PROPOSAL FOR A

5 YEAR UNDERGRADUATE PROGRAMME IN ARCHITECTURE

AT THE TVB SCHOOL OF HABITAT STUDIES

SECTOR D, POCKET II, VASANT KUNJ,

NEW DELHI 110037

Phones : 6433527
6436953

VIDHYA BHARTIYA
EDUCATIONAL SOCIETY, DELHI

C-29, Panchsheel Enclave, New Delhi-110017

Ref No.

Date : 10.7.90

The Chairman
The All India Council of Technical Education
Shastri Bhavan
New Delhi.

(Through proper channel)

Honourable Minister,

We are pleased to enclose our detailed proposal to establish a School of Habitat Studies, styled as the TVB School of Habitat Studies in New Delhi. This proposal has been made in full conformity with the norms prescribed by the All India Council of Technical Education and Council of Architecture.

The School will begin by imparting undergraduate education of 5 years duration in Architecture in conformity with the guidelines prescribed by the Council of Architecture and the AICTE. The Council of Architecture has accorded permission in principle for starting this course. Furthermore, the Human Settlements Management Institute of the Housing and Urban Development Corporation (HUDCO) has also agreed in principle to collaborate with the School.

We are planning to begin classes with effect from September 17, 1990 with an intake of 40 students to be selected on merit on an all-India basis.

Permission in principle may kindly be accorded for starting this course.

With good wishes,

Yours faithfully,

SURESH C JAIN
CHAIRMAN

1. Name and address of the School : TVB School of Habitat Studies
Sector-D, Pocket-II,
Vasant Kunj,
New Delhi - 110037.
Telephone - 6894898

2. Sponsor : Vidhya Bharti Educational Society, Delhi.
(Regd. Under Societies Act, XXI of 1860)
Regd. Office :-
C-29, Panchsheel Enclave
New Delhi - 110017
Telephone - 6433527
6436953

Chairman : Shri Suresh C Jain
President
Builders Federation of
Delhi (Regd.)
C-29, Panchsheel Enclave
New Delhi - 110017.

3. Academic Programme : To begin with a 5-year undergraduate course in Architecture, in conformity with the norms of the Council of Architecture. The detailed syllabus for the first 3 years of the course is appended.

4. Governance of the School : A. The School shall be governed by the Advisory Council comprising of the following:

1. Shri A P Kanvinde (Chairman)
Architect and Urban Designer
B-10, Maharani Bagh
New Delhi - 110065.

2. Shri S K Sharma (Member)
Chairman & Managing
Director
Housing & Urban Development
Corporation
HUDCO House
Lodhi Road
New Delhi - 110003.

3. Shri J R Bhalla (Member)
President
Council of Architecture
5, Sunder Nagar
New Delhi - 110003.

4. Shri Ravindra Bhan (Member)
Member Delhi Urban
Arts Commission
Landscape Architect
D-198, Defence Colony
New Delhi - 110024.

5. Shri Martand Singh (Member)
Secretary
Indian National Trust
for Art & Cultural Heritage
71, Lodhi Estate
New Delhi - 110003.

6. Dr K L Nadir (Member)
Professor, Department of
Humanities and Social
Sciences, IIT, Delhi
New Delhi - 110016.

7. Shri Suresh C Jain (Member)
Chairman
Vidhya Bharti Educational
Society
C-29, Panchsheel Enclave
New Delhi - 110017.

8. Prof. M N Ashish Ganju (Member-Secretary)
Director of the School
C-170, Defence Colony
New Delhi - 110024.

The above professionals have kindly agreed to be on the Advisory Council.
This Advisory Council will be assisted by a series of committies dealing with specialised aspects, including an Academic Council.
In addition the Council will co-opt specialist experts and expand the membership as required.

B. Academic governance

1. Director

Prof. M N Ashish Ganju,
AA Dip (London), F.I.I.A.

2. Dean of Studies

Prof. A G Krishna Menon,
B Arch (Kharagpur),
M S Arch (IIT Chicago),
M S Urban Planning (Columbia),
A.I.I.A., A.I.T.P.I.

C. In due course the School would be seeking affiliation with Delhi University. The School is collaborating with the Human Settlements Management Institute of HUDCO for pedagogic and logistic exchange. The School is also exploring the possibilities of collaboration with other leading Institutions in India and abroad for academic exchange and research.

5. History : Vidhya Bharti Educational Society, Delhi was registered in April 8, 1986, under Societies Act, XXI of 1860. The objectives of the Society as laid down in the Memorandum of Association pertain wholly to the promotion of education and research. For the last three years the Society has been running an unaided School for classes 1-8 for which the Essentiality Certificate has been issued by the Delhi Administration.

