

BACHELOR'S DEGREE COURSE IN ARCHITECTURE
(NEW SCHEME)

(As approved by the Executive Council at its meeting held on
19th December, 1991, vide Resolution No.506)

Effective from the Academic Session 1992-93

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OBJECTIVES

The Bachelor of Architecture Degree programme prepares students for professional practice in the field of Architecture. Being an undergraduate programme, it has a broad scope, providing exposure to a variety of interests in this field and assisting students to discover their own directions for further development.

There is increasing recognition today of Architecture as an intellectual discipline, both as art and as a profession. Architects make a vital contribution in the shaping of our environment and society, in the design and technology for a diverse range of situations, both in the rural and urban contexts. In India, we have further complexities of different social, cultural, geographical, economic and technical nuances which are unique and typical of every region in our country.

It is the appreciation of this over-changing context that the architect must bring to bear of his work. This demands appropriate skills, understanding and knowledge and a deep commitment to professed ideals. Addressing Architectural Design as a comprehensive creative process, this programme is based on the following broad intentions:

- a) To stimulate sensitivity and unveil creative talents.
- b) To reinforce intellectual capabilities and develop proficiency in professional skills to enable graduates to competently pursue alternative careers, within the broad spectrum of architecture.
- c) To provide opportunities to students to try out the role they will eventually play as responsible members of society, under supervision and interactive guidance.

The programme aims at attaining a high level of excellence in Architectural Design. To this end, the design course is seen as the core of the programme with supportive inputs from courses in other streams viz., the Humanities, the Technological and the Professional, built upon a strong foundation of enabling skills in communications and data processing. The emphasis is on the development of faculties of discernment and decision-making with the aid of both objective information and subjective attitudes, based on reason.

Given the complexities of present-day design projects, the architect's role is that of a team Leader and coordinator of the input of specialists in various specific disciplines. He needs to possess a sound knowledge of all aspects of modern building technology to be able to draw up an integrated framework for activities of the other members of the team, to direct them and to assume overall responsibility for the collective effort. This is manifested in the courses in the Technological and professional streams.

SOME FEATURES OF THE REVISED CURRICULUM

1. The curriculum has been structured as a **Five-Year, Two Stage Programme**, the first stage consisting of three years of full-time study followed by practical training in professional offices of construction sites of 20 weeks duration. The second stage consists of full-time study for one-and-a half years. At the successful completion of the first stage and practical training a student, if he may discontinue the programme and shall be eligible for the award of a certificate having completed 'Intermediate in Architecture'.
2. The revised curriculum endeavours to reduce the number of examinations. Instead of being conducted at the end of each semester, examinations shall be held once annually at the end of each academic year, i.e. a total of 5 examinations as against 9 at present.
3. The rationalisation of subjects of study under various streams has been largely retained. However, at some points, the mismatch in course content between different subjects being taught at one time has been removed, so as to achieve better integration with the Architectural Design Programme.
4. The period of practical training has been reverted back to the First term of IV Year as it has been found to be more beneficial to the student at this stage. During this period the students are also required to prepare a Project Report on a subject of their choice.
5. By having to complete all major subjects at third year level the programme was being overloaded at one point. Therefore, the two major courses in the Technological stream viz., Building Construction and Theory of Structures have been reintroduced in the Fourth Year so that immediately after practical training students can have better appreciation of these subjects.
6. In the Final Year, two new subjects have been introduced viz., Advanced Construction Technology and Introduction to Project Management for which instruction shall be through lectures, studios and seminars.
7. Architectural Design, being the central discipline of the course has been dealt within detail and major guidelines have been framed regarding the specific context of these courses. Design Tests and Group Design exercises have been introduced so as to aim for both individual and collective excellence in equal measure. The modified system of framing of problems and appraisal of performance is introduced to give credit to the distinctive abilities of each student. By the time of the next syllabus review after five years it is expected to set the trend for the complete elimination of the concept of comparative assessment of students' work.
8. Special emphasis will be laid on the organization of seminars in both compulsory and elective courses in all streams so that students get opportunities in public speaking and become more articulate in direct presentation of their ideas.

1. **INTERPRETATIONS**

In construing the rules, the following words shall have the meaning herein assigned to them except where the subject of the context otherwise requires:-

