

# SHIVAJI UNIVERSITY, KOLHAPUR



**Estd. 1962**

**NAAC 'A' Grade**

**Faculty of Science and Technology**

**Syllabus for**

**B.Arch. Part-III (Sem. V & VI)**

**(To be implemented from June 2021 onwards)**

(Subject to the modifications that will be made from time to time)

**THIRD YEAR ARCHITECTURE ENGINEERING – CBCS  
PATTERN**

SEMESTER – V																						
Sr. No	Course (Subject Title)	TEACHING SCHEME									EXAMINATION SCHEME											
		THEORY			TUTORIAL			PRACTICAL/ST U			THEOR Y				VIVA-VOCE		TERM WORK					
		Credits	No. of Lectur	Hours	Credits	No. of Lectur	Hours	Credits	No. of Lectur	Hours	Hours	Mode	Marks	Total Mark	Min	Hours	Max	Min	Hours	Max	Min	
1	PC – 501**	1	1	1				9	6	6					As per BOS Guidelines	100	45	6	100	50		
2	BS & AE –502 *	1	1	1				4.5	3	3	3	ESE	80	80		36	100	45	3	70	35	
3	BS & AE –503 **	3	3	3							3	ESE	80	80		36				20	10	
4	PC – 504**	1	1	1				1	2	2	3	ESE	80	80		36			2	20	10	
5	PC – 505**	1	1	1				1	2	2	3	ESE	80	80		36			2	20	10	
6	BS & AE – 506	1	1	1				1	2	2	2	ESE	50	50		23			2	50	25	
7	PC – 507	1	1	1				1.5	3	3		-	-	-		-			3	50	25	
8	PC – 508	1	1	1				1	2	2	2	ESE	50	50		23			2	50	25	
	<b>TOTAL</b>	<b>10</b>	<b>10</b>	<b>10</b>				<b>19</b>	<b>20</b>	<b>20</b>			<b>420</b>			<b>200</b>			<b>380</b>			
SEMESTER – VI																						
1	PC – 601 **	1	1	1				9	6	6		12	ESE	100	100	45	As per BOS Guidelines	100	45	6	100	50
2	BS & AE -602 *	1	1	1				4.5	3	3	4	ESE	80	80	36	100		45	3	70	35	
3	BS & AE -603 **	3	3	3							3	ESE	80	80	36					20	10	
4	PC - 604 **	1	1	1				1	2	2		ESE	80	80	36				2	20	10	
5	PC – 605**	1	1	1				1	2	2		ESE	80	80	36				2	20	10	
6	BS & AE – 606	1	1	1				1	2	2		ESE	50	50	23				2	50	25	
7	PC – 607	1	1	1				1.5	3	3						100		45	3	50	25	
8	PE – 608	1	1	1				1	2	2						50		23	2	50	25	
9	BS & AE - 609	3	3	3								ESE	80	80	36				20	10		
	<b>TOTAL</b>	<b>13</b>	<b>13</b>	<b>13</b>				<b>19</b>	<b>20</b>	<b>20</b>			<b>550</b>			<b>350</b>			<b>400</b>			
	<b>TOTAL</b>	<b>23</b>	<b>23</b>	<b>23</b>				<b>38</b>	<b>40</b>	<b>40</b>			<b>970</b>			<b>550</b>			<b>780</b>			

CIE- Continuous Internal Evaluation ESE – End Semester Examination

\* Means combine passing for external oral & theory paper

\*\* Means combine passing for internal term work & theory paper & external oral as applicable.

- One lecture means period of One Hour (60 Minutes) and One Studio means studio period of One Hour (60 Minutes)
- Per lecture Semester Periods per week –30
- Total week – 15 weeks per semester

Candidate contact hours per week : 30 Hours(Minimum)	Total Marks for B.Arch.-III;Sem V & VI : <b>2300</b>
Theory/Tutorial Duration : 60 Minutes and Practical Duration : 60 Minutes	Total Credits for B.Arch.-III (Semester V & VI): <b>61</b>
There shall be separate passing for theory and practical (term work)courses.	

Semester V				
Sr. No	Code No.	Subject	Credits	Distribution of Credits
1.	PC – 501	** Architectural Design – V	10	(V) 5 + (TW) 5
2.	BS & AE – 502	* Building Construction & Material – V	5.5	(T) 1.5+(V)1.5 + (TW) 2.5
3.	BS & AE – 503	** Theory of Structure – V	3	(T) 1 + (TW) 2
4.	PC – 504	** History of Architecture – II	2	(T) 1 + (TW) 1
5.	PC – 505	** Estimation Costing & Specification – I	2	(T) 1 + (TW) 1
6.	BS & AE – 506	Building Services – III	2	(T) 1 + (TW) 1
7.	PC – 507	Working Drawing – I Arch, Graphics & Drawing	2.5	- + (TW) 2.5
8.	PC – 508	Landscape Architecture	2	(T) 1 + (TW) 1

Semester VI				
Sr. No	Code No.	Subject	Credits	Distribution of Credits
1.	PC – 601	** Architectural Design – VI	10	(T) 3 +(V) 3 + (TW) 4
2.	BS & AE -602	* Building Construction & Material – VI	5.5	(T) 1.5+(V)1.5 + (TW) 2.5
3.	BS & AE -603	** Theory of Structure –VI	3	(T) 1 + (TW) 2
4.	PC - 604	** History of Architecture – III	2	(T) 1 + (TW) 1
5.	PC – 605	** Estimation Costing & Specification – II	2	(T) 1 + (TW) 1
6.	BS & AE – 606	Building Services – IV	2	(T) 1 + (TW) 1
7.	PC – 607	Working Drawing – II Arch, Graphics & Drawing	2.5	(V)1.5 + (TW)1
8.	PE – 608	Interior Design	2	(T) 1 + (TW) 1
9.	BS & AE - 609	Architectural Acoustics	3	(T) 2 + (TW) 1

**NOTE: Distribution of Credits: V- VIVA-VOCE ,T-THEORY, TW- TERM WORK**

Course Title : <b>ARCHITECTURAL DESIGN - V</b>	
Course Code :PC – 501**	<b>Semester : V</b>
Teaching Scheme : L - 1hr + St - 6 hrs	Credits : 10 = (V) 5 + (TW) 5
Examination Scheme : (V) 100 + (TW) 100	Total marks: 200

**Course Description:**

The students shall participate in designing of medium sized buildings with multi-levels & functional complexities. The student is expected to study works of renowned architects on similar design problems to understand their philosophy and design approach through actual case studies, book reviews and internet studies. The student must be aware of psychological and sociological aspects of the design problem.

**Course Objectives:**

- To understand the socio-cultural aspects on Architectural design.
- To understand the climatical considerations bearing on Architectural design.
- To be exposed to suitable building materials and construction technologies to evolve a design solution

<b>Course Content</b>
<p><b>Unit No. 1 – (5%)</b></p> <ul style="list-style-type: none"> <li>• Understanding and analysis of design requirements</li> <li>• Analysis of proposed site</li> </ul>
<p><b>Unit No. 2 – (10%)</b></p> <ul style="list-style-type: none"> <li>• Case study/ Book study/ Net study/ Site visits of similar design problem.</li> <li>• Analysis and presentation of case studies.</li> </ul>
<p><b>Unit No. 3 – (10%)</b></p> <ul style="list-style-type: none"> <li>• Data collection of the proposed design problem</li> <li>• Site visits and site analysis i.e. Topography, Vegetation, etc.</li> </ul>
<p><b>Unit No. 4 – (45%)</b></p> <ul style="list-style-type: none"> <li>• Conceptual design with understanding of circulation within functional spaces, structural systems, study of forms and spaces, building materials and techniques,</li> </ul>
<p><b>Unit No. 5 – (10%)</b></p> <ul style="list-style-type: none"> <li>• Final design presentation with supporting sketches, models and views.</li> </ul>

**Unit No. 6 – (20%)**

- **Time bond problem** – Conceptual design development and final drawings.

