OF SOLIDS	HALF IMPERIAL
2.	TWO-POINT PERSPECTIVE PROJECTIONS OF COMBINATION OF SOLIDS WITH SCIOGRAPHY	HALF IMPERIAL
3.	ONE-POINT PERSPECTIVE PROJECTION OF AN INTERIOR SPACE	HALF IMPERIAL
4.	TWO-POINT PERSPECTIVE PROJECTION OF AN INTERIOR SPACE	HALF IMPERIAL
5	TWO-POINT PERSPECTIVE PROJECTIONS OF EXTERIOR OF A BUILDING.	FULL/HALF IMPERIAL
6	TWO-POINT PERSPECTIVE PROJECTIONS OF EXTERIOR OF A BUILDING WITH ITS SURROUNDINGS & LANDSCAPING ELEMENTS, SCIOGRAPHY, HUMAN FIGURES & CARS.	FULL IMPERIAL

REFERENCE BOOKS / CD

1. Geometrical Drawing for Students / L. H. Morris
2. Manual of Rendering with Pen and Ink / Robert W. Gill / Thames and Hudson
3. Art of Perspective Drawing / Simon Graco

Course Code	:	ARPC 214
Course Title	:	Architectural Design –II (Sessional)
Number of Classes	:	4(L-0,T-0,P-4)
Number of Credit	:	2
Prerequisites	:	Knowledge of 3 rd Semester Architectural Design-I
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PC
Full Marks	:	100
Distribution of Marks:-Continuous internal assessment of 60 marks is to be carried out by the teacher throughout the semester. Distribution of marks:-Drawing Sheets – 40 marks, Attendance & Class performance-10 marks and Viva- voce-10 marks. External assessment of 40 marks shall be held at the end of the semester. Distribution of marks:- Assignments on the day of exam (by External)- 10 marks, Drawing sheet-20 marks, viva-voce-10 marks		

Course Objectives: - On successful completion of the course,

- 1) To understand architectural design of a G+4 residential apartment building according to necessary building bylaws in sketch-wise phases.
- 2) To understand presentation of architectural design.

Modular Division of Syllabus:

UNIT	TOPIC	CONTACT PERIODS		NO OF SHEETS
		Tutorial	Sessional	
1	ARCHITECTURAL DESIGN DRAWINGS & PRESENTATION	0	60	FIVE/SIX (AI)
CONTACT PERIODS:60		INTERNAL ASSESSMENT:8		TOTAL PERIODS:68

D E T A I L C O U R S E C O N T E N T

ARCHITECTURAL DESIGN DRAWINGS & PRESENTATION

60

The design should be presented through a set of architectural drawings in a suitable scale consisting of at least the following sheets: —

- (a) Key Plan
- (b) site layout showing means of access, approach to the designed building, open parking spaces (if any), planting and landscaping;
- (c) plans showing furniture layout, parking spaces (if any), planting and landscaping (wherever applicable);
- (d) Road side elevation , Rear side elevation, One side elevation
- (e) Minimum two sectional elevations cutting at least the toilet(s), stairs and any other service area (if any).
- (f) Block Model / 3-D view
- (g) Make a portfolio of the entire design project of the selected topic.

The drawings should be suitably rendered in pen and ink or colour or any other suitable medium on opaque sheets.

Course Code	:	ARPC 216
Course Title	:	Working Drawing-II (Sessional)
Number of Classes	:	5(L-0,T-1,P-4)
Number of Credit	:	3
Prerequisites	:	Student should able to draw, read and interpret the basic architectural design drawings(Plan, Elevation & Section)
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PC
Full Marks	:	100
Distribution of Marks:-Continuous internal assessment of 60 marks is to be carried out by the teacher throughout the semester. Distribution of marks:-Drawing Sheets – 40 marks, Attendance & Class performance-10 marks and Viva- voce-10 marks. External assessment of 40 marks shall be held at the end of the semester. Distribution of marks:- Assignments on the day of exam (by External)- 10 marks, Drawing sheet-20 marks, viva-voce-10 marks		

Course Objectives: - On successful completion of the course, The students will be in a position to prepare a set of working drawing of a simple double storied load bearing structure drawn manually.