- a) 'University' shall mean the School of Planning and Architecture Deemed to be a University.
- b) 'Director' shall mean the Director of the School of Planning and Architecture.
- c) 'Faculty' shall mean the faculty of the School of Planning and Architecture.
- d) 'Head of the Department' shall mean the Head of the Department of Architecture.
- e) 'He' shall mean he/she.
- f) 'Subject': Architectural Design-I, Architectural Design-II, etc. shall be called the courses of the same subject, i.e. Architectural Design.
- g) 'Course' shall mean the course of study of a particular subject during a particular year or term.
- h) 'Year' shall mean academic year as notified in the academic calendar.
- i) 'Year's Work' shall mean the work done by the student during the year in any subject.
- j) 'Internal Assessment' shall mean the marks awarded to the years' work by the faculty as laid down in the Academic Programme.
- k) 'External Evaluation' shall mean the marks awarded to the years' work by the external jury and/or the marks awarded by the examiners for theory papers.
- l) 'IO' courses shall be those which do not have any External Evaluation and the University examinations consists of Internal Assessment only.
- m) 'IE' courses shall be those which have both Internal Assessment and External Evaluation.
- n) 'Regular Student' shall mean a student who is required to pursue the prescribed course of study in any subject for a particular examination, according to the conditions of clause 6 of the Rules of Examination.
- o) 'Ex-student' shall mean a student who is exempted from pursuing regular course of study for a particular examination.
- p) 'Aggregate' shall mean the sum total of the marks obtained by a student in all the subjects over a whole examination.

- q) 'Degree' shall mean the Degree of Bachelor of Architecture to be awarded to a student on passing the final (fifth) examination.
- r) 'Diploma' shall mean the Diploma in Architecture to be awarded to a student who discontinues the course at any time after passing the third examination, successfully completing the practical training and subject report thereafter, but before passing the final examination.

2. COURSES OF STUDY

The courses of study, subjects, syllabus, academic programme and the scheme of examination shall be as approved by the Academic Council from time to time.

3. ACADEMIC CALENDER

Each academic year shall be divided into two terms, viz. First Term and Second Term, as per the calendar approved by the Academic Council.

4. UNIVERSITY EXAMINATIONS

There shall be the following University Examinations for the B.Arch. Degree Courses:

- I Examination on completion of course of study for one academic year.
- II Examination on completion of course of study for one academic year, after passing the I Examination.
- III Examination on completion of course of study for one academic year, after passing the II Examination.
- IV Examination on completion of course of study for one academic year, after passing the III Examination.
- V Examination on completion of course of study for one academic year, after passing the IV Examination.

Each examination shall consist of the following stages for the different subjects:

- (i) Internal Assessment of the year's work in courses which do not have any External Evaluation, referred to as 'IO' courses.
- (ii) Internal Assessment of year's work clubbed with External Evaluation, either by way of theory paper of external jury, in courses referred to as 'IE' courses.

The classification of courses as 'IO' and 'IE' is laid down in the List of Courses (ref. page 9)

5. PASS PERCENTAGE

The marks required for passing the different examinations shall be as follows:

- (i) 50% in Internal Assessment of year's work in each subject classified as 'IO'.
- (ii) 50% in Internal Assessment of year's work clubbed with External Evaluation, either theory paper or external jury, in all other subjects, classified as 'IE'.

6. ELIGIBILITY FOR APPEARING IN THE EXAMINATION

A student shall be eligible to appear in a University Examination, on payment of prescribed examination fee, if he has pursued the prescribed course of study for that Examination during the preceding year as laid down in the following conditions, unless eligible for ex-studentship under clause 12:

- (i) Attendance: The student shall be required to attend not less than 66% of the lecture/studio classes held for the relevant course of study preceding each examination, separately for all subjects.
- (ii) A student not found to have the minimum attendance in a subject will not be permitted to appear for external evaluation in that subject, if any, by way of either theory paper or external jury, except for Architectural Thesis.
- (iii) Clause 6.1 and 6.11 are not applicable to the Architectural Thesis. A Student will be eligible to appear for External Evaluation subject to his progress and attendance being certified as satisfactory by his Thesis Guide or the Studio Director.

A student not found eligible to appear in the University examination in any subject will be detained to repeat the year as a regular student in that subject.

7. INTERNAL ASSESSMENT

Marks for internal assessment are allotted to evaluate the performance of the students on a continuous basis in each term. The teacher concerned may, in consultation, with the Head of Department adopt any of the methods viz., written tests, viva-voce-class assignments, studio work, seminar, practical, term papers, and tutorials etc. for assessing the performance of the student. Marks will be announced by the teachers periodically. The student must obtain the minimum pass percentage, separately in each subject as mentioned in clause 5.1, i.e. 50% marks in all 'IO' subjects, failing which he shall be detained to repeat the whole year as a regular student in that subject.

A student who fails to obtain the minimum pass percentage in a subject as mentioned in clause 5.1, but secures not less than 35% marks, he will be allowed to improve his performance by submitting for internal assessment such additional assignments or tests as may be given by the subject teacher concern subject to the following conditions:

- (i) The maximum marks which can be counted in such cases shall be limited to 50%.
- (ii) For courses which conclude in the first term, the assignments must be submitted by 15th March and for all other courses by 15th July every year.

8. EXTERNAL EVALUATION

- (i) **External Jury:** The external evaluation of year's work in Architectural Design in all examinations, in Graphics in the first and second examinations and Building Construction in the fourth examination only shall be made by a Jury separately at the end of each term. The combined result of Design for both the odd and even term shall determine the students passing or failing in any year. Graphic shall be evaluated on an annual basis alongwith Architectural Design. The Jury shall consist of four members, of which two will be external members. The students shall make themselves available during the period of external evaluation of offer clarifications on their work.