**Sessional work:**

1. Major design problem
  - Students should deal with one major design project with approximate built up area of 1000 sq.m
  - Design problem may include buildings of medium density and size.
2. Minor time bond design problem
  - Minor time bond design problem of approximate duration to gauge the understanding and creative development of the student.

**Notes:** Design portfolio for major & minor project should be completed with the help of scaled drawings, processed drawings with supporting sketches, models and views.

**Reference Books:**

1. Neuferts architects data – The handbook of building types
2. Architecture: Form , Space & Order – Francis DKching
1. The Local Building Byelaws
2. National Building Code of India 2016- Vol -1/2/3
3. Monologues of Eminent Architects
4. Books on Building Services
5. Books on Landscape Architecture

Course Title : <b>Building Construction &amp; Material – V</b>	
Course Code : BS & AE – 502*	<b>Semester : V</b>
Teaching Scheme : L - 1hr + St - 3hrs	Credits : 5.5= (T) 1.5 +(V)1.5 + (TW) 2.5
Examination Scheme : (T) 80 +(V)100 + (TW) 70	Total marks: 250

### Course Description -

The course intends to explore process of construction activities, supervision of construction, appropriate use of building materials and preparation of detailed drawings to be used for construction by understanding various structural concepts and properties of building materials. The course also includes site visits, case studies and measure drawings of various stages of construction.

### Course Objectives -

- To introduce structural concepts of various parts of buildings
- To introduce construction techniques
- To explain construction details through case studies
- To explain process of construction and supervision

<b>Course Content</b>
<p><b>Unit 1 - Foundations</b></p> <ul style="list-style-type: none"> <li>• Foundations in loose soil <ul style="list-style-type: none"> <li>Pile foundations – different types of piles based on function and materials – bearing piles, friction piles, timber piles, steel piles, R.C.C. piles, cast-in-situ piles &amp; precast piles, grouping of piles, Pile caps for two, three and multiple piles. Typical reinforcement details of R.C.C. piles and pile caps, Singly and doubly under reamed R.C.C. piles, Various pile driving methods. Need of dewatering of excavation trenches, various methods of dewatering.</li> </ul> </li> </ul>
<p><b>Unit 2 – Retaining walls</b></p> <ul style="list-style-type: none"> <li>• Masonry retaining walls – gravity retaining walls, mass retaining walls.</li> <li>R.C.C. retaining walls – various types, reinforcement details, formwork details, construction joint, water bars, waterproofing details</li> </ul>
<p><b>Unit 3 – Staircases</b></p> <ul style="list-style-type: none"> <li>• Timber staircase – joinery details at newel post &amp; floor, stringer &amp; newel post, tread-riser &amp; stringer, handrail &amp; newel post, trimmer-joist-wall-flooring planks etc. Types of finishes given to timber staircase.</li> </ul>

- Steel staircase – various types,
- R.C.C. staircase – various types – with waist slab, folded, cantilever step, with raker beam, central beam. Typical reinforcement details of all types. R.C.C. parapet details, baluster fixing & handrail details, tile fixing details on tread & risers.
- Composite staircase – constructional details of staircase with composite materials – steel & plywood/block board, wood, tile etc., R.C.C. and wood etc.

#### **Unit 4 – Glass curtain walls and structural glazing**

- Typical construction details of Glass curtain walls and structural glazing, spider fittings.

#### **Unit 5 – Claddings**

- Various cladding materials, Construction details of claddings in stone, brick, wood, tiles, aluminium composite panels ( ACP ), UPVC, porcelain

#### **Unit 6 – Steel connections**

- Market forms of steel, Steel stanchions, beams, castellated beam, built up stanchions, built up beams. Connection details of stanchion-foundation, stanchion-stanchion, stanchion-beam, beam-beam, flooring connections, haunched connection. Connections of steel sections with concrete.

## **MATERIALS**

### **Course Content**

#### **Unit 1 – Ferrous materials**

- Introduction, iron ores, selection of iron ores, variation of iron ores
- Pig iron – Properties, types of pig iron
- Cast iron – composition, types and properties.
- Wrought iron – Properties, defects, uses.

Steel – Market forms of steel, magnetic properties of mild and hard steel, factors affecting physical properties, uses of steel.

#### **Unit 2 – Non ferrous materials**

- Aluminium - Properties, types, uses.
- Zink - Properties, types, uses
- Copper- Properties, types, uses
- Asbestos - Properties, types, uses

#### **Unit 3 – Alloys**

- Aluminium alloys, copper alloys, their properties and uses.

#### **Unit 4 – Thermal insulating materials**

- Introduction, types and uses of thermal insulating materials.



## Reference Books:

- 1) Building Construction - Bhindra Arora
- 2) Construction Technology – R. Chudley
- 3) Building Construction – W. B. McKay
- 4) Building Construction and Materials - AniruddhaKolhatkar

Course Title : <b>Theory of Structure V</b>	
Course Code :BS & AE – 503**	<b>Semester : V</b>
Teaching Scheme : L – 3hrs	Credits : 3 = (T) 1 + (TW) 2
Examination Scheme : (T) 80 + (TW) 20	Total marks: 100

## Course Description:

The courses Theory of structure V deal with use and application of tools and techniques required to study the behavior of various structural system and feasibility of different structural system. The course also includes limitations of forms ,spans . It also develops knowledge about choice of proper structural material, strength consideration, behavior and response of loads. The site visits will help students to understand the practical difficulties.

## Course Objectives:

Student shall be able to understand the behavior of Structure systems, feasibility of different structure systems, limitation of forms, spans, choice of proper structural materials, strength consideration, behavior, and response of loads.

Course Content
<b>Unit No. 1 –Fixed Beam</b> <ul style="list-style-type: none"><li>• Concept of fixed beam, advantages of fixed beam, limitations of fixed beam, concept of partial fixity and full fixity,Point of contra flexure.</li><li>• Derivations for calculation of positive and negative bending moment along with shear force for point load (central) and u.d.l cases.</li><li>• Analytical Calculations of positive and negative bending moments &amp; drawing BMD, shear force calculations &amp; drawing SFD for central point load, eccentric point load, uniformly distributed load and their combinations by direct application of formulas.</li></ul>
<b>Unit No. 2 – Continuous beam</b> <ul style="list-style-type: none"><li>• Introduction to continuous beams, advantages and disadvantages of continuous beams, Theorem of Three moment.</li><li>• S.F.D. and B.M.D. for continuous beams with simple supports at ends ( 2 to 4 spans) , simple support at one end &amp; fixed at other end ( 2 to 3 spans) and both ends fixed (2spans) or overhang .</li></ul>

### **Unit No. 3 – Design of steel columns**

- Concept of axial loading on column, IS800, steel table, Slenderness ratio, Effective length of column.(for both end fixed , one end fixed one hinged, both end hinged, one end fixed one free.)
- Conceptual idea of limit state & working stress method for steel str.
- Design of axially loaded steel column by working stress method.
- Concept of built-up columns - lacing and battening.
- Concept of columns subjected to uniaxial and biaxial eccentricity,
- Problems on analysis of stresses for eccentrically loaded columns (with uniaxial or biaxial eccentricity.).

### **Unit No. 4 – Steel roof truss**

- Roof shapes and roofing materials, components of steel roof truss.
- Types of trusses and truss configurations for different spans (key elevations)
- Types of loads on trusses and load combinations for design.
- Design of steel purlin and design of steel truss members by working stress method.

### **Sessional work**

3. 4 assignments each on one topic
4. Site visit report ( For steel structures)

### **Reference Books:**

6. Strength of material by R.S.Khurmi
7. Strength of material by Ramamurtam.
8. Design of steel structures by S.K.Duggal.
9. Design of steel structures by L.S.Negi.

Course Title : <b>HISTORY OF ARCHITECTURE-II</b>	
Course Code : PC-504**	<b>Semester : V</b>
Teaching Scheme : L - 1hrs + St - 2hrs	Credits : 2 = (T)1 + (TW)1
Examination Scheme : (T)80 + (TW)20	Total marks: 100

**Note:** Weightage for each Topic or Unit for Theory Question Paper shall be as per marks mentioned in Course Content below.