The Society is now branching into professional education in Architecture and related areas of Habitat Studies. The Chairman of the Society approached GREHA, a registered Society, engaged in research in housing and urban development as well as development of curricula, to help him to establish a professional course in a new school. The Society's Chairman has also professional interest in promoting education in habitat related areas since he has been in the construction business for many years and is the President of the Builders Federation of Delhi.

5. Need for the School : In focussing on the promotion of Habitat related areas of study the Society has been guided by the following assumptions:

1. There is an enormous shortfall in the supply of architects and related professionals at various levels, especially in the context of the Housing Policy of the Government of India.

2. At present the School of Planning and Architecture is the only Institute in Delhi which offers undergraduate education in Architecture. Nearly 4000 applicants seek admission for the 70 seats which are offered, inclusive of the reserved quotas. In effect only about 40 seats are left for open admission. Hence the shortfall of seats for undergraduate architectural education in Delhi is extremely large. This clearly points to the need for additional undergraduate courses in Architecture for Delhi.

3. There is urgent need to refashion professional education to suit the emerging and particular conditions of our society. There is also need to direct architectural education into new areas of research and innovative problem-solving.

This School is therefore being promoted to meet the challenges mentioned above, and thus contribute to the larger developmental efforts of the nation by apropriate education of skilled personnel.

7. Physical facilities :

A. Land and Building

The School is proposed to be situated at Sector D, Pocket II, Vasant Kunj, New Delhi - 110037, on a plot of about 0.9 Hectares. It contains two buildings, with a total floor area of 2700 square metres, of which 1200 square metres is immediately available for the new School. The existing assets of the Society earmarked for this School include the land, building, furniture, etc., as detailed in the financial projection appended. Additional building space required as per norms of AICTE shall be constructed in a phased manner to meet the demand.

B. Furniture, Equipment & Vehicles

The furniture required for the first year is already under fabrication. The equipment as required under the Council of Architecture norms is on order. There is a van belonging to the Society in use for the School. Further requirements for the subsequent years will be provided in a phased manner as detailed in the financial projection appended.

8. Financial Projection : In the enclosed appendix, the financial projection for the proposed School has been made on the basis of the guidelines of the Council of Architecture. It may be noted that of the total capital outlay of Rs. 219 lacs required, Rs. 115.5 lacs has already been invested. The Vidhya Bharti Educational Society, Delhi will meet all the shortfalls in the capital and recurring expenditure as per the financial projection. As an immediate measure, the Chairman of the Society has deposited a sum of Rs. 5 lacs for the School as an endowment which shall be increased in a phased manner to make the School financially viable.

Further, Shri Suresh C Jain, Chairman of the Society, has given his personal assurance to meet the financial obligations of the School.

9. Student Admission and course work evaluation : The student admissions shall be made strictly in accordance with the norms prescribed by the Council of Architecture in terms of eligibility qualification, admission tests and will be on an all-India basis.

The examination system shall conform to the guidelines of the Council of Architecture.

10. Faculty : The staff shall be recruited on an all-India basis by open selection as per qualification and experience laid down by the AICTE and the Council of Architecture. Pay scales and other allowances, retirement benefits etc., shall be as per approved norms.

11. Tution Fees : It is proposed to charge about Rs.10,000/- as fee, keeping in view the cost of Architectural education and this being an unaided Institution. Efforts to extend financial assistance to the needy admitted students will also be made.

12. Accounts : The accounts of the School shall be audited by a Chartered Accountant and shall be open for inspection by AICTE or its authorised representatives.

Suresh C Jain
Chairman
Vidhya Bhartiya Educational Society, Delhi.

Appendix 'A'

FINANCIAL PROJECTION for first FIVE YEARS

(figures in Rs. lacs)

		Years 1	2	3	4	5	Totals
A.	**Capital Costs**						
1.	Land and development	70.0*	-	-	-	-	70.0
2.	Buildings	18.0*	18.0*	18.0	18.0	18.0	90.0
3.	Furniture	3.0*	3.0	3.0	3.0	3.0	15.0
4.	Equipment	5.0*	7.5	7.5	10.0	5.0	35.0
5.	Vehicles	1.5*	2.0	3.0	2.5	-	9.0
		97.5	30.5	31.5	33.5	26.0	219.0

NOTE: *starred items are already provided/ordered (total = 115.5)