The external evaluation and viva-voce of the Architectural Thesis shall be conducted by a Jury of four members, of which two will be external members.

- (ii) **Theory Paper:** The evaluation of theory papers shall be made by an examiner duly appointed as per clause 9.

9. APPOINTMENT OF EXAMINERS

Members of the Jury and examiners for theory papers will be appointed by the Director on the advice of the Head of the Department. The external members of the Jury shall be drawn from a panel duly approved by the Board of Studies.

10. PROMOTION

- (i) A student shall be promoted to the next class only if he has obtained the minimum pass percentages in each subjects as per clause 5 after appearing in a particular examination and the supplementary examinations as per clause 11, unless he opts for promotion under clause 10(ii) below. A student found in eligible for promotion will respect the year as a regular student, in the subjects in which he has failed.
- (ii) A candidate who fails to obtain the minimum passes percentage in one subject only will be eligible for promotion to the next higher class by setting off one percentage point of aggregate over the whole examination for each percentage point of deficiency in the subject marks, provided the net aggregate left over after covering the deficiency does not fall below a minimum of 50%.

Rule 10(i) and (ii) have been deleted w.e.f. academic session 2001-02.

11. SUPPLEMENTARY EXAMINATIONS

A student shall be eligible to appear in the supplementary examinations to be held in July every year on payment of the prescribed examination fee, if he fails in not more than two subjects but secures a minimum of 35% marks in each as computed under clause 5.2, subject to the following conditions:

- (i) Supplementary examinations will be conducted only for subjects which have theory papers i.e. it does not apply to Architectural Design in all

classes, Graphic in I & II Year and Building Construction in IV Year and Architectural Thesis.

- (ii) The marks obtained in the supplementary examination shall be substituted for the marks obtained in the theory paper in the regular examination for purpose of computing the total marks obtained in that subject under clause 5.2.
- (iii) The maximum marks which can be awarded in a subject to a student who appears in the supplementary examination in that subject shall be limited to 50%.
- (iv) A student who has failed in more than two subjects, but has secured not less than 35% marks in each, will be permitted to appear in supplementary examinations for only two subjects of his choice.

12. EX-STUDENTSHIP

A candidate who is eligible to appear in the theory papers in any subject and/or external jury of Architectural Thesis but has failed to appear may on the recommendation of the Director, be permitted to appear as an ex-student at the subsequent examination in the theory papers in those subjects and/or Architectural Thesis.

13. TIME BAR

- (i) Students of the B. Arch Course shall pass (a) the first examination within two years of joining the course, (b) the fourth examination within seven years of joining the course, and (c) the final examination within three years of passing the fourth examination.
- (ii) Students who fail to pass the examinations within the prescribed time limits shall not be allowed to rejoin the course.
- (iii) Students who have discontinued the course at the Diploma level may be readmitted to the course not later than three years from the date of award of diploma, as per rules for selection and subject to availability of seats.

14. CLASSIFICATION OF RESULTS BASED ON AGGREGATED RESULT OF FINAL EXAMINATION.

70% or above	Passed with distinction
Below 70% & upto 60%	Passed in first class
Below 60%	Passed

LIST OF COURSES

DESIGN STREAM	Architectural Design	AD-1a, AD-1b AD-2a,AD-2b AD-3a, AD-3b AD-4 AD-5a	IE
	Theory of Design	TD-1b TD-2b TD-3a, TD-3b	IO
TECHNOLOGY STREAM	Building Construction	BC-1a,BC-1b BC-2a,BC-2b BC-3a,BC-3b BC-4	IE
	Advanced Building Technology	BC-5a	IO
	Theory of Structures	TS-1a,TS-1b TS-2a,TS-2b TS-3a,TS-3b TS-4	IE
	Building Science & Services - Climatology - Water & Waste Mgmt. - Electrical Instals - Lighting & Accoustic - Ventilation, Commun. & Security Systems - Integrated Energy Mgmt.	BS-1b BS-2a BS-2b BS-3a BS-3b BS-4	IE
PROFESSIONAL STREAM	Building Management - Surveying & Levelling - Specs. & Contracts - Quantities & Estmn. - Building Economics - Project Management	BM-1a BM-3a BM-3b BM-4 BM-5a	IO IE IO
	Professional Practice	BM-5b	IE
HUMANITIES	History of Architecture	HA-2a, HA-2b HA-3a, HA-3b	IE
	Theory of Settlements	TP-2a TP-3a,TP-3b TP-4	IO IE IE
	Art Appreciation	AA-2a,AA2b	IO
ENABLING SKILLS	Mathematics	XM-1a	IO
	Graphics & Communication	XG-1a,XG-1b XG-2a,XG-2b	IE IE
	Computer Applications	XC-1a,XC-1b	IE
OPTIONS	Electives	XE-4 XE-5	IO IO
	Project Report/Seminar	PRX SRX	IO IO
	Architectural Thesis	ADT	IE

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COURSES OF STUDY

1. ARCHITECTURAL DESIGN

Architectural Design is the central discipline of the programme. The Design studio is the area where the students apply their knowledge and develop design skills while testing out the theories and methods learnt in other courses in the Humanities, Technological and Professional streams. The students will Endeavour to acquire an understanding of the determinants of the built form such as social imperatives, environmental concerns and the craft of building. They will review experiences from their own immediate and personal environment as well as the values and perceptions of other people involved in the process of design viz., the user, the client and the public at large, Derivation of concepts and strategies will then lead to a deliberate response in the shape of a specific design proposal with the help of organizational and communicative skills.