UNIT	TOPIC	CONTACT PERIODS		NO OF SHEETS
		Tutorial	Sessional	
1	Flooring Layout	4	15	1
3	Plumbing Layout	7	30	2
3	Electrical Layout	4	15	1
	Total	15	60	4
CONTACT PERIODS:75 INTERNAL ASSESSMENT:10 TOTAL PERIODS:85				

DETAIL COURSE CONTENT			
A set of working drawings in 1: 50/1:20/1:10 scales drawn manually based on a simple double storied load bearing structure. Relevant drawings are to be supplied by teacher.			
Unit No.	Topic	Contents	Number of sheets & sheet size
Unit 1	Flooring Layout	1.1) Prepare flooring plan (As per requirements, use the appropriate size vitrified tiles) 1.2) Typical detail sections.	ONE (A1 or A2)
Unit 2	Plumbing Layout	2.1) Prepare plumbing layouts of a Toilet with plan & sections. 2.2) Prepare plumbing layouts of a Kitchen with plan & sections. 2.3) Prepare plumbing layouts of this building with plan, elevations & sections. 2.4) Detailed plan & section of the under ground water reservoir, septic tank, soak pit & overhead water tank.	TWO (A1 or A2)
Unit 3	Electrical Layout	3.1) Electrical layout of ground floor & first floor showing conduit positions of meter box, distribution box, switch board, light & fans, socket outlets, etc with symbols and legend of symbols.	ONE (A1 or A2)

Course Outcome: At the end of the course:-

The students will be in a position to prepare a set of working drawing of a simple double storied load bearing structure drawn manually.

References Books		
Name of Author	Name of Book	Name of Publisher
J. K. MCKay & W. B. MCKay	Building Construction Volume I, II, III & IV (Metric Ed.) /	Orient Longman
Sushil Kumar	Building Construction	Standards Publishers Distributors, Delhi
Francis D. K. Ching	Building Construction Illustrated	Wiley

Course Code	:	ARPC 218
Course Title	:	Computer Lab-II(Sessional)
Number of Classes	:	4(L-0,T-0,P-4)
Number of Credit	:	2
Prerequisites	:	Students should be in a position to draft two dimensional building drawing in Auto Cad
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PC
Full Marks	:	100
Distribution of Marks:-Continuous internal assessment of 60 marks is to be carried out by the teacher throughout the semester. Distribution of marks:-Drawing Sheets – 40 marks, Attendance & Class performance-10 marks and Viva- voce-10 marks. External assessment of 40 marks shall be held at the end of the semester. Distribution of marks:- Assignments on the day of exam (by External)- 10 marks, Drawing sheet-20 marks, viva-voce-10 marks		

Course Objectives: - On successful completion of the course, the students will be in a position to prepare 2D-Drafting and 3D- Modeling of a building by using Sketch up and Autodesk Revit software.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	SESSIONAL PERIODS
1	Architecture drafting and 3D design with Sketch Up	30
2	Architecture drafting and 3D design with Autodesk Revit	30
CONTACT PERIODS: 60		INTERNAL ASSESSMENTS: 8
TOTAL PERIODS: 68		