**Course description:**

Focus shall be on the study of general architectural features or characteristics observed in particular era with the help of concerned building examples, market places, public spaces and contributions of pioneer architects relevant to that period

**Course objective:**

Subject includes introductory study of Architectural development in chronological manner in Europe or western countries. Objective is to expose the students to the evolution of different architectural solutions through historical periods within the restraints of prevalent social and religious customs, geography, climate, building materials and techniques, aesthetical influences, structural complexities and technology available at the time. The study shall actively help students in preservation of rich Architectural Culture in evolution of Design process.

<b>Course Content</b>
<p><b>Unit 1: Egyptian (20 Marks):</b></p> <ul style="list-style-type: none"> <li>• Detail study of architectural characteristics like types of columns, hieroglyphs, incised wall sculptures, trabeated style, sphinx and obelisks.</li> <li>• Detail study of types of Tombs (types of Mastabas, Royal pyramids and stages involved in its development, Rock Hewn tombs) e.g. Mastaba K1 at Beit Khallaf, Mastaba at Gizeh, Mastaba of Thi-Sakkara, Great pyramid of Cheops-Gizeh, Step pyramid of Zoser Sakkara, Bent pyramid of Dashur, Tombs-Beni Hasan, Tombs of kings-Thebes.</li> <li>• Detail study of types of Temples (mortuary temples and cult temples) e.g. temples at Der el-Bahari-Thebes, temple of Khons-Karnak, Temple of Amun, karnak, thebes, temple of Isis-Philae, temple of Horus-Edfu, and Great temple Abu Simbel.</li> <li>• Brief study of dwellings and fortresses.</li> </ul>
<p><b>Unit 2: Greek (20 Marks):</b></p> <ul style="list-style-type: none"> <li>• Detail study of Greek Orders-Doric, Ionic and Corinthian.</li> <li>• Greek contribution towards Aesthetics or visual aspects: Brief study of optical corrections in architecture, method for column entasis and use of Golden Section (golden mean ratio) in proportioning Greek architecture.</li> <li>• Detail study of Acropolis in Greek city ( example: Acropolis in Athens: Parthenon, Propylae, Erechtheum, Nike), Agora and Civic buildings ( stoas, bouleterion, tholos, theatre, hippodrome and dwellings)</li> <li>• Brief study of classification of Greek temples.</li> </ul>

**Unit 3: Roman (20 Marks):**

- Study of Column orders (Tuscan and Composite)
- Roman contribution towards Engineering: Study of construction of walls, arches, vaults (e.g. Barrel or Tunnel, Groin & Multi-Groin) and domes, Roads, Bridges (e.g. Pons Fabricius-Rome, Bridge of Augustus-Rimini, Trajan's Bridge, Alcantra), Aqueducts (e.g. Aqua Claudia-Rome) etc.
- Study of Temples e.g. temple of Juno Sospita-Lanuvium, Maison Carree:Nimes, Temple of Jupiter-Baalbek, The Pantheon-Rome.
- Study of public buildings like Theatre of Marcellus, Circus Maximus and Maxentius-Rome, Triumphal Arches: Arch of Tiberius, Titus & Constantine-Rome, Colosseum or flavian amphitheatre-Rome, Thermae or Public Baths: Baths of Caracalla-Rome, Baths & Gymnasium-Sardis, Imperial Fora-Rome and Basilica of Constantine-Rome.

**Unit 4: Early Christian and Byzantine (10 Marks):**

- Early Christian Architecture in Rome: study of parts of basilican churches, e.g. Basilica of S.Peter-Rome, S.Clemente-Rome.
- Byzantine Architecture in Constantinople: study of domical construction, methods of forming pendentives e.g. Hagia Sophia-Constantinople.

**Unit 5: Romanesque (10 Marks):**

- General architectural characteristics: articulation, structural division, Pier forms(columns), Triforium Gallery, Crossing, Wall Passages, Circumambulatory, Radiating Chapels, structural vaulting system, the evolution of new concepts in external massing a variety of independent forms was integrated in a single harmonious composition and an increasing mastery of architectural sculpture etc. e.g. Pisa Complex: Cathedral, Campanile, Baptistry.

**Total of 5 Units: 80 Marks**

**ASSESSMENT:**

1. For Sessional work (Internal) assessment each students work should be assessed on the basis of sketches, notes and group seminars of respective Topic or Unit as mentioned in Course Content above.
2. Continuous assessment and marking system should be followed.

**REFERENCE BOOKS:**

1. Sir Banister Fletcher, '*A History of Architecture*', CBS Publications (Indian Edition), 20th Edition 2002.
2. J.C.Palms, '*History of World's Architecture*'.
3. Doren Yarwood, '*A Chronology of western Architecture*', Pover Publications Inc., NewYork, 2010.
4. Francis D. K. Ching, Mark M. Jarzombek, Vikramaditya Prakash, '*A Global History of Architecture*', John Wiley & Sons, 2017.

Course Title : <b>Estimation Costing &amp; Specification-I</b>	
Course Code : PC-505**	<b>Semester : V</b>
Teaching Scheme : L-1hr + St-2hrs	Credits : 2 = (T)1 + (TW)1
Examination Scheme : (T)80 + (TW)20	Total Marks: 100

### Course Description:

The courses Estimation Costing & Specification - I & II deal with use and application of tools and techniques required for estimation and costing of construction projects and study of financial aspects of building constructions.

The course Estimation Costing & Specification – I, at Semester -V, covers aim and objects of estimation and costing and gives an idea to the students to prepare approximate estimates, preparation of outline specifications and detailed estimations of building components & simple buildings. Student shall undertake market survey to study market rates of various materials and labors. The intent of the syllabus is to explore concept of quantity & cost calculations with due relation to specifications.

### Course Objectives:

To make the students' aware of the factors that affect the cost of construction.

To understand the concept of rate analysis for various items in building construction.

To create ability of taking out of quantities from drawings and to determine estimated cost of building projects as per standard procedures.

To inculcate habit of systematic recording of all the statistics concerned to estimating & costing

<b>Course Content</b>
<p><b>Unit No. 1 –</b></p> <ul style="list-style-type: none"> <li>• Aims and objects of the subject estimation, costing and specifications.</li> <li>• <b>Types of estimates</b> – Approximate estimate –purpose and their methods.</li> <li>• Detailed estimate – purpose and their types -</li> <li>• Revised estimate, Supplementary estimate,</li> <li>• Revised supplementary estimate &amp; annual repairs and</li> <li>• maintenance estimates.</li> </ul>
<p><b>Unit No. 2 –</b></p> <ul style="list-style-type: none"> <li>• Listing of building <b>items</b>.</li> <li>• Units(mode) of measurements. IS Code 1200</li> <li>• Terms: Contingencies, Work Charge Establishment, Provisional items, Provisional quantities, Provisional sum, Spot items</li> </ul>

**Unit No. 3 –**

- Principles of taking out **quantities**.
- Measurement form and Abstract form.
- Methods of taking out quantities - Long Wall Short Wall method and Centre Line method.
- Rules of deductions.
- Recording MB, Preparing Abstract and Summary sheets.

**Unit No. 4 –**

- Principles of **Rate analysis**, factors affecting rate analysis, Market survey for current rates of materials and labors. PWD-SSR, Lead Charges and Lift charges, Analysis of rates (based on SSR) for- Excavation, UCRM, BBM, Plaster, PCC and CC in RCC works.

**Unit No. 5–**

- **Specifications**- What is specification, Purposes of writing specifications, General & Brief specifications, Brief specifications for various building items.

**Sessional works:**

- 1). Preparing approximate estimate of a project designed by the students in their S.Y. B.Arch. (Sem-III/IV) Design subject.
- 2). Detailed estimation of any one building components like - water tank, septic tank, compound wall, rcc frame work, staircase etc.
- 3). Detailed estimation of 50 to 100Sq.mt. Load bearing type building.
- 4). Rate analysis for (any Five) building items.
- 5). Short notes (minimum Five) based on above syllabus.