The study of Architectural Design is seen as a cumulative process where the experience of the previous year is used as a base for increasing the depth and breadth of knowledge and development skills in the following year. The range of design problems shall include projects of progressively increasing complexity from a simple rural habitat to multi-use urban mega-structures.

Each Architecture Design Course upto the Third Year shall include both major problems (fully developed schemes) and short problems (Time problems or sketch designs). At least one short problem shall be a six-hour design test on a topic unrelated to the major problem, but of a similar level of understanding. This is to encourage students to hone their skills and invigorate their creative faculties to come up with quick, intuitive responses to difficult situations, as happens in the real world. A part of the design programme in each term will be allocated to the development of a particular aspect of design, consistent with the inputs in other subjects. The internal assessment in this subject shall be on basis of the distribution of credits as follows:-

(i) 70% of the marks for internal assessment shall be allotted to the major Design Problem.

(ii) 20% marks shall be allotted to short problems which may or may not be related to the major design problem but which address any of the specific aspects of design such as structures, services, history, economics, management etc. as theoretically dealt with the other concurrent courses.

(iii) 10% marks shall be allotted to the Design test.

At least one of the major design problems in an academic year, in either term, may be a group design exercise wherein students may take up detailed design of a part of a larger problem to produce a consolidated design solution. This will help students to acquire deeper understanding of smaller areas and also promote the collaborative rather than the competitive aspect. Courses in Design Theory will run concurrently with studio courses at every stage, various aspects of the design problem shall be dealt with lectures, group discussions and library research so as to provide the necessary philosophical and attitudinal background to a rational design approach.

The studio programme of various design problems shall be set well in advance of the commencement of the terms by the studio Director in close consultation with the other subject teachers to ensure that exercises in other subjects are directly

relevant to the studio problem as far as possible. The content of the exercises and criteria of assessment shall be ascertained and discussed with the students before taking up the problems. Vertical integration with problems in other years shall be encouraged to induce multiple interactions within the student community at all levels and between the students and the faculty as a whole.

The courses AD-1a through AD-3b shall run in sequence beginning in the first term of First year and ending in the second term of Third year. Thereafter the courses AD-4 and AD-5 shall run in sequence in the second term of Fourth Year and first term of the Final Year. The Architectural Thesis is to be taken up after these two sequences, set to an independent and flexible time schedule.

AD-1a Problems related to the understanding of the elements of architectural design, concepts of space and form and their perception.

Parameters of design, Anthropometrics, human activity and the use of space, Interrelationship of Architectural space to form, structure, and materials and to nature as a contextual setting.

Synthesis of observations in the study of a given space through elementary measured drawings, sketching & photography. Design of a basis shelter, an architectural form with a specific function.

AD-1b Design of a simple building in the immediate or observable environment. Exercises relating personal experiences to behavioral needs and translating them into architectural program requirements. Systematic introduction to issues related with the design of human habitat, its components and space standards.

Element of site-planning and landscaping. Interpretation of site information as a decision-making aid. The design of the environment outside the building. Problems aimed at drafting and presentation skills in the 2-D format.

AD-2a Design of a simple building for public activity in a non-urban setting, or a situation without urban regulatory controls. Introduction to other role players in the Architectural process viz., the client and the user. Appreciation of the non-personal view as a process resources.

Study of the social and physical environment & methods of construction in vernacular architecture, emerging out of the traditional way of life of the people in a given place including topographic survey. This may be a village or part of a small town.

AD-2b Design of a group of building and ancillary, set in the context studied in ADS-2a. Introduction to concepts of shared open space, clustering, community, aggregation and economy. Emphasis will also be laid on site planning. This shall be a group design exercise with each member handling a different aspect or a different portion of the total problem.

Problems aimed at drafting and presentation skills in the 3-D format.

This course shall be fully integrated with the building construction studio with the objective of producing basis working drawings of one or more of the designed

buildings upto two storey. Emphasis shall be laid on clarity of details and architectural expression in functional and constructional elements.

- AD-3a Design of a multi-functional public building in the urban setting. Introduction to urban development, controls, codes and bye-laws. Exercises in articulation and manipulation of programmed needs, Design methodology, criticism and evaluation of alternative concepts.

Study of an urban environment in use. Urban activities, services and construction methods, and phenomena of social utilizations, growth and change shall be the focus of the study.