DETAIL COURSE CONTENT

Unit	Topic	Contents	Number of Classes
MODULE-1		Architecture drafting and 3D design with Sketch Up	30 Periods
Unit-1	Toolbars		2
Unit-2	Camera controls	Pan , Zoom,Orbit,Scenes set	
Unit-3	Basic tools	Rectangle, Circle ,Select , pencil, push /pull , follow me,Groups ,Components Move , Rotate, Copy , Array , Polar array , Offset ,Section tool ,Paint bucket	
Unit-4	Openings	Choose Template,Open file, import,Export	2
Unit-5	Modeling practice	Column, Beam,Stair,Walls + floor , Windows , Doors , Frames , tables ,etc	
Unit-6	Creating materials	Search online for materials ,Create new material	
Unit-7	Edit materials	Scale, Rotate ,Edit ,Texture placement.	3
Unit-8	Modeling practice	Chair ,Shelves ,Accessories	
Unit-9	Warehouse	Download models , Edit models, Groups vs components,Scale	
Unit-10	Project 1:	Single Store Building Exterior Model	2
Unit-11	Section plane	Sections - Elevations, Floor plans	5
Unit-12	Layouts	Preparing views , Sending to layouts , Positioning,Sizing ,Moving copy,Using scenes , Scale, Dimensions,Updating model reference ,Styles in layout,Title block	
Unit-13	Detailing phase	Tables ,Counters ,Rugs ,Picture frames / posters ,Light fixtures,Doors , Windows, Planters,Text, Accessories	4
Unit-14	Lighting phase	Lights and settings Lighting with shades ,Directional lights , Ambient lights , General lights, Accent lights	4

Unit-15	Project 2:	Interior Space - Bedroom ,living Room	4
Unit-16	Render phase	Fixing the lighting , Editing materials ,VRay material effects ,Camera positioning ,shadows,Render settings	4
MODULE-2 Architecture drafting and 3D design with autodesk revit			30 Periods
Unit-1	Introduction to Building Information Modeling Revit User Interface & Project Setup	Recent files Screen ,Creating a new project User interface	1
Unit-2	Project Organization	Floor Plans,Ceiling Plans,Elevations,Section,Details 3d Views, Views Organization,legends,schedule,sheet,families,group,revit Links, View Navigation	5
Unit-3	Elements	Datum/Host element/Hosted components/views/Annotations Levels/Grid/Reference Planes Add walls.door, Windows,floors,Roofs Properties Palette/Option Bar Draw Option	3
Unit-4	Basic Architectural Modeling	Elements Selection Selection Filter Modify Element:Edit Tools/Modify Tool/Geometry Tools Load Content/Family libraries Parametric Constraints(Level,Align.EQ,Dimension Lock)	6
Unit-5	View Creation and Properties	Creating Plans ,Elevations,Sections,Callouts,Details,Drafting	6
Unit-6	Views	Duplicate Views View Properties/View Control Bar Visibility Graphics 3D Orthographic Views/Perspective Right Click Menu Options	3
Unit-7	Output	Printing/PDF/Setting Export to DWFx/DWG/DGN/Settings Exportto IFC,gbXML Export image	6

References Books:-

- (1) Mastering Autodesk Revit 2020 Author -Robert Yori , Marcus Kim & Lance kirby Publisher: Sybex; 1st edition (14 November 2019)
- (2) Revit 2020 for Architecture: No Experience Required. Author - Eric Wing Publisher- Sybex; 2nd edition (2 January 2020)
- (3) Revit Essentials for Architecture: 2021 and beyond (Aubin Academy) Author - Paul F Aubin Publisher- G3b Press; 2021st ed. edition (August 26, 2020)
- (4) The SketchUp Workflow for Architecture Author- Michael Brightman Publisher- Wiley; 2nd edition (7 September 2018)

PROGRAMME ELECTIVE SUBJECTS (Any one to be selected)

Course Code	:	ARPE 202
Course Title	:	(Elective-I)-Surveying (Sessional)
Number of Classes	:	3(L-0,T-1,P-2)
Number of Credit	:	2
Prerequisites	:	Knowledge of Measured Drawing
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PE
Full Marks	:	100