**Reference Books:**

1. Estimating and Costing in Civil Engineering by B.N. Dutta
2. Estimating ,Costing, Specification & Valuation in Civil Engineering by M.Chakraborty
3. PWD-SSR
4. IS Code 1200

Course Title : <b>BUILDING SERVICES – III</b>	
Course Code : BS & AE - 506	<b>Semester : V</b>
Teaching Scheme : L - 1hr + St - 2hrs	Credits : 2 = (T)1 + (TW)1
Examination Scheme : (T)50 + (TW)50	Total marks: 100

### **Course Description :**

With the successful completion of the course, students will understand principles for designing of large scale electrical, illumination and mechanical services. They will be able to design vertical transportation and their execution in their building projects, execute building management and safety systems in construction projects. They will develop capability to interact technically with MEP experts. Students will be able to design services for architectural design project, allocate space for the same.

### **Course objective:**

The objective of the subject is to enable students to understand and apply:

- The students should be able to a lot spaces in their design for the topics below.
- Electrical requirements for given situation, its calculations and design.
- Artificial Illumination and its application in buildings.
- Overview and introduction to heating, ventilation, and air conditioning focusing on different HVAC systems.
- Lift, escalator and travelator requirements for given situation
- Introduction to building's firefighting system, security system and pumps and water. Integrating natural and artificial illumination.

<b>Course Content</b>
<p><b>Unit 1: Introduction to Electrical Services</b>            Concept of earthing and lightening conductor at plot level, Power distribution system in city; function of substations; locational guidelines for substations, land and other infrastructural requirement for substation; power distribution system in locality. Norms and standards for site level transformers and layout of substations. Solar energy integrated electrical design of buildings and smart buildings. Strategies for low power consumption. Electrical panels, wiring systems, wires and cables, data cabling, broadband, switchboard, distribution board. Electrical layout of a residence.</p>
<p><b>Unit 2: Illumination (Lighting)</b>            Type of Lighting according to building like in residential buildings, restaurants, offices, museums and art galleries, gardens. Types of lighting like ambient, task, focal and decorative, etc., Objectives of lighting, various terms like Luminous flux, Lumen, Candela, Lux, Reflection Factor, etc. Natural (day) lighting with concepts like direct solar illumination, sky radiation, sky component, external and internal reflected component, glare. Artificial lighting during the night</p>

and day. Characteristics of lighting like intensity, uniformity, exposed brightness, direction, disruption of brightness. Garden lighting for trees, flowers, paths and drives, sundials, sculptures

### **Unit 3: Heating, Ventilation and Air Conditioning (HVAC) Systems**

To understand the need and importance of mechanical services. Basic principles, laws and terminologies related to HVAC. Evaporative cooling systems of air conditioning, refrigerant cycle and its reversal. Components of mechanical vapour compression and refrigeration systems. To understand types of air conditioners such as window, split packaged, direct expansion, central etc. Natural and artificial ventilation. Heating for buildings, central and local heating, insulation, radiators, convectors.

### **Unit 4: Vertical Transport (Lifts, escalators, travelators, Automated parking)**

**Elevators** – Components of elevators. Types of elevators-traction, sky lobby, lift lobby, provision of elevators for a building, planning considerations - location in building, recommendations of the National Building Code, etc. Safety features and codes. Service requirements: space and physical requirements, machine room spaces and their typical layout. Design of typical lift banks.

**Escalators** – Components of escalators. Advantages and disadvantages of escalator, design of escalator, application - location and arrangement in buildings. **Travelators** - space requirement, inclination.

**Automated Parking System:** Multi storage parking garage, an APS provider for parking.

### **Unit 5: Building Safety, Automation and Management system**

**Fire Fighting System** - Causes of fire, Provision for corporate building, basic extinguishing components, Fire detectors-classification and types, Fire alarm system, control panel, external firefighting system, internal firefighting system, water and foam sprays, Sprinkler system – types and advantages.

**Security Systems** – Burglar system, CCTV system, intercom, Video doorbell, Surveillance system, Limited Access system, Data terminal equipment, discretionary Access control.

**Pumps: Classification of pumps like displacement pumps, velocity pumps, Buoyancy pump, impulse pumps, etc. Types of pumps like reciprocating pump, rotatory pump, centrifugal volute pump, turbine pump, jet pump, airlift pump, hydraulic ram, etc.**

### **Sessional Work:**

1. Drawing sheets and notes based on above topics
2. Continuous assessment and marking system should be followed
3. Internal assessment will be based on understanding of above topics

### **References:**

- National Building Code of India: National Electrical Code.
- Kothari and Nagrath, Basic Electrical Engineering
- O.P. Gupta, Energy Technology
- John Mathew, Introduction to the Design and Analysis of Building Electrical System
- Gondzik, Mechanical and Electrical Equipment for Building
- Raina & Bhattacharya, Electrical Design Estimating and Costing.
- Keyoumars Ehteshami, Handbook of Fire Protection and Safety



- Kelly & Connell, Interior Lighting Design - A Student's Guide.
- Sadhu Singh, Refrigeration and Air Conditioning
- National Building Code 2005
- Grondzik, Kwok, Stein, Mechanical and Electrical Equipment for Buildings
- Ananthanarayana, Basic Refrigeration and Air Conditioning

Course Title : <b>WORKING DRAWING -I</b>	
Course Code : PC - 507	<b>Semester : V</b>
Teaching Scheme : L - 1hr + St - 3hrs	Credits : (TW)2.5
Examination Scheme : (TW)50	Total marks: 50

### Course Description

The subject introduces the student to methodology of preparation of working drawing Based on the principles of visual communication interpretation and reading of drawing. These drawing should enable the site staff to transform the drawing into actual construction with help of sufficient dimensions and details.

### Course Objective

Introduction of working drawing for composite construction based on design problem done in second year architecture which should include.

R.C.C. framed structure, steel framed structure and load bearing structure.

<b>Course Content</b>	
<b>Unit- 1</b>	<ul style="list-style-type: none"> <li>• Building Permission Plan</li> </ul>
<b>Unit-2</b>	<ul style="list-style-type: none"> <li>• Location plan</li> <li>• Centre line plan</li> <li>• Excavation plan</li> <li>• Foundation plan</li> <li>• Ground beam /plinth beam</li> </ul>
<b>Unit-3</b>	<ul style="list-style-type: none"> <li>• Floor plans</li> <li>• Lintel level plan all floors</li> <li>• Shuttering plan all floors</li> <li>• Terrace plan</li> </ul>
<b>Unit-4</b>	<ul style="list-style-type: none"> <li>• Elevation of all sides</li> </ul>

<b>Course Title : Landscape Architecture</b>	
Course Code : PC - 508	<b>Semester : V</b>
Teaching Scheme : L - 1hr + St - 2hrs	Credits : 2 = (T)1 + (TW)1
Examination Scheme : (T)50 + (TW)50	Total marks: 100

**Note:**

- Internal marks should be based on assignments, sketches, and Design etc.
- Assignments shall be completed individually which cover the modules- 1 to 6. Module - 6 will be concerned with the individual drawings, 3d views, model (optional) explaining the concept, the landscape design process and detailing of it.

**Course Description:**

The course intends to make the students understand the concept of landscape architecture, different landscape styles in the world. Students will gain the knowledge of site analyse site with respect to its natural surrounding area. They will understand the basic design, details of hardscape and Softscapes in the landscape design.

**Course objective:**

The objective of the subject is to enable students to understand landscape design as an allied field of architecture; to introduce landscape architecture and the scope of it. It will create awareness regarding the process of landscape design for small and large buildings; Indoor and outdoor spaces.

