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
VIDHYA BHARTIYA
EDUCATIONAL SOCIETY, DELHI
C-28, 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 Bhartiya 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 Bhalja (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
committees 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),

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 appropriate 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 Bhartiya 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. Tuition 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.
### FINANCIAL PROJECTION for first FIVE YEARS

(figures in Rs. lacs)

<table>
<thead>
<tr>
<th>Years</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Capital Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Land and development</td>
<td>70.0*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>70.0</td>
</tr>
<tr>
<td>2. Buildings</td>
<td>18.0*</td>
<td>18.0*</td>
<td>18.0</td>
<td>18.0</td>
<td>18.0</td>
<td>90.0</td>
</tr>
<tr>
<td>3. Furniture</td>
<td>3.0*</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>15.0</td>
</tr>
<tr>
<td>4. Equipment</td>
<td>5.0*</td>
<td>7.5</td>
<td>7.5</td>
<td>10.0</td>
<td>5.0</td>
<td>35.0</td>
</tr>
<tr>
<td>5. Vehicles</td>
<td>1.5*</td>
<td>2.0</td>
<td>3.0</td>
<td>2.5</td>
<td>-</td>
<td>9.0</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>97.5</td>
<td>30.5</td>
<td>31.5</td>
<td>33.5</td>
<td>26.0</td>
<td>219.0</td>
</tr>
</tbody>
</table>

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

### B. Recurring Costs

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Salaries of faculty and admn./ tech. staff</td>
<td>3.8</td>
<td>6.0</td>
<td>12.0</td>
<td>17.0</td>
<td>21.0</td>
<td>25.0</td>
</tr>
<tr>
<td>2. Overheads (including electric, water, telephone bills, insurance, etc.), and consumables (including stationery, materials, etc.)</td>
<td>1.25</td>
<td>0.5</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>3. Maintenance and Repairs (including bldgs., furniture, fixtures, etc.)</td>
<td>8.75</td>
<td>0.5</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>4. Library</td>
<td>1.5</td>
<td>1.5</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>5. Contingencies</td>
<td>0.5</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>9.0</td>
<td>16.5</td>
<td>22.5</td>
<td>28.0</td>
<td>33.5</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 'B'

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

Detailed Syllabus for first three years/6 Semesters
<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>SEMESTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. A DESIGN STUDIO</td>
<td>ORGANICALLY EVOLVED SETTLEMENTS</td>
</tr>
<tr>
<td>2. A/B MATERIALS &amp; CONSTRUCTION WORKSHOP</td>
<td>I</td>
</tr>
<tr>
<td>3. B ENVIRONMENTAL ENGINEERING</td>
<td>I</td>
</tr>
<tr>
<td>4. D STRUCTURAL THEORY &amp; DESIGN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>THEORY OF STRUCTURES II</td>
</tr>
<tr>
<td>5. B SOIL MECHANICS &amp; FOUNDATION ENGINEERING</td>
<td></td>
</tr>
<tr>
<td>6. C SETTLEMENT PLANNING</td>
<td>EVOLUTION OF SETTLEMENTS I</td>
</tr>
<tr>
<td></td>
<td>EVOLUTION OF SETTLEMENTS II</td>
</tr>
<tr>
<td>7. E SURVEY</td>
<td>I</td>
</tr>
<tr>
<td>8. D BUILDING MANAGEMENT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONSTRUCTION SUPERVISION</td>
</tr>
<tr>
<td>9. A/E THEORY OF DESIGN</td>
<td></td>
</tr>
<tr>
<td>10. E MATHEMATICS &amp; APPLIED MECHANICS</td>
<td>MATHMATICS</td>
</tr>
<tr>
<td>11. E DRAWING &amp; COMMUNICATION</td>
<td>I</td>
</tr>
<tr>
<td>12. E COMPUTER APPLICATION</td>
<td></td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Subjects</th>
<th>L</th>
<th>T/6</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Studio</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>3.6</td>
</tr>
<tr>
<td>Materials &amp; Construction Workshop</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Environmental Engineering I</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Evolution of Settlement Planning I</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Mathematics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Drawing &amp; Communication I</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>Survey - Land</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>5</td>
<td>5</td>
<td>20(30)</td>
<td>16.0+3</td>
</tr>
</tbody>
</table>

**Semester 2**: Focus on Organically Evolved Settlements  
16 weeks, 30 hrs/week

<table>
<thead>
<tr>
<th>Subjects</th>
<th>L</th>
<th>T/6</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Studio</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>Materials &amp; Construction Workshop</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Evolution of Settlement Planning II</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2.5</td>
</tr>
<tr>
<td>Building Management : Estimation</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td>Applied Mechanics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Drawing &amp; Communication II</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Survey - Rural Habitat</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Introduction to Structures</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>7</td>
<td>6</td>
<td>17(30)</td>
<td>18.5+2.5</td>
</tr>
</tbody>
</table>
### SEMESTER 3: Planned Settlements

