



# **HINDUSTAN UNIVERSITY**

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE

(Estd. u/s 3 of the UGC Act, 1956)

Padur, Kancheepuram District - 603 103.

## **SCHOOL OF ARCHITECTURE DEGREE FOR BACHELOR OF ARCHITECTURE**

### **CURRICULUM & SYLLABUS 2013-14**

### **B.Arch. ARCHITECTURE**



## ACADEMIC REGULATIONS (B. Arch)

(Effective 2013-14)

### 1. Vision, Mission and Objectives

#### 1.1 The Vision of the Institute is "To make every man a success and no man a failure".

In order to progress towards the vision, the Institute has identified itself with a mission to provide every individual with a conducive environment suitable to achieve his / her career goals, with a strong emphasis on personality development, and to offer quality education in all spheres of engineering, technology, applied sciences and management, without compromising on the quality and code of ethics.

#### 1.2 Further, we always strive

- To train our students with the latest and the best in the rapidly changing fields of Engineering, Technology, Management, Science & Humanities.
- To develop the students with a global outlook possessing, state of the art skills, capable of taking up challenging responsibilities in the respective fields.
- To mould our students as citizens with moral, ethical and social values so as to fulfill their obligations to the nation and the society.
- To promote research in the field of Science, Humanities, Engineering, Technology and allied branches.

#### 1.3 Our aims and objectives are focused on

- Providing world class education in engineering, technology applied science and management
- Keeping pace with the ever changing technological scenario to help our

students to gain proper direction to emerge as competent professionals fully aware of their commitment to the society and nation.

- To inculcate a flair for research, development and entrepreneurship.

### 2. Admission

2.1. The admission policy and procedure shall be decided from time to time by the Board of Management (BOM) of the Institute, following guidelines issued by the Council of Architecture (COA). The number of seats in B. Arch programme will be decided by BOM as per the directives from COA and taking into account the market demands. Some seats for Non Resident Indians and a few seats for foreign nationals shall be made available.

2.2. Candidates for admission to the B.Arch. Degree Programme shall be required to have passed the Higher Secondary Examination of (10+2) curriculum with Mathematics as subject of study with an aggregate of not less than 50% in (10+2) level or have passed a 3 year diploma (10+3) recognized by the Central / State Government with Mathematics as a subject of study with an aggregate of not less than 50% or any other examination of any University or Authority accepted by this university as equivalent thereto.

2.3 In addition to the qualifying examinations the candidate might have passed, he / she shall also write a National Aptitude Test in Architecture (NATA) and secure minimum qualifying marks as prescribed by the Council of Architecture from time to time.

2.4. The selected candidates will be admitted to the B. Arch. programme after he/she fulfills all the admission requirements set by the Institute and after payment of the prescribed fees.

2.5. In all matters relating to admission to the B. Arch. programme, the decision of the Institute and its interpretation given by the Chancellor of the Institute shall be final.

2.6. If at any time after admission, it is found that a candidate has not fulfilled any of the requirements stipulated by the Institute, the Institute may revoke the admission of the candidate with information to the Academic Council.

### 3. Structure of the programme

3.1. The programme will have a curriculum comprising of theory, theory cum studio and studio based courses. The courses will cover:

- (a) Humanities and Social Science subjects.
- (b) Engineering subjects like Design of structures, Building Services etc,
- (c) Relevant professional courses like Architectural Design, Human Settlement Planning etc.

There shall be a certain number of core courses and sufficient number of elective courses that can be opted by the student. The curriculum is designed to equip the students not only to respond appropriately to the core area of built environment but also to the challenges thrown open to meet the concerns of the 21st century.

Curriculum structure of each semester shall have a blend of theory courses and studio based courses. The total number of courses per semester shall not exceed 7.

3.2. The duration of the programme will be a minimum of 10 semesters, but in any case not more than 16 semesters excluding the semesters withdrawn on medical grounds. B. Arch programme will have a curriculum and syllabi for the courses approved by the Academic Council.