B.	**Recurring Costs**						
1.	Salaries of faculty and admn./ tech. staff	3.8 (6.0)	12.0	17.0	21.0	25.0	81.0
2.	Overheads (including elec., water, telephone bills, insurance, etc.), and consumables (including stationery, materials, etc.)	1.25 (0.5)	1.0	1.5	2.0	2.5	7.5
3.	Maintenance and Repairs (including bldgs., furniture, fixtures, etc.)	0.75 (0.5)	1.0	1.5	2.0	2.5	7.5
4.	Library	1.5	1.5	1.0	1.0	1.0	6.0
5.	Contingencies	0.5	1.0	1.5	2.0	2.5	7.5
		(9.0) 7.8	16.5	22.5	28.0	33.5	109.5

Appendix'B'

Academic Programme
for 5 year/10 Semester Undergraduate Course
in Architecture

Detailed Syllabus for first three years/6 Semesters

S.NO.	DISCIPLINE CODE	SUBJECTS	SEMESTERS					
			1	2	3	4	5	6
1.	A	DESIGN STUDIO	ORGANICALLY EVOLVED SETTLEMENTS		PLANNED SETTLEMENTS		SPONTANEOUS SETTLEMENTS	INDIVIDUAL PROJECT
2.	A/B	MATERIALS & CONSTRUCTION WORKSHOP	I		II		III	INDIVIDUAL PROJECT
3.	B	ENVIRONMENTAL ENGINEERING	I	-	II	-	III	-
4.	B	STRUCTURAL THEORY & DESIGN	-	INTRODUCTION TO STRUCTURES	THEORY OF STRUCTURES I	THEORY OF STRUCTURES II	STRUCTURAL DESIGN I	STRUCTURAL DESIGN II
5.	B	SOIL MECHANICS & FOUNDATION ENGINEERING	-	-	-	I	-	-
6.	C	SETTLEMENT PLANNING	EVOLUTION OF SETT. PLNG. I	EVOLUTION OF SETT. PLNG. II	PLANNING THEORY	PLANNING PRACTICE & CONTROLS	NON-FORMAL URBAN HOUSING	HOUSING POLICY & FINANCE
7.	E	SURVEY	I	II	III	-	-	-
8.	D	BUILDING MANAGEMENT	-	ESTIMATION	CONSTRUCTION SUPERVISION	CONSTRUCTION PLANNING & SCHEDULING	SUPERVISORY MANAGEMENT	PUBLIC PARTICIPATION IN DECISION MAKING
9.	A/E	THEORY OF DESIGN	-	-	HISTORY	PRINCIPLES OF DESIGN I	PRINCIPLES OF DESIGN II	-
10.	E	MATHEMATICS & APPLIED MECHANICS	MATHEMATICS	APPLIED MECHANICS	-	-	-	-
11.	E	DRAWING & COMMUNICATION	I	II	-	-	-	-
12.	E	COMPUTER APPLICATION	-	-	-	-	-	I

KEY TO DISCIPLINE CODE: (A) DESIGN & ARCHITECTURE; (B) BUILDING ENGINEERING; (C) SETTLEMENT PLANNING; (D) BUILDING MANAGEMENT; (E) BASIC SCIENCES & SKILLS

ACADEMIC PROGRAMME

SEMESTER 1 : Focus on Organically evolved Settlements

16 weeks 30 hrs/week

Subjects	Hours L	Hours T/S	Hours P	Credits
Design Studio	0	0	6	3
Materials & Construction Workshop	0	1	5	3
Environmental Engineering I	1	0	1	1.5
Evolution of Settlement Planning I	2	0	1	2.5
Mathematics	2	2	0	3
Drawing & Communication I	0	1	4	2.5
Survey - Land	0	1	3	2.5
Totals	5	5	20(30)	18.0+3

SEMESTER 2 : Focus on Organically evolved Settlements

16 weeks 30 hrs/week

Subjects	Hours L	Hours T/S	Hours P	Credits
Design Studio	0	0	7	3.5
Materials & Construction Workshop	0	1	5	3
Evolution of Settlement Planning II	2	1	0	2.5
Building Management : Estimation	1	1	0	1.5
Applied Mechanics	2	2	0	3
Drawing & Communication II	0	0	4	2
Survey - Rural Habitat	1	0	1	1.5
Introduction to Structures	1	1	0	1.5
Totals	7	6	17(30)	18.5 + 3.5