- AD-3b Design problems on the design of closed environment, with emphasis on the articulation of interior spaces, detailing and finishing materials, textures, colour and light, acoustics and air-conditioning. Exterior spaces formed by buildings, Elevations, fenestration and built form as a moderator of urban space, site planning and landscaping. The problems may be set in the context studied in ADs 3a.

Working drawings related to one or more aspects studied above with a view to understanding structure and services related to buildings of 3 to 5 storeys and the implications of specifications on the quality and cost of the final architectural product. This course shall be integrated with the building Construction studio. This may be group efforts in a simulated a real-time situation.

- Ad-4 Design problem involving a high density, large scale housing, Socio-economic determinants, Legislative and economic constraints and technological alternatives shall be studied in detail. Exercises in simulation and conceptual modeling shall be conducted. Application of concepts of community participation, phasing, financing and construction planning.

Project documentation including basic working drawings, preliminary estimates, outline specifications and scheduling aimed at comprehensive understanding of the implementation process.

- AD-5 Design of a multi-functional complex of buildings in the metropolitan context. Issues related to the growing problems or urban areas in third world countries their future development shall be explored. Emphasis on the design with relation to the contextual environment, traffic and Planning controls and impact analysis.

An understanding of the architectural implications of such development scheme should lead to insights in the formulation of political and administrative policy.

Preparation of analytical report of a high order and innovative presentation of final design proposals will be insisted upon.

- ADT The Architectural Thesis is the culmination of the development of the student's knowledge, attitudes and skills over the course of studies in architecture. It is an occasion for exercising conscious choices in the field based on the students personal abilities and inclinations, and for testing out his commitment. The student, in consultation with the faculty, is expected to demonstrate through an

imaginative approach, his expertise in effecting positive changes in our built environment.

2. THEORY OF DESIGN

The courses in Design Theory aim to evolve a conceptual frame work for intelligent appreciation of architecture and to develop a vocabulary for discussing design ideas. The structure of the courses consists of set of lectures and prescribed reading followed by group discussions and seminars.

TD-1b The genesis of indigenous architecture, its geographical and cultural sign posts. Evolution of ideals and design principles in modern architecture. Influences governing the formation of attitudes as a prelude to the act of design. The translation of design ideas into architectural expression.

TD-2b Architecture as a socially useful discipline. The concept of measuring, function, style, type, social purpose and ideology, The relationship of architecture to the sciences, arts, economics and politics. Study of selected writing, and buildings in monumental and vernacular scales. Man-made design at all levels including objects of daily use.

TD-3a Design Methodology :- Design as a multi-variety problem solving process. Theories of Program and Function, thinking techniques, information processing and research methods, generators of creativity, design matrices and system integration.

TD-3b Design Evaluation and Criticism: Value judgments in design, Appreciation of designer's skills, theories of perception and variability of perception. Theoretical issues in contemporary architectural thought, Seminars on the works of selected Indian and International architects and related topics.

3. BUILDING CONSTRUCTION

This course is designed to expose students to the process of building construction, the components of buildings and the materials, skills and equipment used in shaping them. The emphasis is on familiarization by direct handling and observation, Students shall be encouraged to acquire a taste for good workmanship and quality products.

The course is visualized as having three essential components viz. a lecture course in materials and methods of construction, a building workshop which may be conducted within the School and at specific venues outside and a construction studio wherein principles and practices shall be applied to the production of meaningful working details and drawings. The construction studio will be integrated with the Architectural design studio wherever possible.

BC-1a Historical evolution of building material and Construction method. Introduction to primary building elements, walls, piers, foundations, roofs, bricks, stone and block masonry their properties and manufacture. Studio exercises in brick

bonding foundation details, wall details upto plinth level. Workshop in brick laying, setting-out, mudblocks etc.

- BC-1b Introduction to secondary elements door, windows, railing and sunshades etc. timber sawing and seasoning, timber products, roof tiles, and sheets, studio exercise on door and window details, timber trusses and miscellaneous joinery, workshop, in carpentry and joinery, fixing of frames in masonry, simple wall and floor finishes.
- BC-2a Introduction to specialised elements such as staircases, built-in-furniture, show windows, sliding and folding doors, panelling and external paving, gates, grills etc. Studio exercises related to metal windows, partitions, mezzanines and cabinetry. Workshop in steel welding and forging, shuttering, bar bending and concreting, painting and laminating.
- BC-2b Investigation of materials, techniques and details related to vernacular architecture as studied in AB-2a. Exploration of alternatives. Studio programme to be integrated with AB-2b. Workshops in appropriate and innovative materials and construction at various research institutions and building centres.
- BC-3a Introduction to the problems of large scale industrial, commercial and institutional buildings such as basements, large span roof, roof flights, false ceilings and floors, cavity walls curtain walls and renovation and strengthening of existing structures. Studio exercise related to industrial structure comprising of some of the above components, workshop on shoring, underpinning, dewatering, waterproofing, erection and cladding.
- BC-3b Investigation of hi-tech material and technologies related to interior finishing and detailing, exterior finishes etc. Studio Programme to be integrated with AD-3b. Workshop on sanitary and plumbing installations, finishing works.
- BC-4 Studio programme integrated with AD-4. Production of a set of detailed working drawings.
- BC-5a Advanced Building Technology. Introduction of pre-stressing, prefabrication & systems building. Jointing, tolerances and modular co-ordination. Mass production, transportation, storage and handling of materials. Characteristics, performance and application of mechanized construction equipment. Advanced vernacular construction techniques.