3.3. The academic programmes of the Institute follow the credit system. The general pattern is:

- One credit for each lecture / tutorial hour per week per semester;
- One credit for 2 hours of laboratory / studio or practical or project work per week / semester.
- For Practical Training and Thesis design credit will be as shown in the detailed curriculum.

3.4. For the award of degree, a student has to earn certain minimum total number of credits specified in the curriculum. The curriculum of the B. Arch programme shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits of 215 - 225.

### 3.5. In addition, every student shall successfully complete the following:-

- a) A practical training for a period of two semesters to expose students to architectural profession.
- b) A thesis work.
- c) A minimum of one compulsory educational tour apart from site / field visits.

3.6. The medium of instruction, examination and the language of project reports will be English.

#### 4. Faculty Advisor

4.1 To help the students in planning their courses of study and for getting general advice on the academic programme, the concerned Department will assign a certain number of students to a Faculty member who will be called their Faculty Advisor.

#### 5. Class Committee

5.1 A Class Committee consisting of the following will be constituted by the Head of the Department for each class at the beginning of the semester.

- (i) A Chairman, who is not teaching the class.
- (ii) All subject teachers of the class.
- (iii) Two students nominated by the department in consultation with the class.

The Class Committee will meet as often as necessary, but not less than three times during the semester.

##### The functions of the Class Committee will include :

- (i) Addressing problems experienced by students in the classroom and the laboratories.
- (ii) Analyzing the performance of the students of the class after each test and finding ways and means of addressing problems, if any.
- (iii) During the meetings, the student members shall express the opinions and suggestions of the class students to improve the teaching/learning process.

#### 6. Grading

6.1 A grading system as shown below will be adhered to.

Range of Marks	Letter Grade	Grade points
95 - 100	S	10
85 - 94	A	09
75 - 84	B	08
65 - 74	C	07
55 - 64	D	06
50 - 54	E	05
< 50	U	00
	I (Incomplete)	—

#### 6.2 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits  $C_i$  of course "i" and the grade points  $P_i$  earned for that course taken over all courses "i" registered by the student to the sum of  $C_i$  for all "i". That is,

$$GPA = \frac{\sum_i C_i P_i}{\sum_i C_i}$$

CGPA will be calculated in a similar manner, at any semester, considering all the courses enrolled from first semester onwards.

6.3 For the students with letter grade I in certain subjects, the same will not be included in the computation of GPA and CGPA until after those grades are converted to the regular grades.

6.4 Raw marks will be moderated by a moderation board appointed by the Vice Chancellor of the University. The final marks will be graded using absolute grading system.

## **7. Registration and Enrollment**

- 7.1** Except for the first semester, registration and enrollment will be done in the beginning of the semester as per the schedule announced by the University.
- 7.2** A student will be eligible for enrollment only if his/her programme of study has not exceeded the maximum duration of the programme as specified in the regulation 3.2 and will be permitted to enroll only if (i) he/she has cleared all dues in the Institute, Hostel & Library up to the end of the previous semester and (ii) he/she is not debarred from enrollment by a disciplinary action of the University.
- 7.3.** Students are required to submit registration form duly filled in.

## **8. Registration requirement**

- 8.1** A full time student shall not register for less than 18 credits or more than 24 credits in any given semester. This requirement includes a compulsory registration of the following in the respective semesters as applicable.
- (a) Architectural Design / Architectural Drawing / Practical Training and Thesis.
  - (b) Mechanics of structure / Design of structure / Disaster Resistant Structures.
  - (c) Materials and Construction.
  - (d) History of Architecture.
  - (e) Professional Practice.
- 8.2** If a student finds his/her load heavy in any semester, or for any other valid reason, he/she may withdraw courses within three weeks of the commencement of the semester with the written approval of his/her Faculty Advisor, HOD and the Director (Academic). However the student should ensure that the total number of credits registered for, in any semester, should

enable him/her to earn the minimum number of credits per semester for the completed semesters.