SEMESTER 3 : Planned Settlements

16 weeks 30 hrs/week

Subjects	Hours L	Hours T/S	Hours P	Credits
Design Studio	0	0 6	~~6~~	~~3~~ 6
Materials & Construction Workshop	0	0	4	2
Environmental Engineering II	2	0	2	3
Theory of Structures I	2	2	2	2
Settlement Planning : Planning Theory	2	0	0	2
Building Management : Construction Supervision	2	1	1	3
Theory of Design - History	1	1	0	1.5
Survey : Urban Habitat	1	0	1	1.5
Totals	10	4	16(30)	20.0 + 3

SEMESTER 4 : Focus on Planned Settlements

16 weeks 30 hrs/week

Subjects	Hours L	Hours T/S	Hours P	Credits
Design Studio	0	0 8	~~8~~	~~4~~ 8
Materials & Construction Workshop	0	0	6	3
Theory of Structure II	2	2	0	3
Soil Mechanics & Foundation Engineering	2	2	0	3
Settlement Planning : Planning Practice & Controls	2	0	0	2
Building Management : Construction Planning & Scheduling	2	0	2	3
Theory of Design - Principles of Design I	1	1	0	1.5
Totals	9	5	16(30)	19.5 + 4

SEMESTER 5 : Focus on Spontaneous Settlements

16 weeks 30 hrs/weeks

Subjects	Hours L	T/S	P	Credits
Design Studio	0	0 7	~~7~~	~~3.5~~ 7
Materials & Construction Workshop	0	0	5	2.5
Environmental Engineering III	2	0	1	2.5
Structural Design I	3	2	2	5
Settlement Planning : Non-formal Urban Housing	1	1	0	1.5
Building Management : Supervisory Management	2	2	0	3
Theory of Design - Principles of Design II	1	1	0	1.5
Totals	9	6	15(30)	19.5 + 3.5

SEMESTER 6 : Focus on Project

16 weeks 30 hrs/week

Subjects	Hours L	T	P	Credits
Design Studio - Project Materials & Construction Workshop	0	0 16	~~16~~	10 16
Structural Design II	3	2	0	4
Settlement Planning : Housing Policy & Finance	1	1	0	1.5
Building Management : Public Participation in Decision-Making	2	2	0	3
Computer Application	1	1	2	2
Totals	7	5	18(30)	20.5 + 6

COURSE OUTLINES

Design Studio

Objectives.

The design studio is the arena where theoretical and practical learning, in all the subjects forming part of this syllabus, is to be synthesised by means of exercises. Since the syllabus is focussed on the three mission contexts - organically evolved settlements, planned settlements, and spontaneous settlements - the design exercises would be grounded in the real problems drawn from the students' immediate environment. The design skills thus developed would have direct relevance to field situations affecting the majority.

Methodology.

1. Studio exercises to develop an understanding of
   'place' - as space for human habitation
   'occasion' - as rhythm of human activity
   'community' - as the collective expression of needs and aspirations of people

2. The mission contexts are seen as a progression of principles of habitation which emerge from an understanding of life support systems interlinking nature and the built environment.

Semester 1 and 2 focus on the mission context - organically evolved settlements. Exercises would deal with

a) rural homestead
b) village cluster - from hamlet to village
c) consolidation of habitation with increasing complexity of human activity.
d) development of an urban structure and ethos.

Semester 3 and 4 focus on the mission context - planned settlements. Exercises would deal with:

a) building design as a conscious expression of social order
b) types of buildings
c) systems of infrastructure
d) open spaces in neighbourhood design

Semester 5 focuses on the mission context - spontaneous settlements. Exercises would deal with -

1) adaptation processes of socially marginal groups
   a) with a rural base (squatter settlements)
   b) with urban aspirations (unauthorised colonies)

2) adaptative processes for buildings/neighbourhoods
   a) rehabilitation/upradation
   b) incrementality

Semester 6 is devoted to a project which is individually selected by each student based on one of the mission contexts.

Materials and Construction Workshop

Objectives.

This course seeks to combine basic technical knowledge of materials with the creative use of building skills and construction techniques. The focus is on the three mission contexts, starting with commonly used indigenous/natural materials and techniques, and progressing to processed/industrial materials used in the urban context.

Traditional materials and methods of construction as well as appropriate new technologies will be given emphasis. Modern materials and their uses would also be learnt selectively. Direct use and familiarisation will be ensured for each student through the Building Centre workshop activity.

Teaching Methodology.

The course is organised to explain general principles in the classroom (lecture) hours, familiarise students with live situations through the Building Centre Workshop activity, and to integrate the theoretical concepts from the classroom with practical experience from the workshop, through small group tutorials/studio exercises.

Theoretical concepts are covered under the following heads:-

1) Materials - building materials commonly used, their performance characteristics in terms of various tasks, testing procedures, standards and codes.