Distribution of Marks:-Continuous internal assessment of 60 marks is to be carried out by the teacher throughout the semester. Distribution of marks:-Drawing Sheets – 40 marks, Attendance & Class performance-10 marks and Viva- voce-10 marks. **External assessment** of 40 marks shall be held at the end of the semester. Distribution of marks:- Assignments on the day of exam (by External)- 10 marks, Drawing sheet-20 marks, viva-voce-10 marks

Course Objectives:-On satisfactory completion of the course, the students should be in a position to perform the typical aspects of: —

- (i) Different types of survey work.
- (ii) Use operational details of various survey equipments.
- (iii) To know the types, use and operational details of various surveying equipments.
- (iv) Measurement off linear horizontal and vertical distance in field, measurement of vertical and horizontal angles adopting precautions and standard data recording methods.
- (v) Setting out orientation and layout a building in plot.
- (vi) Learn advanced surveying techniques like total station and DGPS

MODULAR DIVISIONOF THE SYLLABUS

MODULE	TOPIC	CONTACT PERIOD
1	INTRODUCTION	6
2	CHAIN SURVEY	6
3	PLANE TABLE SURVEY	6
4	LEVELLING	6
5	THEODOLITE SURVEY	6
6	BUILDING LAYOUT	9
7	ADVANCED SURVEYING TECHNIQUES	6
CONTACTPERIODS: 45 INTERNALASSESSMENTS: 6 TOTAL PERIODS: 51		

DETAIL COURSE CONTENT

Module	Topic	Contents	Number of Classes
Module 1	INTRODUCTION	Primary classification of surveying (Plane surveying and Geodetic surveying), General principle of surveying, Conventional symbols, Different accessories used in survey - Ranging rod, Metric chain, Tape, Arrow pin, Peg, Mallet, Prismatic compass, Levelling staff, Dumpy level, Plane table with all accessories (Alidade ,Spirit level, Tough compass, U-fork with plumb bob), Theodolite with all accessories.	6 Periods

Module 2	CHAIN SURVEY (Triangulation method)	To measure and locate an area with reference to a permanent object and Orientation with respect to North direction, Field book entry in connection to the chain survey. Instruments and accessories required: Ranging rods, Chain, Steel tape, Arrow pins, Pegs, Mallet, Prismatic compass with stand, Field book.	6 Periods
Module 3	PLANE TABLE SURVEY (Radiation and Intersection method)	To locate different objects with reference to permanent objects. Instruments and accessories required: Plane table with stand, A1 sheet, Board pin, Alidade, U-fork with plumb bob, Ranging rods, Chain, Steel tape, Arrow pins, Pegs, Mallet, Trough compass .	6 Periods
Module 4	LEVELLING	Longitudinal and Profile leveling using Dumpy level, Concept of Back sight, Fore sight and intermediate sight, "Rise and Fall method" and "Height of the Instrument method", Method of filling field book and standard checks in each of the field book pages. Instruments and accessories required: Levelling Instrument with stand (Dumpy level), Levelling staff, Ranging rods, Chain, Steel tape, Arrow pins, Pegs, Mallet, and Compass.	6 Periods
Module 5	THEODOLITE SURVEY	Study of different parts with uses, Adjusting and leveling of instrument, Face left observation, Face right observation, Concept of least count, Uses of vernier scale. Setting of different angles both in horizontal and vertical, measuring horizontal length and vertical height. Using Theodolite , Ranging rods, Chain, Steel tape, Pegs, Mallet, Rope, Compass, Lime powder	6Periods
Module 6	BUILDING LAYOUT	a)Layout a small residential building (any design approved by teacher-in-charge in 2/3 groups)by center line method. Using Ranging rods, Chain, Steel tape, Pegs, Mallet, Rope, Compass, Lime powder b) Building layout and locating station points using theodolite. Using Ranging rods, Theodolite , Chain, Steel tape, Pegs, Mallet, Rope, Compass, Lime powder.	9 Periods
Module 7	ADVANCED SURVEYING TECHNIQUES	Introduction to TOTAL STATION. Its operational procedures and uses, multi-functioning in surveying. Introduction to use of DGPS (Differential Global Positioning System) Automated and digital surveying, G.P.S. AREAL photography etc.	6 Periods