<b>Course Content</b>
<p><b>Unit 1: Introduction to Landscape Architecture</b> Introduction to landscape architecture, need and scope, aspects of landscape architecture from functional, socio-cultural, ecological, economical, aesthetical point of view. Study of landscape elements (natural/manmade) and study of landscape characters. Study of Landscape elements such as land, vegetation, water, earth &amp; climate, Natural &amp; manmade elements, etc. Principles of landscape design.</p>
<p><b>Unit 2: History of Landscape Architecture</b> Study of the evolution of the landscape history in the world from pre-history up to modern era, origin of garden concept, history of Landscape Architecture including natural &amp; cultural factors of the place, development of landscape architecture through history in different parts of the world such as China, Japan, Italy, France, Spain, England, Persia, Egypt, Greece, Rome. Study of Landscape history of India; Ancient India and Mughal Period. Modern &amp; contemporary Landscape architecture.</p>
<p><b>Unit 3: Introduction to modern landscape planning</b> Study planning of cities like Jaipur, Chandigarh, Delhi and colonial period etc. Study the concepts of streetscapes, waterfronts, green infrastructure, green roof, etc.</p>

**Unit 4: Hardscape and Softscapes elements**

Hardscapes such as pergolas, garden furniture, fences, rocks, masonry, paving & surfacing, roads & parking lots, walks & plazas w.r.t. materials and **landscape construction details** through site visits. Softscapes such as plantation, turfing, water features. Design criteria for landscape design such as visual, functional, micro-climatic, ecological and aesthetic. Basic horticultural study of plants, plant selection, planting design and care of plants.

**Unit 5: Site planning and site analysis**

Study of factors affecting landscape design, i.e. context, climate w.r.t. surrounding environment. Introduction to **sustainable site planning and sustainable Landscape design**. Site analysis includes study of physical and socio-cultural context, topography, hydrology and vegetation.

**Unit 6: Landscape design and Services**

Macro, micro-climatic and contextual considerations in landscape architecture. Landscape Services like electrical, surface water drainage, irrigation, soil management techniques etc. Landscape design of a small residential unit or a small public area. Conceptualization with creative thinking with landscape design details showing indoor-outdoor relationship between built and unbuilt spaces.

**Reference books:**

Time saver standards for landscape architecture

Landscape architecture a manual of site planning and design – Symonds

Residential landscape architecture, Norman. K. Booth

Visual analysis of landscape development, Peter Jacobs and Douglas Way

Landscape planning and energy conservation. Gary. O. Robinette (ed), Van-Nostrand Reinhold

Introduction to landscape architecture, Michael Laurie

National building code 2016

The landscape of man, Geoffrey and Susan Jellicoe, Thames and Hudson

<b>Course Title : ARCHITECTURAL DESIGN - VI</b>	
Course Code :PC – 601**	<b>Semester : VI</b>
Teaching Scheme : L – 1hr + St - 6hrs	Credits : 10 = (T) 3 +(V) 3 + (TW) 4
Examination Scheme : (T)100 +(V)100 + (TW)100	Total marks: 300

**Course Description:**

The students shall participate in designing of medium sized buildings with multi-levels & functional complexities. The student should be exposed to connection of indoor and outdoor spaces- landscape elements in architectural design, different services like Electrical, Plumbing, Ventilation, etc.

Student should also be aware of the local building bye laws and National Building Code.

**Course Objectives:**

- To understand the visual interaction between indoor – outdoor spaces and landscape elements.
- To understand the spatial and structural implications of basic services involved
- To be aware of the local building bye laws.

<b>Contents</b>
<p><b>Unit No. 1 – (5%)</b></p> <ul style="list-style-type: none"> <li>• Understanding and analysis of design requirements</li> <li>• Analysis of proposed site</li> <li>• Understanding the local building bye laws.</li> </ul>
<p><b>Unit No. 2 – (10%)</b></p> <ul style="list-style-type: none"> <li>• Case study/ Book study/ Net study/ Site visits of similar design problem.</li> <li>• Analysis and presentation of case studies.</li> </ul>
<p><b>Unit No. 3 – (10%)</b></p> <ul style="list-style-type: none"> <li>• Data collection of the proposed design problem</li> <li>• Site visits and site analysis i.e. Topography, Vegetation, etc.</li> <li>• Implication of the local building bye laws.</li> </ul>

**Unit No. 4 – (45%)**

- Conceptual design and design development with understanding of Building services and landscape elements.

**Unit No. 5 – (10%)**

- Final design presentation with supporting sketches, models and views.

**Unit No. 6 – (20%)**

- Layout of building services.
- Report on the local building bye laws.

**Sessional work:**

1. Major design problem
  - Students should deal with one major design project with approximate built up area of 1000 sq.m
2. Study of local building bye laws and services.

**Notes:** Design portfolio must include Architectural design problem, Building services (Layout drawings - Conceptual) and Report of local building bye laws.

**Reference Books:**

3. Neuferts architects data – The handbook of building types
4. Architecture: Form , Space & Order – Francis DKching
5. The Local Building Byelaws
6. National Building Code of India 2016- Vol -1/2/3
7. Monologues of Eminent Architects
8. Books on Building Services
9. Books on Landscape Architecture

Course Title : <b>Building Construction &amp; Material – VI</b>	
Course Code :BS & AE - 602*	<b>Semester : VI</b>
Teaching Scheme : L - 1hrs + St - 3hrs	Credits : 5.5= (T) 1.5 +(V)1.5 + (TW) 2.5
Examination Scheme : (T) 80 +(V)100 + (TW) 70	Total marks: 250

### Course Description:

The course intends to explore process of construction activities, supervision of construction, appropriate use of building materials and preparation of detailed drawings to be used for construction by understanding various structural concepts and properties of building materials. The course also includes site visits, case studies and measure drawings of various stages of construction.

### Course Objectives:

- To introduce structural concepts of various parts of buildings
- To introduce construction techniques
- To explain construction details through case studies
- To explain process of construction and supervision

<b>Course Content</b>
<p><b>Unit 1- Doors and Windows</b></p> <ul style="list-style-type: none"> <li>• Sliding doors in M. S., Aluminium and T. W.</li> <li>• T. W. Sliding and folding door with detail</li> <li>• Pivoted glazed door</li> <li>• Aluminium sliding and hinged windows, various options for sliding windows - 2T2S 3T3S, 2T4S. Various finishes of aluminium windows.</li> <li>• UPVC windows</li> </ul>
<p><b>Unit 2 - M. S. Roofing</b></p> <p>Different types of M. S. roof trusses for span up to 25 meters with roofing materials North light roof truss Roof covering materials : straight with curved Roof covering materials – G.I., A.C. aluminium, galvalum sheets, accessories of roof coverings.</p>
<p><b>Unit 3 - M. S. Sliding and hinged Gates</b></p> <ul style="list-style-type: none"> <li>• Rolling shutter</li> <li>• Different types of M. S grills for balcony and staircase</li> <li>• Different types of S. S. railing for balcony and staircase</li> </ul>

**Unit 4 – Precast construction components**

- Precast Construction Components for Columns, Beams, Staircase, flooring, Partitions, Doors and Window Frames, Compound Wall

**Unit 5 – Partitions**

- Partitions : Removable and Folding in timber and aluminium, modular aluminium partitions.

**Unit 6 – Ferro cement**

- Introduction of Ferro cement, casting techniques, uses.

**MATERIALS - VI****Contents****Unit 1 - Ceramics, various clay products**

- Tile manufacturing characteristics and types
- Terracotta manufacturing process, Terracotta use, Advantages and disadvantages of Terracotta
- Earthenware
- Stoneware
- Porcelain
- Vitrified tiles
- Clay blocks

**Unit 2 - Glass**

- Classification, composition and properties of glass, Different types of glass, Coloured glass, Available size and thickness of glass, Name of the companies which manufacture the glass.

**Unit 3 - Plastics**

- Historical background, Composition, polymerization, classification, different type of resins, moulding, compound fabrication properties and uses, Application in Building

Industry.

**Unit 4 – Sound insulation materials**

- Introduction, types and uses of sound insulating materials.

**Reference Books:**

- Advanced Construction Technology by Roy Chudley
- Building Construction by S P Arora , S P Bindra
- Building Materials & Construction by Punmia
- Building Construction by S C Rangwala



<b>Course Title : Theory of structure VI</b>	
Course Code :BS & AE -603**	<b>Semester : VI</b>
Teaching Scheme : L - 3hrs	Credits : 3 = (T) 1 + (TW) 2
Examination Scheme : (T) 80 + (TW) 20	Total marks: 100

### Course Description:

The courses Theory of structure V deal with use and application of tools and techniques required to study the behavior of various structural system and feasibility of different structural system. The course also includes Design process for RCC members. It also develops knowledge about choice of proper section, strength consideration, behavior and response of loads. The site visits will help students to understand the practical difficulties.