2) Components - the discipline of assembling different materials into building components; standards, codes, testing procedures for strength and safety.

3) Process - building construction as a process integrating skills, tools, materials and components.

Studio/Tutorial exercises to be organised around inventories of building materials, components and processes, prepared by students for each mission context according to semesters. Students to be sent to field situations, corresponding with the mission context, to record examples from the built environment, study availability of building materials, and understand the construction process.

A representative list is as follows:-

1) Materials - earth, bamboo, thatch, timber, stone, brick and clay products, lime and cements, concrete, metals, ceramics, glasses, bitumen, asphalts, asbestos cement products, fibre glass, plastics, composite materials from agricultural and industrial waste, paints and preservatives.

2) Components - foundations, plinths, floors, walls, roofs, stairs, door/windows, hardware, plumbing and electrical fixtures/fittings, roads and pathways, tanks, drains and service ducts.

3) Process - construction equipment, including tools for various trades and simple site machinery; sequence of building operations and coordination of various trades; building trades and market mechanisms; preparation of information for construction activity, including drawings, specifications and bills of quantities.

In Semester 1 and 2, inventories will be drawn from 3 examples of rural/semi urban locales representing different regional types, such as coastal areas, plains hilly regions.

In Semester 3 and 4, inventories will be drawn from examples of urban locales which represent regional variations in planned settlements.

In Semester 5, inventories will be drawn from local spontaneous settlements.

In Semester 6, the student will use the Building Centre workshop for experiments/exercises relevant to the individual project.

ENVIRONMENTAL ENGINEERING

Objectives.

This course is to provide an understanding and basic technical knowledge of life support systems for maintaining public health. The course content is focussed around each mission context, with an emphasis on appropriate and energy conserving techniques.

This course is reinforced by a broader theoretical base in ecology of human settlements covered under the course for Planning Theory in Semester 3.

Teaching Methodology.

The course is organised in three sets which integrate Environmental Engineering through the sub-heads of Climate, Water & Waste and Energy. The course runs for the first semester of each academic year. Each semester thre will be a practical component through the Building Centre Workshop where students will undergo training in constructional skills related to the delivery of public health services.

Environmental Engineering I

Climate	:	Global climatic factors, concepts of thermal comfort, passive strategies for appropriate climatic design, micro-climate control.
Water & Waste	:	Water cycles, natural & developed sources, quality and purity, health & water, traditional techniques of treatment & storage, methods of upgradation.
	:	Organic & non-organic waste, pollutants, appropriate methods for disposal or re-use of wastes.

Energy : Renewable and non-renewable energy sources, energy scarcity & eco-balance, social forestry, composting, biogas - design of system, stoves & chulhas, rural electricity : supply, measurement of need, motors & pumps.

Environmental Engineering II

Climate : Psychometric chart, calculated heat gain & loss, means of thermal control, solar geometry, sunshading, evaporative cooling-system design, principles of air-conditioning.

Micro climate and urban form.

Water & Waste : Decentralised and centralised systems of water delivery and sewerage disposal. System economics. Harvesting rain, bulk water treatment.

Urban waste: types of waste, hazards, disposal, re-use. Centralised & decentralised systems for waste disposal. Storm water systems and roads.

Plumbing fixtures and fittings for simple buildings.

Energy : Public utilities, electricity distribution system, electricity demand, tariffs & rules. Internal electrification of simple buildings - circuits, wiring, fixtures & fittings, safety.

External distribution lines, streetlighting - system design & integration with building form, external surface treatment.

Daylighting design, artificial illumination system, equipment and end-use efficiencies. Principles of solar heating, photovoltaics, wind energy : simple appliances

Environmental Engineering III

Case studies : Water consuming strategies & technologies for developmental needs. Integrated systems of energy & waste recycling.

Spontaneous settlements and urban waste, scavenging and recycling of scrap & goods. Systems of incremental extension of urban services - management, finance, operation.

Structural Theory and Design

Objectives.

The principal objectives of the structural syllabus are:

(1) it should equip the student with the skills to choose a structral system relevant to the building form, functional requirements and the materials and technologies available.

(2) the student should be able to estimate the preliminary sizes of all members.

(3) the student should be able to design and detail some very simple buildings without expert help.

Methodology.

New analysis and design methods (such as matrix methods, yeild line analysis, limit state design etc), particularly those amenable to computerisation, should be adapted.

More advanced concepts which are very rarely used, such as "influence lines", should be avoided.