## **9. Minimum requirement to continue the programme**

- 9.1** For those students who have not earned the minimum required credit prescribed for that particular semester examination, a warning letter to the concerned student and also to his parents regarding the shortage of his credit will be sent by the HOD after the announcement of the results of the university examinations.

## **10. Temporary discontinuation**

- 10.1.** A student may be permitted by the Director(Academic) to discontinue temporarily from the programme for a semester or a longer period for reasons of ill health or other valid reasons. Normally a student will be permitted to discontinue from the programme only for a maximum duration of two semesters.

## **11. Discipline**

- 11.1.** Every student is required to observe discipline and decorum both inside and outside the campus and not to indulge in any activity, which will tend to bring down the prestige of the University.
- 11.2.** Any act of indiscipline of a student reported to the Director (Academic) will be referred to a Discipline Committee so constituted. The Committee will enquire into the charges and decide on a suitable punishment, if the charges are substantiated. The committee will also authorize the Director(Academic) to recommend the implementation of the decision to the Vice-Chancellor. The student may appeal to the Chairman, Academic Council whose decision will be final. The Director(Academic) will report the action taken at the next meeting of the Academic Council.

## 12. Attendance

- 12.1.** A student whose attendance is less than 75% in a semester is not eligible to appear for the end-semester examination. The details of all students who have attendance less than 75% will be announced by the teacher in the class. These details will be sent to the concerned HODs and Director (Academic).
- 12.2.** Those who have less than 75% attendance will be considered for condonation of shortage of attendance. However, a condonation of 10% in attendance will be given on medical reasons. Application for condonation recommended by the Faculty Advisor, concerned faculty member and the HOD is to be submitted to the Director (Academic) who, depending on the merits of the case, may permit the student to appear for the end semester examination. A student will be eligible for this concession at most in two semesters during the entire degree programme. Application for medical leave, supported by medical certificate with endorsement by a Registered Medical Officer, should reach the HOD within seven days after returning from leave or, on or before the last instructional day of the semester, whichever is earlier.
- 12.3** As an incentive to those students who are involved in extra curricular activities such as representing the University in Sports and Games, Cultural Festivals, and Technical Festivals, NCC/ NSS events, a relaxation of up to 10% attendance will be given subject to the condition that these students take prior approval from the officer-in-charge. All such applications should be recommended by the concerned HOD and forwarded to Director(Academic)

within seven instructional days after the programme/activity.

## 13. Assessment Procedure

- 13.1** The Academic Council will decide from time to time the system of tests and examinations in each subject in each semester.
- 13.2** For each theory course, the assessment will be done on a continuous basis as follows:

Test / Exam	Weightage	Duration of Test / Exam
First Periodical Test *	10%	2 Periods
Second Periodical Test *	10%	2 Periods
Model Exam	20%	3 Hours
Seminar/ Assignments/Quiz	10%	-
Attendance	10%	
End - semester examination	50%	3 Hours

\*Best out of the two tests will be considered.

- 13.3** For theory cum studio based courses, sessional assessment, with a weightage of 50%, will be carried out through a minimum of six evaluations out of which at least two should be in the form of a test. The weightage for the individual evaluation shall be recommended by the class committee and announced by the HOD. The end semester examination will carry a weightage of 50%.
- 13.4** For studio based courses - Architectural Design, the evaluation will be carried out through sessional assessment, with a weightage of 50%, based on the class records of the candidate and through a viva-voce examination at the end of the semester, based on the portfolio of class records of the candidate. The viva-voce

will be conducted by a panel consisting of an sessional examiner and an external examiner appointed by the University, and weightage for viva-voce is 50%.

### **13.5 Practical Training**

The evaluation will be carried out through sessional assessment carrying a weightage of 50% based on the monthly progress reports and through a viva-voce examination conducted at the end of 2 semesters with a weightage of 50%. The viva-voce will be conducted by a panel consisting of a sessional examiner and an external examiner appointed by the University.