### Course Objectives:

Student shall be able to understand the behavior of RCC Structural systems, feasibility of different structure systems, limitation of forms, spans, choice of proper structural section, strength consideration, behavior, and response of loads. Students are able to select proper structural section with concept of factor of safety, characteristic strength of material.

<b>Course Content</b>
<p><b>Unit No. 1 –Introduction to RCC</b></p> <ul style="list-style-type: none"> <li>• Definition , advantages of RCC , Types of load combinations , limit state method of design , characteristic strength of materials , factor of safety ,practical knowledge about compressive strength of concrete and tensile strength of steel (laboratory experiment observations expected )</li> </ul>
<p><b>Unit No. 2 – Design of singly reinforced beam</b></p> <ul style="list-style-type: none"> <li>• Limit state of collapse, assumptions, stress-strain relationship , strain diagram , stress block diagram for singly reinforced beam.</li> <li>• Design parameters, neutral axis, lever arm , total tensile and compressive force.</li> <li>• Types of sections , balanced section ,under-reinforced section ,over-reinforced section, design and analysis of singly reinforced section.</li> </ul>
<p><b>Unit No. 3 – Design of shear reinforcement</b></p> <ul style="list-style-type: none"> <li>• Concept of shear, bond and development length.</li> <li>• Design of shear reinforcement.</li> <li>• Site visit to study the reinforcement.</li> </ul>
<p><b>Unit No. 4 – Design of short axially loaded RC column</b></p> <ul style="list-style-type: none"> <li>• Design of short axially loaded RC columns (circular, rectangular, square)</li> <li>• Analysis of RCC columns</li> </ul>

**Unit No. 5 – Simply supported slab and cantilever slab**

- Concept of one-way and two-way slab.
- Design of one-way simply supported slab.
- Design of cantilever slab.

**Unit No. 6 – Design of axially loaded RCC footing**

- Structural action of foundation.
- Design of axially loaded RCC footing.

**Sessional work**

5. 6 assignments each on one topic
6. Site visit report .

**Reference Books:**

10. Strength of material by R.S.Khurmi
11. Strength of material by Ramamurtam.
12. Design of steel structures by S.K.Duggal.
13. Design of steel structures by L.S.Negi.

<b>Course Title : HISTORY OF ARCHITECTURE-III</b>	
Course Code : PC – 604**	<b>Semester : V</b>
Teaching Scheme : L - 1hr + St - 2hrs	Credits : 2 = (T)1 + (TW)1
Examination Scheme : (T)80 + (TW)20	Total marks: 100

**Note:** Weightage for each Topic or Unit for Theory Question Paper shall be as per marks mentioned in Course Content below.

### **Course Description:**

Focus shall be on the study of general architectural features or characteristics observed in following periods with the help of concerned building examples, market places, public spaces and contributions of pioneer architects relevant to that period:

### **Course objective:**

Subject includes the study of various styles in Architecture mainly of Europe, America and India through various ages of Renaissance, Gothic, Industrial revolution and Modern period. Objective is to expose the students to the evolution of different architectural solutions through historical periods within the restraints of prevalent social and religious customs, geography, climate, building materials and techniques, aesthetical influences, structural complexities and technology available at the time. More emphasis is given to know the evolution of architecture in India after Independence. The study shall actively help students in preservation of rich Architectural Culture in evolution of Design process.

<b>Course Content</b>
<p><b>Unit 1: Gothic (15 Marks):</b></p> <ul style="list-style-type: none"> <li>• Introduction to Architectural development under Gothic period in the countries France, Britain, Spain, Italy and central Europe.</li> <li>• Detail study of architectural characteristics like pointed arch, vaulting, flying buttresses, window tracery, ornamental features etc.</li> <li>• e.g. Abbey church-St. Denis, Notre Dame de Paris, Laon cathedral, Rheims cathedral, Chartres cathedral, Amiens cathedral-France, Salisbury Cathedral-England, S. Elizabeth, Marburge cathedral-Germany</li> </ul>
<p><b>Unit 2: Renaissance (15 Marks):</b></p> <ul style="list-style-type: none"> <li>• Introduction to Architectural development under Renaissance period in the countries Italy, France, Britain, Spain, Portugal, central Europe and Russia. Study of stylistic phases under Renaissance period with religious churches and secular Palazzos and Villas: Early Renaissance (Brunelleschi-churches, Alberti-facades), High Renaissance (Bramante-Tempietto, Gallo-palazzo Farnese), Late Renaissance (Palladio-villas), Mannerism, Boroque and Rococo and Neo-Classical.</li> <li>• e.g. St. Peter-Rome, St. Paul’s Cathedral-London, Basilica of San Lorenzo, Florence cathedral, Church of San Andrea, Palazzo Rucellai, Palazzo Pitti-Florence (Italy), Palazzo Ricardi/ Medici Palalce- Florence(Italy), Villa Rotunda-Vicenza, Chateau de Chambord (France), Chateau De</li> </ul>

<p>Maisons near Paris(France), Whitehall Palace- London.</p> <ul style="list-style-type: none"> <li>• Contribution of Leonardo Da Vinci, Michelangelo, Andrea Palladio in Italian Renaissance and Inigo Jones, Christopher Wren in English Renaissance and Francois Mansart in French Renaissance.</li> </ul>
<p><b>Unit 3: Effect of Industrial Revolution in Europe and America (10 Marks):</b></p> <ul style="list-style-type: none"> <li>• Introduction, technological development, effect on Architecture and town planning, Industrial Architecture.</li> <li>• e.g. Factory Towns- city of Manchester and City of Lowell Massachusetts, Port-Albert Dock- Liverpool, Panoptic Prison-Pentonville prison, Workhouse- Bridge Street workhouse-Manchester</li> </ul>
<p><b>Unit 4: Introduction of Modernism in Europe and non European countries. (20 Marks)</b></p> <ul style="list-style-type: none"> <li>• Introduction of Modernism and its influence in different countries like England, Germany, United States, Brazil etc. Brief study of different styles, ‘ism’s and movements associated with it. Study of philosophies developed by schools like Bauhaus and Chicago school (Introduction with few examples). Study of emergence of new materials like steel, concrete and glass and its effect on Architecture.</li> <li>• Contribution by pioneering Architects like Le Corbusier, Mies van der Rohe, Frank Lloyd Wright, Walter Gropius, Louis Sullivan, Louis I Kahn, Philip Johnson, Alvar Aalto, Oscar Neimeyer, Gerrit Rietveld, Richard Neutra, Peter Behren, Josep Lluís Sert, Antonio Gaudí, Buckminster Fuller, Pier Luigi Nervi, Kenzo Tange, I M Pei, Frank O Gehry, Tadao Ando, Zaha M. Hadid, Rem Koolhaas, Daniel Libeskind, Bernard Tschumi, Santiago Calatrava, Hassan Fathy, Moshe Safdie, Geoffrey Bawa, Mario Botta, Luis Barragan etc. (Introduction with few examples)</li> </ul>
<p><b>Unit 5: Evolution of Architecture in India after Independence (20 Marks):</b></p> <ul style="list-style-type: none"> <li>• Introduction to Architectural development and emergence of Modernism in India after Independence under various Architects. Study of contribution by international architects like Le Corbusier and Louis I Kahn in cities like Chandigarh and Ahmedabad.</li> <li>• Contribution of pioneering Architects like Achyut Kanvinde, Shiv Nath Prasad, B.V. Doshi, Charles Correa, Raj Rewal, Joseph Allen Stein, Laurie Baker, Nari Gandhi, Anant Raje, Hasmukh Patel, Ranjit Sabikhi, Kuldip Singh, Habib Rahman, Uttam Jain, Ajoy Choudhury, Satish Gujral, P.T.Krishnan, Christopher Beninger, Krishnarao Jaisim, I.M. Kadri, Prem Nath, Sen Kapadia, Sanjay Mohe, Hafeez Contractor, Rahul Mehrotra, Brinda Somaya, Anupama Kundoo, Revathi Kamat, Soumitro Ghosh. (Introduction, Contribution, study of Design Philosophy with Architectural Examples)</li> </ul>

**Total of 5 Units: 80 Marks**

**Assessment:**

1. For Sessional work (Internal) assessment each students work should be assessed on the basis of sketches, notes and group seminars of respective Topic or Unit as mentioned in Course Content above.
2. Continuous assessment and marking system should be followed.