4. THEORY OF STRUCTURES

The objective of the course is to develop in the students a feel for structural principles and they relate to building design. Essentially, the students should be able to conceive structure as a system that forms space and that architecture and structures cannot be conceived independently. In current architectural practices, structural engineering is a specialist discipline. The architect therefore should be able to appreciate his consultant's concerns and make an informed choice regarding the most appropriate structural system for his building. He should have a reasonable understanding of its operational and economic implications.

The course is visualized as having three essential components viz., a lecture series introducing concepts, a studio in which those will be applied in demonstrative exercises to determine elements and preparing drawings for the same, and laboratory studies for testing of structural material and systems models.

TS-1a Concept of direct force mechanism in structures, tension and compression. Equilibrium of forces, concept of structure and tie. composition and resolution of forces. Concept of loads as forces, response as deformation, stress and strain, Hook's Law. Concept of Euler's load, phenomena of buckling, short and long columns, masonry walls and piers, and design using slenderness ratio and monogram method.

Laboratory verification of Booke's Law destructive testing of brick and brick-mortar combinations. Study of models using ties, struts and membranes only.

TS-1b Concept of direct force and bending mechanism. Concept of force applied as displaced from the point of support. Bending moment and shear force. Behavior of homogeneous material in response of direct and bending forces. Theory of simple bending and principles of super-position, distribution of shear and bending stress. Beam as a structural element. Design of steel and timber beams. Concept of compound stresses as material response to a set of applied forces. Analysis and design of masonry structures subject to direct and bending forces.

TS-2a Concept of arch, vault and dome as direct stress members alimenter bending. Development of advanced arches that take direct forces and bending also. Design and drawings of simple trusses in steel and timber, riveted, welded and bolted joints.

Laboratory studies in truss design and model formation, and testing to failure.

TS-2b Concept of behaviour of heterogeneous materials in direct force and bending. Elastic Theory, Ultimate Load Theory. Design of RCC beams, columns, slabs. Introduction to pre-stressed concrete structures.

Laboratory testing of concrete samples and RCC beams.

TS-3a Concept of Structural in determinacy and its application in structural system development. Soil mechanics, soil bearing capacity. Design of continuous structures in steel and RCC. Foundation Engineering. Design of foundations in RCC, piles and rafts, retaining walls.

TS-3b Principal considerations for structural analysis. Methods of analysis. Complex and composite structures. Design of continuous beams in steel and RCC. Design of complex girders and box girders. Behaviour of structures under wind and seismic loads.

TS-4 Structure System Studies, Synthesis of force systems to create structure systems Vector active, surface-active and built-active systems. Shells and folded plates, Vierendeel Trusses, Space structures, High-rise and large-span structures. Pre-stressing and post-tensioning.

5. **BUILDING SCIENCE & SERVICES**

The objective of the course is to provide a wide exposure to environmental support systems as they apply to human habitat. The subjects covered shall be under two basic aspects of (i) climate and environmental control and (ii) water and waste management. These will be studied as areas of energy consumption, with special emphasis on alternative and appropriate methods of energy use and its conservation through innovative operational management.

The course will be supported by a theoretical background of environment, ecology and human settlements as studied in Theory of Settlements courses TP-2a and

TP-3B. Integration with the workshops in Building Construction will be sought at various stages.

- BS-1b Climatology and Thermal Control. Global climatic factors, thermal comfort, heat gain and loss, u-values for wall and roofs, solar geometry, shading devices, solar heating and cooling, passive systems.
- BS-2a Water and Waste Management. Water resources, collection, processing and distribution, internal hot and cold water supply. Domestic plumbing and sanitary fixtures. Waste and sewage disposal systems, storm water drainage. Sewage and effluent treatment, septic tanks, sewage systems for a small project. Solid waste treatment.
- BS-2b Energy Systems and Installations. Thermal, mechanical and electrical energy and its generation, properties and applications. Electrical distribution systems and safety devices, internal wiring, loads, demand, tariffs and rules. Electrical equipment and appliances, Solar-powered appliances, photo-voltaics, wind and wave energy. Fossil fuels, natural gas and bio-gas.
- BS-3a Lighting and Acoustics. Day lighting, Indian design sky and calculations based thereon, artificial lighting, illuminance and glare, lighting systems, design and choice of luminaires, architectural lighting and special effects. Basic acoustical concepts, sound insulation and transmission, absorption, reverberation time, noise control and attenuation.
- BS-3b Ventilation, Communications and Security Systems. Principles of air-cooling and air-conditioning, their implications on architectural form and details, systems and equipment. Lifts, escalators and conveyors, inter-communication, monitoring devices, fire protection and alarm system.
- BS-4 Integrated Energy Management. The energy crisis, renewable & non-renewable energy sources. Waste recycling, energy recovery techniques, integrated systems for non-potable water supply and sewage treatment, scavenging. Social forestry, fodder and the nitrogen chain, strategies and technological for a developmental needs, incremental extension of urban services and their management.