### **13.6 Thesis**

Every candidate shall submit a thesis on a topic approved by a committee constituted by the Head of the department. A thesis review committee will also be constituted by the Head of the Department, which shall comprise of the supervisor of thesis, sessional members, and two or more external architects. The thesis shall be evaluated by the review committee through continuous sessional assessment, carrying a weightage of 50%, with a minimum of 4 reviews and through a viva-voce examination at the end of the semester which carries a weightage of 50%. The viva-voce will be through a panel consisting of the Head of the Department and two external examiners appointed by the University.

**13.7** For courses on Physical Education, NSS, etc the assessment will be satisfactory/ not satisfactory only.

### **14. Make up Examination/Periodical Test**

**14.1.** Students who miss the end-semester examinations / Model examination for valid reasons are eligible for make-up examination /Model examination. Those

who miss the end-semester examination / Model examination should apply to the Head of the Department concerned within five days after he / she missed examination, giving reasons for absence.

**14.2.** Permission to appear for make-up examination / model examination will be given under exceptional circumstances such as admission to a hospital due to illness. Students should produce a medical certificate issued by a Registered Medical Practitioner certifying that he/she was admitted to hospital during the period of examination / model exam and the same should be duly endorsed by parent / guardian and also by a medical officer of the University within 5 days.

### **15. Declaration of results**

**15.1.(i)** For theory and theory cum studio based course a candidate who secures not less than 50% of total marks prescribed for the course with a minimum of 50% of the marks prescribed for the end semester examination shall be declared to have passed the course and earned the specified credits for the course.

(ii) To be eligible to appear for the end semester examinations for a particular course, a candidate will have to secure a minimum of 40% marks in the sessional for that course.

(iii) Candidates are required to obtain all credits assigned to the first two semesters of the programme within the first four semesters of the programme. Candidates failing to satisfy this requirement will not be allowed to proceed to the fifth semester until the condition is satisfied. Further, candidates will not be allowed to proceed to seventh semester if they have not cleared all the courses assigned during third & fourth semesters.



- 15.2** For Architectural Design studio courses, a candidate who secures not less than 50% of the marks prescribed for a course with a minimum of 50% of the marks prescribed for sessional assessment and a minimum of 50% of the marks prescribed for the end-semester examination shall be declared to have passed the course and earned the specified credits for the course.
- 15.3** For Architectural Design, practical training and thesis courses, candidates failing to secure minimum passing marks of 50% in the sessional assessment will not be allowed to appear for viva-voce examination in the respective subject at the end of the semester.
- 15.4** For the thesis, a candidate who fails to secure minimum passing marks of 50% in sessional assessment, will not be allowed to appear for viva - voce examination at the end of the semester. However, he/she will have an option to redo the sessional on the same topic or may choose a new topic when offered next.
- 15.5** A candidate who has secured minimum pass marks (50%) in sessional assessment in thesis but has failed in end semester viva voce examination may improve and resubmit the thesis for viva voce examination only during next semester university examination. The sessional assessment marks secured earlier will remain valid. However he/she will have an option to choose a new topic altogether for thesis, wherein he/she will have to appear for sessional assessment again, secure minimum passing marks of 50% and appear for viva-voce examination at the end of the semester.
- 15.6** After the valuation of the answer scripts, the tabulated results are to be scrutinized by the Result Passing Boards of UG programmes constituted by the Vice-Chancellor. The recommendations of the Result Passing Boards will be placed before the Standing Sub Committee of the Academic Council constituted by the Chancellor for scrutiny. The minutes of the Standing Sub Committee along with the results are to be placed before the Vice-Chancellor for approval. After getting the approval of the Vice-Chancellor, the results will be published by the Controller of Examination/Registrar.
- 15.7** If a candidate fails to secure a pass in a course due to not satisfying the minimum requirement in the end semester examination, he/she shall register and re-appear for the end semester examination during the following semester. However, the sessional marks secured by the candidate will be retained for all such attempts.
- 15.8** If a candidate fails to secure a pass in a course due to insufficient sessional marks though meeting the minimum requirements of the end semester examination, wishes to improve on his/her sessional marks, he/she will have to register for the particular course and attend the course with permission of the HOD concerned and Director (Academic) with a copy marked to the Registrar. The sessional and external marks obtained by the candidate in this case will replace the earlier result.
- 15.9** After twelve semesters, the sessional marks of the candidate will not be considered for a pass in a course. A candidate who secures 50% in the end semester examination shall be declared to have passed the course and earned the specified credits for the course.
- 16 Revaluation**  
A candidate can apply for the revaluation of his/her end semester examination