**Reference books:**

1. Sir Banister Fletcher, ‘*A History of Architecture*’, CBS Publications (Indian Edition), 20th Edition 2002.
2. J.C.Palms, ‘*History of World’s Architecture*’.
3. Lang, J.T (2002). ‘*A Concise History of Modern Architecture in India.*’

4. Bhatt and Scriver, '*Contemporary Indian Architecture- After the Masters*', University of Washington Press, 1991
5. Francis D. K. Ching, Mark M. Jarzombek, Vikramaditya Prakash, '*A Global History of Architecture*', John Wiley & Sons, 2017.
6. Ar. Vedula VLN Murthy, '*Modern, Post Modern Architecture and Pioneer Architects*'

<b>Course Title : Estimation Costing &amp; Specification - II</b>	
Course Code : PC-605**	<b>Semester : VI</b>
Teaching Scheme : L-1hr + ST-2hrs	Credits : 2 = (T) 1 + (TW) 1
Examination Scheme : (T) 80 + (TW) 20	Total Marks: 100

**Course Description:**

The courses Estimation Costing & Specification - I & II deal with use and application of tools and techniques required for estimation and costing of construction projects and study of financial aspects of building constructions.

The course Estimation Costing & Specification – I, at Semester -V, covers aim and objects of estimation and costing and gives an idea to the students to prepare approximate estimates, preparation of outline specifications and detailed estimations of building components & simple buildings. Student shall undertake market survey to study market rates of various materials and labors. The intent of the syllabus is to explore concept of quantity & cost calculations with due relation to specifications.

**Course Objectives:**

To make the students' aware of the factors that affect the cost of construction. To understand the concept of rate analysis for various items in building construction. To create ability of taking out of quantities from drawings and to determine estimated cost of building projects as per standard procedures. To inculcate habit of systematic recording of all the statistics concerned to estimating & costing

Prerequisite: Student should have internalized knowledge of the courses – Building Construction and Technology, Knowledge of Construction Materials and Reading skills of working drawings from their previous semester's syllabi.

<b>Course Content</b>
<p><b>Unit No. 1 –</b></p> <ul style="list-style-type: none"> <li>• Listing of building items for a framed structure type building.</li> <li>• Preparing detailed estimation of a RCC framed building.</li> <li>• Preparing abstract with brief specifications based on SSR.</li> <li>• Preparing summary sheet.</li> <li>• Application of computers in estimation &amp; costing etc.</li> </ul>

**Unit No. 2 –**

- Calculating quantity of reinforcement in RCC elements with reference to detailed RCC drawings of footing, column, beam, slabs, Staircase etc.

**Unit No. 3 –**

- Calculating structural steel quantity of a M.S. Fabricated structure With reference to detailed structural drawing of a truss.

**Unit No. 4 –**

- Calculating wood work quantity of a Door, Window, Wooden roof truss etc. With reference to detailed drawing.

**Unit No. 5–**

- Principles of writing specifications, Types of specifications, Writing detailed specifications for – Excavation, PCC, BBM, UCRM, Plastering, Pointing, Concrete in RCC works, reinforcement steel.

**Sessional works:**

- 1). Preparing detailed estimation of (G+1) RCC framed building having area 100 to 200Sq.Mt. built-up area.
- 2). Detailed reinforcement quantity calculation of any two RCC elements.
- 3). Detailed structural steel quantity of any one item.
- 4). Writing detailed specification for building items (Minimum Five Items)

**Reference Books:**

1. Estimating and Costing in Civil Engineering by B.N. Dutta
2. Estimating, Costing, Specification & Valuation in Civil Engineering by M.Chakraborty
3. PWD-SSR
4. IS Code 1200

Course Title : <b>BUILDING SERVICES – IV</b>	
Course Code : BS & AE - 606	<b>Semester : VI</b>
Teaching Scheme : L - 1hr + St - 2hrs	Credits : 2 = (T)1 + (TW)1
Examination Scheme : (T)50 + (TW)50	Total marks: 100

**Course Description :**

With the successful completion of the course, students will understand principles for designing of large scale electrical, illumination and mechanical services. They will be able to design vertical transportation and their execution in their building projects, execute building management and safety systems in construction projects. They will develop capability to interact technically with MEP experts. Students will be able to design services for architectural design project, allocate space for the same.

**Course objective:**

The objective of the subject is to enable students to understand and apply in design knowledge about: Hot water supply design in hospitals and hotels, Hospital services like CSSD, hospital gases and incinerators, Community kitchens, laundry and housekeeping services, Swimming pools, Sustainable Services for hospitals and hotels, Solar electrical panels for electricity generation, Water treatment plant for hospitals and hotels. (STP / ETP).

<b>Course Content</b>
<p><b>Unit 1: Hot Water Supply</b> Energy for heating, Types and classification of Geysers and Heaters, Hot water systems in Luxury Hotels and Hospitals and buildings in cold climatic conditions, Market survey and study of hot water pipes, systems in use, fuels in use, deviation from theoretical systems. Solar and electrical hot water supply- decentralised.</p>
<p><b>Unit 2: Hospital Gases, CSSD</b> <b>Hospital Gases:</b> Types of gases needed for hospitals, Centralized and decentralized system of hospital gases. <b>CSSD (Central Sterile Supply Department):</b> Purpose and function of Central Sterile Supply Department, advantages of CSSD, equipment in CSSD, material flow process in CSSD, methods of sterilization and disinfection, essentials of the department, movement of personnel, tentative plan and planning of CSSD.</p>
<p><b>Unit 3: Laundry, Community Kitchens, House Keeping Services</b> <b>Laundry:</b> Need of laundry for hotels and hospitals, working of Hotel laundry and hospital laundry, advantages of laundry, Types of laundry like manual laundry and mechanical laundry, types of laundry management viz. in-house, contractual and rental, advantages and disadvantages of each type, Location of laundry in building and its space requirements, flow process chart for industrial laundering, Factors to be considered while designing laundry</p>



operation, Laundry process, planning, location, space requirement, etc.

**Kitchens:** Kitchen for hotel restaurant and diet kitchens for hospitals, Function, planning and utility management.

**House Keeping Services:** Housekeeping in Hotels, Function of housekeeping, importance of housekeeping, coordination of housekeeping with other departments, housekeeping services, flow chart for housekeeping personnel.

- Housekeeping in hospitals, introduction, present scenario, interdepartmental relationship, responsibilities of housekeeping department of hospital.

#### **Unit 4: Swimming Pools**

Services required for swimming pool, types of swimming pools public, private and domestic swimming pool, design of swimming pools, filtration plant, balancing tank, water strainers, water heating, underwater lighting, changing cubicles and toilets, organic or naturalistic swimming pools.

#### **Unit 5: Bio-medical waste and Incinerator**

Definition and classification and bio medical waste in hospitals, biomedical generation, segregation, collection, treatment and disposal.

#### **Unit 6: Sustainable services for hospitals and hotels:**

- i) Photovoltaic panels on roof tops of hospitals and hotels for electrical/lighting needs.
- ii) Sewage/Effluent water treatment plant for hospitals and hotels in order to reuse the water for toilet flushing or gardening.

#### **References:**

1. Hotel Housekeeping Operations Management by g. Raghubalan and Smritee Raghubalan.
2. Medical Gases- an Introduction by Marian Lucas
3. Handbook for CSSD by Joan Losper.
4. Linen and Laundry service by Dr. Sharad Gajuryal
5. Swimming Pools: design and Construction by Philip H. Perkins.
6. Medical Waste Incineration and Pollution Prevention by Alex S. Green.
7. The Solar Electricity handbook by Michael Boxwell.
8. An Applied guide to Water and Effluent treatment Plant Design by Sean Moran.