6. BUILDING MANAGEMENT

This course deals with the entire gamut of activities concerned with the implementation process subsequent to the preparation of the design and construction drawings. The sequence shall begin with the framing of work specifications and progressively lead to concepts of scheduling construction management and project planning.

- BM-1a Surveying and Leveling Tools and equipment for land surveying. Interpretation and preparation of contour maps. Exercises in layout of buildings and checking the same at site.
- BM-3a Specifications & Contracts. Methods of specification writing, typical space for building works, implications of variations and incomplete specifications, impact on building costs. Types of contracts, tenders, relative merits, general conditions and commercial terms. Studio exercises related to specifications for a small building project. Standard CPWD specifications, Scheduled and Non-scheduled items.
- BM-3b Quantities & Estimation. Types of areas, types of estimates, methods of taking out quantities, modes of measurement, preliminary and detailed estimates, plinth

area rates and cost indices, rates of labour and material, rate analysis, CPWD schedule of rates.

BM-4 Building Economics, Fundamental economic concepts and analysis, cost control, cash-flow analysis, cost projections, cost-benefit, financing, feasibility, Estate investments and returns, rentals, easement, valuation, law relating to properties and buildings.

BM-5a Introduction to Project Management. Project Planning, feasibility studies, project report, project financing, Project organisation, process and structure and personnel selection, responsibilities of the project manager. Project implementation, Site investigations, layout, site organisation, networking techniques, PERT/CPM, LOD, time-cost analysis, value engineering, Project monitoring, cost control, manpower management, safety and labour laws.

BM-5b Professional Practice. The Architects' Registration Act. The architect and his office. Relationship with clients, consultants and contractors. Legal responsibilities. Code of Professional Practice Fees, Agreements and Contracts, negotiations, arbitration and Architectural competitions. Building Codes and regulations. Building Permit. Presentations, business management, sales promotion, human relations and personnel management. Efficiency studies and performance appraisal, billing, accounting, correspondence, information storage and retrieval.

7. **HISTORY OF ARCHITECTURE**

The course is designed to arouse in the student a sense of curiosity and to sharpen his powers of observation. The importance of the timelessness of architecture shall be emphasized. Students shall undertake a chronological study of world architecture with emphasis on the Indian sub-continent and a comparison of the different stages of developments in India and other parts of the world. The architectural study is to be linked with the social developments of civilizations, geographical and geological factors, materials and structures etc. The course shall include sketching and understanding of historical buildings, historical analyses and measured drawings.

HA-2a Indus Valley civilization and the early Aryan architecture of the Ganges valley, Vedic planning principles. Study of the architecture of the Chinese, West Asian, Egyptian, Greek, Roman and Latin American civilization. Buddhist architecture in India and abroad.

HA-2b Early Hindu temple forms, regional nuances and growth of temple cathedrals. Hindu architecture outside India. Development of Christian architecture including Early Christian, Byzantine, Romanesque and Gothic. The development of Islamic architecture in the west.

HA-3a The advent of Islam into India, Architecture of early Islamic Delhi and the regional variations. Influences of Islamic ideas on secular and religious architecture in India. The Mughal period in India, Renaissance in Italy, the spread of renaissance and Baroque in Europe.

HA-3b Architecture of the Industrial Revolution in Europe and the Revival styles. Colonial architecture, Lutyens' New Delhi. Introduction to Modern architecture, Post-Introduction to Modern architecture, Post-Independence Indian architecture upto contemporary times.

8. **THEORY OF SETTLEMENT PLANNING**

The courses aims at familiarizing the student with the social, economic and organizational perspectives at the national, regional and local levels as a context in which his architectural product is likely to be placed. This will also provide the

necessary background for making informed choices for further studies in related specialized disciplines. Special reference to the problems of urbanization in India, and global environmental concerns.