The course extends over five semesters, starting with the introduction in the 2nd semester and ending with design excercises in the 6th semester.

Introduction to Structures (semester 2)

1. Concepts of strength, serviceability and durability in relation to the building use, life-span, materials and technologies at hand and the resources available.

2. Nature of loadings (dead, live, wind, ice, earthquake etc.), their effects on various type of structures and their statistical basis of derivation.

3. Concepts of safety factors for materials and loadings and their statistical basis.

4. Examples of structures which illustrate various structural concepts such as uniaxial tension and compression (cables, arches), bending (including cantilevers), shear, torsion, frames and trusses, skin structures (shells, domes and nets).

5. Inter-connection between the materials chosen, the building forms, structural principles adopted and the massing.

6. Properties of solid and hollow sections (area, moment of inertia, elastic modulus, radius of gyration) and their effects on the strength and stifness of a member.

Theory of Structures I (semester 3)

1. Tensile/compressive structures - cables, arches, columns.
2. Concepts of elasticity and plasticity.
3. Concepts of static and kinematic determinancy.
4. Forces in statically determinate, pin jointed plane and space frames by resolution of forces, method of sections, graphical methods.
5. Theory of plane section bending and derivation of shear, bending moments, slopes and deflections of beams (simple, encastree', cantilevers and proped cantilevers) using calculus and plastic hinges.
6. Continuous beams and portal frames using moment distribution and plastic methods.

7. Strain energy and virtual work of rigid and deformable systems.
8. Deflections of structures - virtual work method, moment area method, graphical methods.

Theory of Structures II (semester 4)

1. Bending and shear in two way slabs using elastic and yeild line methods.
2. Buckling in columns.
3. Force deflection method and generation of stiffness matrices for 1,2,3-dimensional structures, both determinate and indeterminate.
4. Forces and displacements by inversion of stiffness matrix, including effects of loads, tempreatures, prestrain and support movements.
5. Analysis of skin structures such as shells, domes and nets using surface stresses and strains, bubble analogy and empirical modelling.
6. Introduction to finite element theory (basics only) and its importance as a global, computer based method.
7. Approximate methods of analysis for axial forces, bending, shear and deflections in multi-span/multi-storey frames.
8. Introduction to prestressing and post tensioning.

Structural Design I (RCC) (semester 5)

1. Introduction to limit state design: loads, stresses, safety factors, compression, flexure, shear, torsion, bond, combined axial and bending.
2. Simplification of the structure in terms of sub frames and elements.
3. Design of rectangular, T and L beams.
4. Design of slabs : one way, two way, flat slab, ribbed slab.
5. Design of short and slender columns under axial forces and biaxial bending.
6. Design of bases.
7. Concrete mix design, cube testing, shuttering, admixtures.
8. Rules governing reinforcement detailing.
9. Deflections, crack control and durability.

Structural Design II (Steel, Timber, Brick) (semester 6)

1. Properties and stresses of steel (elastic and plastic).
2. Standard steel sections : rods, flats, L, T, Channels, Universal Beams and columns, box sections, tubes and castellated beams.
3. Design of ties, struts, beams, columns, trusses and bases.
4. Riveted, bolted and welded joints.
5. Fire and corrosion protection to steel.
6. Properties and stresses in timber.
7. Design of timber trusses, beams and columns.
8. Nailed, glued and bolted joints.
9. Fire, damp and termite proofing of timber.
10. Properties and stresses in brickwork.
11. Design of brick walls and piers under vertical and lateral loads.

Settlement Planning

Objectives.

The intent is to provide theoretical basis, together with a range of techniques, for solving problems inherent to the process of urbanisation, with special reference to Indian conditions. Urban agglomorations are grouped under three heads/mission contexts. The first two courses deal with organic evolution of settlements and the processes of planning for these. The third and fourth course deal with formal planning theory and techniques applicable to planned settlements. The fifth course deals with planning for spontaneous settlements which are peripheral to the formal planning process. The sixth course seeks to deal with policy issues at an elementary level.

Methodology.

Evolution of settlement planning (semester 1)

Significance of continuity in human settlements.
Historic determinants of human settlements in terms of migrations, socio-cultural beliefs, geographical location and climate, technology, political power.

Commanalities and contrasts in alternate settlement patterns based on time and location - ancient, medieval, and modern - and their cultural significance.

Evolution of settlement planning (semester 2)

Principles of settlement planning as evidenced in ancient texts in India.

City as a distinct spatial entity.
The theoretical constructs of Geddes, Ebenezer Howard, Mumford, Doxiadis and others.
Planning of settlements in the colonial era.
Existing towns and new developments - area of contrast and spatial friction.
Prospects of integration of old and new development.