Course Title : <b>WORKING DRAWING –II</b>	
Course Code : PC - 607	<b>Semester : VI</b>
Teaching Scheme : L - 1hr + St - 3hrs	Credits : 2.5 = (V)1.5 + (TW)1
Examination Scheme : (V)100 + (TW)50	Total marks: 150

### Course Description

The subject introduces the student to methodology of preparation of working drawing Based on the principles of visual communication interpretation and reading of drawing. These drawing should enable the site staff to transform the drawing into actual construction with help of sufficient dimensions and details.

### Course Objective

Introduction of working drawing for composite construction based on design problem done in second year architecture which should include.

R.C.C. framed structure, steel framed structure and load bearing structure.

<b>Course Content</b>
<b>Unit- 1</b> 1- Section –Sufficient number
<b>Unit-2 – Details</b> A) Toilet details B) Plumbing drainage water disposal
<b>Unit-3 -Doors and Window</b> <b>Door</b> 1) Wooden door / Flush door /Glass doors etc.  <b>Window</b> 1) Wooden window 2) Aluminium window 3) UPVC window
<b>Unit – 4</b> 1) Kitchen Platform 2) Railing details 3) Staircase details
<b>Unit – 5</b> 1) Site development 2) Compound wall 3) Landscape

Course Title : <b>INTERIOR DESIGN</b>	
Course Code : PE - 608	<b>Semester : VI</b>
Teaching Scheme : L - 1hr + St - 2hrs	Credits : 2 = (V)1 + (TW)1
Examination Scheme : (V)50 + (TW)50	Total marks: 100

### **Course description:**

Individual College may offer topics depending upon the availability of experts and resource material. The colleges will have the opportunity to focus on a particular group of topics according to the overall philosophy and mission statement of the College.

The probable Interior Design elective topics are – [the list is only suggestive and individual colleges can frame newer topics which meet the course objectives]. Exhibition Design, Set Design , Commercial & Office Space Design, Residential Interiors, Specialized interiors – Hospitals, Laboratories, Auditoriums, Gymnasiums, Furniture Design, Product Design, etc. With the successful completion of the course student will understand the intricacies of interior space planning and its historical background, the modern trends in the field. Student will be capable to carry out small and medium sized interior design projects with material specification and sample and one project estimate completed.

### **Course objectives:**

To enable students to comprehend relationship between Architecture and Interior Design as a Space making disciplines. • To evolve understanding about thoughtful design of interior spaces & how it can increase efficiency and add depth and meaning to the built environment. • To enable students to comprehend the connection that the subject of Interior design has with other Design Disciplines like Conservation, Preservation, Restoration, Sustainability, Art, Product design and Graphic design.

Basics of interior design such as interior spaces, its types and various components, treatments, finishes, etc. Indoor lighting, furniture design materials selection for different environments.

<b>Course Content</b>
<p><b>Unit 1:</b> Introduction Definitions, concepts, themes and types of interior spaces. Behavioral psychology, perception and the related role of interior spaces.</p>
<p><b>Unit 2:</b> History A historical overview of the influence of various design movements on interior design. Interior decoration and crafts of various indigenous tribes and communities of the sub-continent.</p>

**Unit 3:** Elements of Interior Design - Interior Treatment and Finishes Treatment methods, finishes, material selection, design options for floor, ceiling, walls, staircase, openings, interior services elements, etc. in order to achieve certain functional and/or aesthetical demands of the space.

**Unit 4:** Elements of Interior Design-Lighting a types, fixtures, enhancement accessories, selection for different contexts. Interior elements and significance in enhancing environment visuals and inducing moods; rocks, plants, water, flower, artifacts etc.

**Unit 5:** Furniture Design & Interior Layouts and Planning Human comfort, lifestyle aspirations, and function as context to design of furniture, interior spaces. Office and residential interior design layouts and furniture. Interiors and furniture of various age groups.

**Unit 6 :** Estimate & analyses cost & rates, prepare bill of quantities specifications& tender. Practice professional ethics while fulfilling various duties in interior design

**Unit 7 :** introduction to leed and griha rating in interior design

### **Sessional work:**

The faculty is expected to set out the broad contour and sub aspects (including basic principles, case studies, application in building projects etc.) of the particular subject and conduct input and demonstration interactions and define the nature of the sessional work to be done by the students.

### **References:**

1. Francis D.K.Ching, Interior Design Illustrated
2. Syanne Slesin and Stafford Ceiff, Indian Style
3. Gary Gordon, Interior Lighting For Designers
4. Steprt Devan Kness, Logan and Szebely, Introduction to Interior Design
5. Ahmed Kasu, Interior design

<b>Course Title : ARCHITECTURAL ACOUSTICS</b>	
Course Code : BS & AE - 609	<b>Semester : VI</b>
Teaching Scheme : L - 3hrs	Credits : 3 = (T)2 + (TW)1
Examination Scheme : (T)80 + (TW)20	Total marks: 100

**Note:** Internal marks should be based on assignments, sketches, question bank, etc.

**Course Description:**

The course intends to make students understand the basics of acoustics, develop capability to apply the fundamentals of acoustics in the design of building and communicate with technical accuracy in a professional and an academic environment.

**Course objective:**

The objective of the subject is to enable students to understand and apply:

1. Basic laws and terminologies related to Acoustics, Acoustical requirements of a given activity, its calculations and designing of the space.
2. Urban noise control and its application at site and building level.

<b>Course Content</b>
<p><b>Unit 1: Introduction to Acoustics</b>            The history of Acoustics, definition and functions of acoustics, various key concepts such as origin of sound, propagation, spherical wave front, wave length, amplitude, velocity, intensity and intensity levels with Decibel scale, properties of sound, characteristics of sound like sound absorption, sound reflection, and sound transmission, defects of sound like sound resonance, Sound reverberation, sound echo, etc. and their remedies; phenomenon in acoustics like directional sound, sound and distance.</p>
<p><b>Unit 2: Behaviour of sound in open and enclosed spaces</b>            Sound refraction, sound diffraction, first order reflection, inverse square law. Understanding near field, free field, and reverberant field. Studying absorptive and reflective materials. Design considerations for good an acoustical design such as shape, size, occupancy, purpose, geometry for open air amphitheatre, auditorium, recording studios, etc. Defects like sound shadow, dead spots, whispering galleries or sound creep and their remedies.</p>
<p><b>Unit 3: Noise Control and Sound Reinforcement Systems</b>            To understand noise, its psychological and physiological effects. Transmission of sound (air borne and structure borne), sources and methods of insulation of indoor noise, control measures for mechanical noise and its vibrations, Outdoor noise sources such as traffic noise and their control methods, various types of sound absorbent materials, hollow and composite wall construction, floors and ceilings. Characteristics and components of a good Sound reinforcing</p>

system such as microphones, amplifiers and speakers

**Unit 4: Acoustical Design Principles and Factors**

Case studies and at least one design exercise of an auditorium, cinema hall, conference room or recording studio, Discotheque, karaoke bars, home theatre, lecture halls/classrooms.

Site selection and planning, shape, dimensions, occupancy and seating arrangement, treatment of interior surface, desired reverberation time. Exercise output shall be in the in the form of plan, section, construction details and calculation sheets.

**Unit 5: Acoustical materials types**

Sound absorbing materials like foam panels, fabric panels, underlayment, partitions, mineral wool, curtains, hanging baffles, acoustic tiles, cotton batts. Sound reflecting materials like marble, granite, clay brick, ceramic tile, smooth concrete, plaster, metal, glass. Absorption and reflection coefficient. Use of materials to reduce, elevate, absorb and divert sound.

**References:**

1. Catalogues of leading Audio equipment's companies
2. Egan, Architectural Acoustics
3. Kandaswamy, Architectural Acoustics and Noise Control □J.E. Moore, Design for Good Acoustics and Noise Control.
4. National Building Code 2005
5. Templeton, D., Acoustics in the Built Environment.
6. A.B. Wood, A Text book of sound.
7. Yarwood, T.M., Acoustics.