- TP-2a Sociology. Man, Environment & Sociology. Rural society, village community, traditional patterns and trends of change. The concept of social stratification, urbanism, urbanization and modernization. Concept of social structure, cultural and social institutions. Distinctive nature of a sociological approach. Relationship between social structure and spatial structure.
- TP-3a Introduction to Settlements. Historical survey of the city as an architectural form, and as an expression of the vitality of a civilization. Comparative study of the origin and growth of settlements. River Valley Civilizations. Principles of settlement planning in ancient Greece, Rome and India. Medieval towns in Europe and India. Renaissance city planning. Colonial urbanization. Industrial revolution and planning theories of the nineteenth century.
- TP-3b Urban Planning. On-the-spot study of an existing settlement. Contemporary problems of settlements, Current theories on physical planning. New towns and cities. Environmental impact of planned and unplanned growth, regional linkages, indigenous life support systems in rural India. Natural eco-systems and interdependence of systems in the biosphere. Rural housing problems and policies.
- TP-4 Housing and Urban Development. Social-economic aspects of urban housing and problems of slums. Housing policy, finance and development. Modern city planning process, survey methods and programme analysis techniques. Master Plans. Site planning and the rationale of urban regulatory controls, densities and related concepts. Urban redevelopment and renewal urban traffic and transportation planning

Seminar on human settlements.

9. **ART APPRECIATION**

The course is considered as a medium for understanding architecture as one of the principal arts in the pantheons of human creativity. The flowering of aesthetic sensibilities and a taste for the visual and sensory appeal of physical form. The emphasis is to make students into connoisseurs of art rather than consummate artists themselves.

AA-2a History of Art. Art through the ages, architecture as art, milestones in art from the prehistoric, Paleolithic, Neolithic, classical, medieval, renaissance and modern periods. Indian art heritage, Indus valley to the present day.

AA-2b Art consciousness. Aesthetics, perception, symbolism, expression, style, fashion, appropriateness and values. Critical appraisal of examples from the visual as well as performing arts. Seminar Course.

The following courses are classified under the stream of enabling skills which shall help students in finding methods of learning, problem solving and expression of ideas, relevant to all subjects in the curriculum. They will introduce students to the full range of possibilities with simple exercises in their application. The students are expected practice extensively with a view to their own personal improvement till a satisfactory standard is achieved.

10. **MATHEMATICS**

XM-1 Differentiation, maxima and minima, integration, menstruation, centroids and moment of inertia, simple differential equations, Geometric mapping, cartography, matrix algebra, vector algebra.

11. **GRAPHICS**

XG-1a Basic Architectural Drawing. Freehand and mechanical drawing appropriate to architectural applications. Projections, symbols, lettering, conventions; values in drawn lines, tone, texture, colour and light, sciagraphy. indoor and outdoor sketching.

XG-1b Basic Design and Communication Graphics. Studies in composition, scale and proportion, rhythm, harmony and character, diagrams, ideograms, business graphics, skills and presentation techniques.

XG-2a Architectural Presentation Techniques. Three-dimensional views, cut-away views, architectural rendering and model making in different media, colour presentation, optics and kinetics, Life drawing, Art lettering.

XG-2b Advanced Business Presentation. Multi-media presentation, Reprographic techniques, print-making, architectural photography, Audio-visual projection, animated graphics. Business graphics appropriate for illustration of reports and as accompaniments for seminars.

12. **COMPUTER APPLICATIONS IN ARCHITECTURE**

XC-1a Introduction to computers as an analytical tool. Hardware and software. Computer languages, basic operations and applications such as word-processing and database management, simple computer programming.

XC-1b Computer programming for structural design, Project documentation and management. Computer Graphics, Computer-aided design and drawing.

The following courses are classified under optional subjects wherein the exact course content will vary depending on the students' choice, their interests and the interests of the School as an institution. It is possible that, consistent with the school's commitments from time to time, certain themes may be permitted and students encouraged to choose their subject matter, for study or research, accordingly.

13. ELECTIVES

Electives courses shall be offered on the basis of availability of expertise both within the faculty as well as from outside. The endeavour shall be to offer a wide variety for students to choose from commensurate with their abilities and interests.

14. PROJECT REPORT

PRX Project Report is intended to keep the students in touch with academic world while they are out of the School and doing field training in professional offices or construction sites. The students are expected to choose topics which are of special interest to them and prepare a report after research.

The topics shall be whetted by a Project Co-ordinator. The topics may be related to the work done during the training period and on certain occasions certain topics may be assigned by the school in as much they would form a part of a major research project which the school may be handling at that time. No individual guidance will be provided.

15. SEMINAR

SRX The Seminar shall be a research paper on a subject of theoretical nature on any aspect of architecture. This may or may not be related to the thesis topic. The overall supervision shall be by a Seminar Co-ordinator to be Appointed from within the faculty and the individual guidance shall be provided by experts in the subject, preferably from within the faculty but in exceptional cases, if found expedient in the opinion of the Co-ordinator, outside experts may be appointed.

The thrust of the seminar shall be on achieving a thorough understanding of the topic of study and on the ability to present it to an intelligent and critical guidance.

16. ARCHITECTURAL THESIS

ADT The Architectural Thesis is the culmination of the development of the student's knowledge, attitudes and skills over the course of studies in architecture. It is an occasion for exercising conscious choices in the field, based on the student's personal abilities and inclinations, and for testing out his commitment. The student, in consultation with the faculty, is expected to demonstrate through an imaginative approach, his expertise in effecting positive changes in our built environment.