answer paper in a theory course within 2 weeks from the declaration of the results, on payment of a prescribed fee through proper application to the Registrar/ Controller of Examinations through the Head of the Department. The Registrar/ Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for project work.

### 17. **Grade Card**

**17.1** After results are declared, grade card will be issued to each student which will contain the following details.

- (i) Program and branch for which the student has enrolled.
- (ii) Semester of registration.
- (iii) List of courses registered during the semester and the grade scored.
- (iv) Semester Grade Point Average (GPA).
- (v) Cumulative Grade Point Average (CGPA).

### 18. **Class/Division**

**18.1** Classification is based on CGPA and is as follows:

CGPA  $\geq$  8.0: **First Class with distinction**

6.5  $\leq$  CGPA < 8.0: **First Class**

5.0  $\leq$  CGPA < 6.5: **Second Class.**

**18.2** (i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance within the minimum duration of the programme.

(ii) The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree having

passed the examination in all the courses **within 12 semesters.**

(iii) The period of authorized discontinuation of the programme (vide clause 10.1) will not be counted for the purpose of the above classification.

### 19. **Transfer of credits**

**19.1.** Within the broad framework of these regulations, the Academic Council, based on the recommendation of the transfer of credits committee so consulted by the Chancellor may permit students to earn part of the credit requirement in other approved institutions of repute and status in the country or abroad.

**19.2** The Academic Council may also approve admission of lateral entry (who hold a diploma in Engineering/ technology) candidates with advance credit based on the recommendation of the transfer of credits committee on a case to case basis.

### 20. **Eligibility for the award of B.Arch Degree.**

**20.1** A student shall be declared to be eligible for the award of the B.Arch Degree provided the student has

- (a) Successfully completed the course requirements within the prescribed maximum duration.
- (b) Attend at least one educational tour.
- (c) No disciplinary action is pending against him / her.
- (d) The award of degree must have been approved by the Board of Management of the University.

### 21. **Power to modify**

**21.1** Notwithstanding all that has been stated above, the Academic Council has the right to modify any of the above regulations from time to time subject to approval by the Board of management.

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**SEMESTER I**

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
<b>THEORY</b>							
01.	MA1111	Mathematics	3	0	0	3	3
02.	AR1101	Art Appreciation	2	0	0	2	2
03.	AR1102	History of Architecture I	2	0	0	2	2
<b>Theory Cum Studio</b>							
04.	AR1103	Materials & Construction I	2	0	3	3	5
05.	AR1104	Computer Studio I	1	0	4	3	5
06.	AR1105	Architectural Drawing I	2	0	4	4	6
<b>Studio</b>							
07.	AR1106	Architectural Design I	0	0	10	5	10
		<b>TOTAL</b>	<b>12</b>	<b>0</b>	<b>21</b>	<b>22</b>	<b>33</b>

**SEMESTER II**

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
<b>THEORY</b>							
01.	CE1104	Mechanics of Structures - I	3	0	0	3	3
02.	AR1111	Theory of Architecture -I	2	0	0	2	2
03.	AR1112	History of Architecture -II	2	0	0	2	2
<b>Theory Cum Studio</b>							
04.	AR1113	Materials & Construction - II	2	0	3	3	5
05.	AR1117	Computer Studio II	1	0	4	3	5
06.	AR1115	Architectural Drawing II	1	0	5	3	6
<b>Studio</b>							
07.	AR1116	Architectural Design II	0	0	12	6	12
		<b>TOTAL</b>	<b>11</b>	<b>0</b>	<b>24</b>	<b>22</b>	<b>35</b>