REFERENCE BOOKS

1. C.L Kochher, Surveying, Dhanpat Rai Publication, New Delhi.
2. N.N. Basak, Surveying and Levelling, Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. Chandra A.M, Plane surveying, New Age International Publishers.
4. T.P.Kanetkar, S.V. Kulkarni, Surveying and Levelling volume I, Pune Vidyarthi Gruh Prakashan.
5. Duggal, Surveying
6. Punmia and Jain, Surveying and Surveying (Vol I & II)
7. Online latest Manual on application of land surveying Instruments, i.e. Total station survey, DGPS etc.

Course Code	:	ARPE 202
Course Title	:	(Elective-I)-Alternative building technology (Sessional)
Number of Classes	:	3(L-0,T-1,P-2)
Number of Credit	:	2
Prerequisites	:	Knowledge of MMC-I studied in 3 rd semester
Course offered in	:	Fourth Semester
Course Duration	:	17 weeks
Course Category	:	PE
Full Marks	:	100
Distribution of Marks:-Continuous internal assessment of 60 marks is to be carried out by the teacher throughout the semester. Distribution of marks:-Drawing Sheets – 40 marks, Attendance & Class performance-10 marks and Viva- voce-10 marks. External assessment of 40 marks shall be held at the end of the semester. Distribution of marks:- Assignments on the day of exam (by External)- 10 marks, Drawing sheet-20 marks, viva-voce-10 marks		

Course Objectives:- On satisfactory completion of the course, the students should be in a position to Know the alternative building materials and construction technology used in India in the building industry so that they can apply the knowledge in professional field.

MODULAR DIVISION OF THE SYLLABUS

MODULE	TOPIC	CONTACT PERIOD	No of sheets
1	Introduction to building material	6	ONE A1/A2
2	Masonry wall	9	ONE A1/A2
3	Mud wall	6	ONE A1/A2
4	Alternate method of construction	9	ONE A1/A2
5	Concept of Ferro Cement structure	6	ONE A1/A2
6	Field visits	9	PPT presentation
CONTACT PERIODS: 45		INTERNAL ASSESSMENTS: 6	TOTAL PERIODS: 51

DETAIL COURSE CONTENT

Module	Topic	Contents	Number of Classes
Module-1	Introduction to building material	Bamboo as building construction material, properties, types, joinery details with examples.	6
Module-2	Masonry wall	SMB (Stabilised Mud Blocks), Hollow clay blocks, Cement blocks – Making of blocks, Properties, Specifications and Applications with examples.	9
Module-3	Mud wall	Rammed Earth Wall- Making of wall, Properties, Specification and Application with examples. (Documentation “Earth Architecture”, Auroville. Hassan Fathy’s work, Laurie Baker’s work.)	6
Module-4	Alternate method of construction	Alternate method for Foundation, Lintel and Chajja. Roof-Dome, Arch Panel Roof, Vault using SMB, Clay blocks with examples	9
Module-5	Concept of Ferro Cement structure	Concept of Ferro Cement structure, Building Components made out of Ferro cement such as Roof, Wall, Staircase with examples.	6
Module-6	Field visits	Field visits to be arranged by teachers. Group work could be encourage	9
One power point presentation to be made by each group (four to five students in each group) on the field visit.			

Reference Books:

1. K S Jagadish, “Building with Stabilised Mud”; IK International Publishing House PVT Ltd.
2. K S Jagadish, B V Venkatarama Reddy, K S Nanjunda Rao, “Alternative Building Materials and Technology”; New Age International Publishers.
3. Jules J A Janssen, “Building with Bamboo-A Handbook”.
4. Chris Van Uffelen, “Bamboo Architecture and Design(Architecture and materials)”.