**16 weeks 30 hrs/week**

<table>
<thead>
<tr>
<th>Subjects</th>
<th>L</th>
<th>T/L</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Studio</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>3.6</td>
</tr>
<tr>
<td>Materials &amp; Construction Workshop</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Environmental Engineering II</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Theory of Structures I</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Settlement Planning: Planning Theory</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Building Management: Construction Supervision</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Theory of Design - History</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td>Survey: Urban Habitat</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>10</td>
<td>4</td>
<td>16(30)</td>
<td>20.0+3</td>
</tr>
</tbody>
</table>

### SEMESTER 4: Focus on Planned Settlements

**16 weeks 30 hrs/week**

<table>
<thead>
<tr>
<th>Subjects</th>
<th>L</th>
<th>T/L</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Studio</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>4.8</td>
</tr>
<tr>
<td>Materials &amp; Construction Workshop</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Theory of Structures II</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Soil Mechanics &amp; Foundation Engineering</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Settlement Planning: Planning Practice &amp; Controls</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Building Management: Construction Planning &amp; Scheduling</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Theory of Design - Principles of Design I</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>9</td>
<td>5</td>
<td>16(30)</td>
<td>19.5+4</td>
</tr>
</tbody>
</table>
### Semester 5: Focus on Spontaneous Settlements
16 weeks 30 hrs/week

<table>
<thead>
<tr>
<th>Subjects</th>
<th>L</th>
<th>T/S</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Studio</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>Materials &amp; Construction Workshop</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Environmental Engineering III</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Structural Design I</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Settlement Planning: Non-formal Urban Housing</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td>Building Management: Supervisory Management</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Theory of Design - Principles of Design II</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>9</td>
<td>6</td>
<td>15(30)</td>
<td>19.5</td>
</tr>
</tbody>
</table>

### Semester 6: Focus on Project
16 weeks 30 hrs/week

<table>
<thead>
<tr>
<th>Subjects</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Studio - Project</td>
<td>0</td>
<td>0</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Materials &amp; Construction Workshop</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural Design II</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Settlement Planning: Housing Policy &amp; Finance</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td>Building Management: Public Participation in Decision-Making</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Computer Application</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>7</td>
<td>5</td>
<td>16(30)</td>
<td>20.5</td>
</tr>
</tbody>
</table>
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.
Semanter 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

Semanter 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) adaptive processes for buildings/neighbourhoods
   a) rehabilitation/upgradation
   b) incrementality

Semanter 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 familiarization will be ensured for each student through the Building Centre workshop activity.

Teaching Methodology.

The course is organized 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 cement, 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, doors/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 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.
ENVIROMENTAL 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 there 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 grid, motors & pumps.

Environmental Engineering II

Climate

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

Micro climate and urban form.

Water & Waste

Decentralised and centralised systems of water delivery and sewage 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 systems, equipment and end-use efficiencies. Principles of solar heating, photo-voltaics, 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 structural 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, yield 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 exercises in the 6th semester.

Introduction to Structures (semester 4)

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 stiffness of a member.

Theory of Structures I (Semester 2)

1. Tensile/compressive structures – cables, arches, columns.
2. Concepts of elasticity and plasticity.
3. Concepts of static and kinematic determinacy.
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, encastré, cantilevers and propped 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 yield 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, temperatures, prestress 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 posttensioning and post tensioning.
Structural Design I (RC) (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.

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.

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

1. Properties and stresses of steel (elastic and plastic).
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.
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 agglomerations 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.

Commonalities 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 4)

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, characteristics of urban and rural roads. Traffic characteristics 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 distribution 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
Employer 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 1)

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. FWS accounting and procedure of works.
6. Preparation of Bill of Quantities.
7. Analysis of rates.
8. Specifications.

CONSTRUCTION SUPERVISION (semester 2)

1. Mobilisation of building resources.
2. Responsibilities of designers, builders, and owners.
3. Specifications for contract items and Codeal requirements.
4. Quality Control at various stages of construction, including checking of drawings/specifications, testing of materials, 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. Coating 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 techniques.
3. Study of construction sequence for various works, including preparation of bar charts.
4. CPK/PERT scheduling:
   - Critical path and milestone
5. Resource scheduling and resource levelling.
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
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 intrinsic 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.
5. Devising alternate solution sets, incorporating different
   configurations of physical survey data, social survey data, design
   criteria and public preference.
6. Redefining the optimum
Theory of Design

Objectives.
This art of course 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 exercise 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 classes as a sequel to the theory classes.

MATHEMATICS (semester 1)

1. Limit and Continuity,
2. Differentiation, Integration.
3. Definite Integrals.
5. Matrix Algebra.
6. Transposition and inversion of matrices

APPLIED MECHANICS (semester 2)

1. Friction, Potential energy and virtual work.
2. Centre of Mass, moment of inertia.
3. Momentum, Bernoulli equations.
5. Equilibrium and resolution of forces at a joint.
7. Torsion of shafts.
Drawing and Communication

Objectives.

This course is for skill training in
a) Visualization 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 organized as studio exercises 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, isograms
   - 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 equipped 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)

Emphasis will be on:

a) boundary records/revenue records
   landmarks/bench marks
b) sampling techniques
   questionnaire 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
   - Word processor
   - Data handling
   - Graphics
   - Software for structural design, quantity surveying and project planning (CPM/PERT)

4. Applications
   - Practical on 3

5. Programming
   - Lectures and practicals on making programmes.