**SEMESTER III**

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
<b>THEORY</b>							
01.	CE1213	Mechanics of Structures - II	3	0	0	3	3
02.	CE1214	Building Services I	3	0	0	3	3
03.	CE1215	Surveying, levelling & Site Planning	2	0	3	3	5
04.	AR1201	Theory of Architecture - II	2	0	0	2	2
05.	AR1202	History of Architecture - III	2	0	0	2	2
<b>Theory Cum Studio</b>							
06.	AR1203	Materials & Construction - III	2	0	4	4	6
<b>Studio</b>							
07.	AR1204	Architectural Design III	0	0	14	7	14
		<b>TOTAL</b>	<b>14</b>	<b>0</b>	<b>21</b>	<b>24</b>	<b>35</b>

**SEMESTER IV**

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
<b>THEORY</b>							
01.	CE1217	Design of Structures I	3	0	0	3	3
02.	AR1211	History of Architecture - IV	2	0	0	2	2
03.	CY1203	Environmental Science and Engineering.	2	0	0	2	2
04.	AR1217	Advanced Computer Graphics.	3	0	0	3	3
05.	AR1218	Climate and Built Environment	3	0	0	3	3
<b>Theory Cum Studio</b>							
06	AR1215	Materials & Construction - IV	2	0	4	4	6
<b>Studio</b>							
07.	AR1216	Architectural Design - IV	0	0	14	7	14
		<b>TOTAL</b>	<b>15</b>	<b>0</b>	<b>18</b>	<b>24</b>	<b>33</b>

### SEMESTER V

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
<b>THEORY</b>							
01.	CE1313	Design of Structures - II	3	0	0	3	3
02.	CE1314	Estimation and specification	3	0	0	3	3
03.	AR1306	Building Services II	3	0	0	3	3
04.	AR1511	Sustainable Architecture	3	0	0	3	3
05.	AR1305	Contemporary Architecture	3	0	0	3	3
06.	E 1	Elective I	2	0	0	2	2
<b>Theory Cum Studio</b>							
07.	AR1303	Materials & Construction - V	2	0	4	4	6
<b>Studio</b>							
08.	AR1304	Architectural Design V	0	0	14	7	14
		<b>TOTAL</b>	<b>19</b>	<b>0</b>	<b>18</b>	<b>28</b>	<b>37</b>

### SEMESTER VI

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
<b>THEORY</b>							
01.	CE1315	Design of Structures - III	3	0	0	3	3
02.	AR1316	Human Settlement Planning	3	0	0	3	3
03.	AR1314	Building Services - III	3	0	0	3	3
04.	AR1315	Professional Practice & Ethics - I	2	0	0	2	2
05.	E 2	Elective II	2	0	0	2	2
06.	E 3	Elective III	2	0	0	2	2
<b>Theory Cum Studio</b>							
07.	AR1312	Materials & Construction - VI	2	0	4	4	6
<b>Studio</b>							
08.	AR1313	Architectural Design - VI	0	0	14	7	14
		<b>TOTAL</b>	<b>17</b>	<b>0</b>	<b>18</b>	<b>26</b>	<b>35</b>

**SEMESTER VII**

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
<b>THEORY</b>							
01.	AR1507	Urban Design and Renewal	3	0	0	3	3
02.	AR1501	Landscape and Ecology	3	0	0	3	3
03.	AR1503	Urban Economics and Sociology	2	0	0	2	2
04.	AR1505	Professional Practice & Ethics - II	3	0	0	3	3
05.	E4	Elective-IV	3	0	0	3	3
<b>Studio</b>							
06.	AR1504	Architectural Design - VII	0	0	16	8	16
07.	AR1506	Dissertation	0	0	4	2	4
		<b>TOTAL</b>	<b>14</b>	<b>0</b>	<b>20</b>	<b>24</b>	<b>34</b>

**SEMESTER VIII & IX**

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
<b>THEORY</b>							
01.	AR1507	Practical Training	0	0	48**	24	48**
		<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>48**</b>	<b>24</b>	<b>48**</b>