Planning Theory (semester 3)

Aims and objectives of settlement planning.
Levels of planning in India and their inter relationships.
Various models of the planning process - choice theory/advocacy planning/action planning - their application in the Indian context.
Components of settlement and models of urban structure.
Land use planning : locational attributes - ecology, man-nature interface, human activity systems and choice of space qualities, urban land policy.

Movement network : Inter and intra settlement linkages with reference to efficiency of communication, environmental impact, and resources.

Models of urban and regional planning.
Ecological planning.

Planning Practice and Controls (semester 4)

Urban Development Plans - types, scope, and objectives.
Data base for development plans - survey research, analysis and presentation of physical and socio-economic data, administration of field surveys, use of aerial photography and remote sensing.
Introduction to traffic engineering, charactristics of urban and rural roads. Traffic charactristics in villages, towns, cities and highways.

Strategic choices for urban structuring.
Planning Controls - FAR, density, ground coverage, setbacks, parking standards, etc.
Building bye-laws - health and safety standards for human habitation.

Non-Formal Urban Housing (semester 5)

The informal sector : Definition and magnitude
Urbanisation trends and growth of informal sector
Role of informal sector in the development process
Non-formal housing and the informal sector of economy
Physical profile of squatter settlements
Various approaches towards squatter settlements:

- Environmental improvement schemes
- Resettlement schemes
- Sites and services approach

An appraisal of present practices and possible guidelines
The unauthorised settlements : Causes of origin and perpetuation
Social, economic and physical profiles
Possibilities of integration with city
Incorporation of informal sector in settlement planning through -
Housing policy
land policy

Housing Policy and Housing Finance (semester 6)

Introduction to real estate economics
Income distributon and housing finance
National Housing Policy - its rationale and implications

Shelter options in relation to financing schemes

HUDCO norms and patterns

Loan schemes of banks and other financial institutions

Employee loan schemes of Government and Corporations

National Housing Bank - the prospects

Building Management

Objectives.

This set of courses deals with the optimisation of productivity and quality in the built environment.

The courses are organised in sequence to start with estimation of building costs, followed by control of quality, programming of work, and management of workforce. The last course deals with the relationship between technical parameters and user satisfaction.

Methodology.

ESTIMATION (semester 2)

1. Scales in drawings and dimensioning.
2. Methods of calculation of surface area and volumes for building works.
3. Surveying data recording and interpretation thereof.
4. Criteria of measurement.
5. PWD accounting and procedure of works.
6. Preparation of Bill of Quantities.
7. Analysis of rates.
8. Specifications.
9. General conditions of contract, tendering.

CONSTRUCTION SUPERVISION (semester 3)

1. Mobilisation of building resources.
2. Responsibilities of designers, builders, and owners.
3. Specifications for contract items and Codal requirements.
4. Quality Control at various stages of construction, including checking of drawings/specifications, testing of meaterials, and awareness of building pathology.

5. Provision of essential items like water, electricity, and equipments.
6. Procurement, storage and inventory control of materials for construction.
7. Optimum utilisation of workforce, materials and equipment.
8. Costing and billing.
9. Safety measures and precautions, including health and hygiene.

CONSTRUCTION PLANNING AND SCHEDULING (semester 4)

1. Definition of tasks.
2. Break down of structure of activities, and their inter-relationships. Workshop training for optimisation of construction technologies.
3. Study of construction sequence for various works, including preparation of bar charts.
4. CPM/PERT scheduling:-
   - Critical path and mile stones
5. Resource schdduling and resource levelling.
6. Supply of critical items.
7. Constraints affecting construction schedule.

Supervisory Management (semester 5)

1. Concept of formal organisation.
2. Organisational structure - line, staff, department.
3. Inter-organisational relationships - Contractors and their agents suppliers

Professional practice

Other public organisations
Designers - architects, engineers, consultants

4. Duties and responsibilities of supervisors
5. Personnel management -
   detailing of manpower and job specifications
   skill qualifications and training
   recruitment and control
   labour relation : elements of labour laws
   management of health, safety, accidents
   reporting and action

6. Dealing with the workforce -

   • motivation and work, including intrisic and extrinsic rewards.
   • organisational communication.
   • management of conflict, including grievance redressal.
   • performance appraisal.