**SEMESTER X**

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
<b>THEORY</b>							
01.	E5	Elective - V	3	0	0	3	3
02.	E6	Elective - VI	3	0	0	3	3
<b>Studio</b>							
03.	AR1512	Thesis	0	0	32**	16	32**
		<b>TOTAL</b>	<b>6</b>	<b>0</b>	<b>32**</b>	<b>22</b>	<b>38**</b>

**TOTAL NUMBER OF CREDITS: 216**

Note:

- o 2 hours of Studio in Architectural Design / Materials and Construction / Architectural Drawing / Computer Studio = 1 Credit
- o 1 hour of Lecture (L) / Tutorial (T) = 1 Credit
- o P = Studios / Lab / Practical / Practical Training
- o TCH = Total contact hours.

\*\* Undeterminable number of Hours, it may be about 30 hrs duration / week.

## ELECTIVES

Elective No.	Semester	Code No.	Subject Name	L	T	P	C	TCH
I	V SEM	AR1353	Theory of Interior Design	2	0	0	2	2
		AR1214	Energy Efficient Architecture	2	0	0	2	2
		AR1354	Construction Equipment and Methods	2	0	0	2	2
II	VI SEM	AR1359	Visual Communication and Architecture	2	0	0	2	2
		AR1360	Landscape Construction	2	0	0	2	2
		CE1487	Building Maintenance and Retro techniques	2	0	0	2	2
III	VI SEM	AR1361	Building Interior materials and construction	2	0	0	2	2
		AR1362	Urban Ecology	2	0	0	2	2
		AR1363	Construction Quality and Cost Control	2	0	0	2	2
IV	VII SEM	AR1554	Urban Housing	3	0	0	3	3
		AR1551	Disaster Mitigation and Management	3	0	0	3	3
		AR1555	Conservation of Built Vernacular	3	0	0	3	3
V	X SEM	AR1559	Interior accessories and furniture design.	3	0	0	3	3
		AR1560	Landscape Services and EIA	3	0	0	3	3
		AR1561	Project Management	3	0	0	3	3
VI	X SEM	AR1562	Interior Lighting and Landscape	3	0	0	3	3
		AR1563	Landscape System Integration	3	0	0	3	3
		AR1564	Infrastructure Planning and Management	3	0	0	3	3

**SCHOOL OF ARCHITECTURE**  
**SYLLABUS FOR I SEMESTER B.ARCH COURSE (2013 batch)**

**MA1111 MATHEMATICS**

**L T P C**  
**3 0 0 3**

**Goal**

To create the awareness and comprehensive knowledge in engineering mathematics.

**Objectives**

The course should enable the students to:

- Understands the representation of points in space, direction cosines and different forms of the plane. Learns symmetrical and unsymmetrical forms of a straight line and the concept of skew lines.
- Understands the different forms of the sphere, plane section of a sphere and the tangent planes. Understands the formation of cone and cylinder.
- Find the inverse of the matrix by using Cayley Hamilton Theorem and Diagonalisation of matrix using transformation.
- Learn the solutions of second order linear differential equations of standard types and Euler's linear differential equation.
- Learn partial differentiations involving two and three variables and expansions of functions using Taylor series. Understands the concept of envelopes.

**Outcomes**

The students should be able to:

- Use 3D object plots the points in space. Evaluates the direction cosines of a straight line. Determines the shortest distance between the skew lines.
- Study models, 3D objects and learn different concepts of sphere, cone and cylinder.
- Identify Eigen value problems from practical areas and obtain its solutions and using transformation diagonalising the matrix which would render Eigen values.
- Recognize and to model mathematically and solving, the differential equations arising in science and engineering.
- Expands functions using Taylor's theorem. Understand and model the practical problems and solve it using maxima and minima as elegant applications of partial differentiation. Evaluates the envelopes of standard functions.