Public Participation in Decision-making (semester 6)

1. Definition of various publics in a development situation, including individuals, groups, organisations, and unorganised sector.
2. Communication of design decisions to the publics - demystification of technical information.
3. Analysis of public responses.
4. Negotiation and bargaining - definition of bargaining base.
5. Devising alternate solution sets, incorporating different configurations of physical survey data, social survey data, design criteria and public preferences.
6. Redefining the optimum

Theory of Design

Objectives.

This set of courses seeks to define the basic considerations which govern design decisions.

Methodology.

The courses are taken in the 3rd 4th and 5th semesters, starting with examples taken from history, followed by explication of the analytical processes leading to the generation of design solutions, including aesthetic appreciation.

Course I - History (semester 3)

History as an illustration of design principles expressed through significant cultural periods. The variety of influences, including materials, construction technologies, prevailing beliefs and values, which are sought to be resolved into built form. Distinction between unchanging (perennial) aspects of architectural expression and the dynamic aspects subject to periodic change.

Course II - Principles of Design 1 (semester 4)

Design as a rational and self-conscious excercise in defining form.

a) The utilitarian matrix of form
b) Generators of creativity - connectivity/dissociation, originality/imitation, intuition/rationality.

Course III - Principles of Design 2 (semester 5)

c) Resolution of diverse criteria to signify meaning
d) Modes and criteria of evaluation

MATHEMATICS AND APPLIED MECHANICS

Objectives.

This course is to provide the student with basic knowledge of application of elementary mathematical principles, leading to a basic understanding of force systems and equilibrium.

Methodology.

Students will be taught practical applications of principles through interactive tutorial clauses as a sequel to the theory classes.

MATHEMATICS (semester 1)

1. Limit and Continuity,
2. Differentiation, Integration.
3. Definite Integrals.
4. Differential Equations.
5. Matrix Algebra.
6. Transposition and inversion of matrices
7. Basics of vector Algebra.

APPLIED MECHANICS (semester 2)

1. Friction, Potential energy and virtual work.
2. Centre of Mass, moment of inertia.
3. Momentum, Bernoulli equations.
4. Analysis of stress and strain.
5. Equilibrium and resolution of forces at a joint.
6. Bending and shear of beams.
7. Torsion of shafts.
8. Standard deviation.

Drawing and Communication

Objectives.

This course is for skill training in

a) Visualisation and representation by means of graphic imagery
b) Idea articulation by means of written words
c) Understanding media, including 3 dimensional scale models, photography, audio-visual techniques

Methodology

The course is taken in semester 1 and 2.

Teaching would be organised as studio excercises in

a) principles of composition - point, line, plane, mass, space, colour, texture, scale, proportion, rhythm, harmony, character

b) drawing skills - freehand sketching
mechanical drawing, including plans, sections, elevations, 3-D projections, calligraphy and lettering, measured drawing of built examples

c) representation skills - diagrams, ideograms
scale models,
audio-visual projection

SURVEY

Objectives.

In order to define the conditions, both physical and socio-economic, within which building can effectively take place, the courses in surveying are organised around the two themes:

1. Land
2. Human activity in the context of
   a) rural habitat
   b) urban habitat

Methodology.

Survey 1 - Physical survey of Land (Semester 1)

In this semester students are to be equiped with the basic tools and techniques of physical survey of land - plane and geodetic survey. This will include :

theory of measurement and errors
linear distance and traverse computation
levelling and use of theodolite
Mapping of data and contouring
computation of area and earthwork quantities.

Statutory requirements of planning surveys, including Cadastral maps.

In the second and third semesters, students are to be trained to relate the physical dimensions/spatial order of the built environment with basic demographic and attitudinal variables.

Survey 2 - Rural Habitat (Semester 2)

Empahsis will be on :-

a) boundary records/revenue records
   landmarks/bench marks

b) sampling techniques
questionnare design
interview - types and methods
data collection and analysis

c) ethnographic survey

Survey 3 - Urban Habitat (Semester 3)

Emphasis will be on descriptive statistics, either published or generated by practical exercises.

A basic set of techniques to be employed would be :

measures of central tendency
dispersion
ratios, rates and relationships

This course will provide a background for the course on planning techniques which is taken in the 4th semester.

COMPUTER APPLICATION

Objectives.

This course is intended to familiarise students with the versatility of the computer.

Methodology.

The course begins with the appreciations of the equipment, and through a process of practice classes imparts the basic knowledge of preparing simple programmes.

1. Introduction to computer	- Hardware - Software
2. Languages	
3. Uses of computer	- Wordprocessor - Data handling - Graphics - Softwares for structural design, quantity surveying and project planning (CPM/PERT)
4. Applications	- Practical on 3
5. Programming	- Lectures and practicals on making programmes.