**UNIT I PLANE AND LINES**

**9**

Direction ratios and direction cosines of a line Equations of a plane and intersecting planes - Symmetric form of a straight-line Angle between lines and planes Coplanar lines skew lines shortest distance.



<b>UNIT II CURVED SURFACES</b>	<b>10</b>
Equations of sphere section by a plane - Tangent plane standard equations of cone, cylinder and properties	
<b>UNIT III MATRICES</b>	<b>9</b>
Characteristic equation, Eigen values and Eigenvectors of a real Matrix, Cayley Hamilton Theorem without proof; Reduction of a real symmetric matrix to diagonal form.	
<b>UNIT IV ORDINARY DIFFERENTIAL EQUATIONS</b>	<b>8</b>
Linear Second order and higher order Differential equations with constant coefficients. Differential equations with variable coefficients of Euler type.	
<b>UNIT V FUNCTIONS OF TWO VARIABLES</b>	<b>9</b>
Partial differentiation, total derivative, approximations, Taylor's Theorem, Maxima and Minima, envelope	
<b>TOTAL : 45</b>	

#### TEXT BOOKS

1. Venkataraman, M.K., "Engineering Mathematics", Volume I, Fourth Edition, The National Pub. Co., Chennai, 2003.
2. Chandrasekaran .A, "Engineering Mathematics (for I Semester) ", First Edition, Dhanam Publishers, Chennai, 2008.

#### REFERENCES

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi, 1998.
2. P.Kandasamy, K.Thilagavathy and K.Gunavathy, Engg Mathematics Vol & II, S.Chandan Publishers 1998.

#### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1101 ART APPRECIATION

L T P C  
2 0 0 2

### Goal

To understand that arts and art forms were simultaneously developing with architecture in cultures and civilization and to understand that architecture is also a form of art.

### Objectives

The course should enable the students to:

- To understand and appreciate the Role of Art in History of World Architecture- Past and present.
- To familiarize students with grammar of Art from the study of works Renowned Artists.[Sculptures'/painters]
- To study vocabulary of Art and its principles, the symbolic relationship of Art and Architecture.
- To identify art in terms of its form: Content and context [social and cultural] and to develop a sense of AESTHETICS which is a necessary component in Architectural Design.
- To study Modern Art and New directions [isms] evolved during 19th and 20th centuries.
- To study Art in Indian Context through Ages/periods. [Vernacular traditions] and its contemporary manifestations.

### Outcomes

The students should be able to:

- Identify, understand and appreciate -Art in Architecture,
- To create Built Forms incorporating [Judicially]
- To understand appropriate Indigenous Art elements.

### UNIT I UNDERSTANDING ARTS

5

The definition of art - the needs and meaning of works of art - Technical language of art - Appreciation of art form.

### UNIT II THE TECHNIQUES OF ART

5

Drawing - architecture - sculpture - painting - printing - minor arts (glass wave stain glass, lithographic prints, etc.) - Industrial art (Art Nouveau, Bauhaus)

### UNIT III ART IN WESTERN WORLD

8

Cave paintings of pre-historic period -Art forms and shapes in Egyptian, Mesopotamian, Greek, Roman and Italian Renaissance periods -Birth of Modern arts, definitions of-Impressionism and postimpressionism, artnouveau, cubism Dadaism, surrealism, Abstract art, expressionism, futurism &constructivism.

**UNIT IV ART HISTORY OF ASIAN WORLD****8**

Cave art, Indus valley civilization, Vedic civilization, Buddhist, Hindu (Indo Aryan and Dravidian), rock cut art. Islamic art form, Imperial style, Post independent, Mughal. Recent developments in Indian Art and Architecture.

**UNIT V RECENT TRENDS****4**

Art forms, patterns and furniture of the British period in India, Use of modern materials and technique-Recent development in Indian Art.

**TOTAL : 30****TEXT BOOK**

1. Helen Gardner, Fred S. Kleiner, Christin J. Mamiya , "Art Through The Ages: The Western Perspective", Cengage Learning, 2005.

**REFERENCES**

1. Peter and Linda Murray, " The penguin Dictionary of Art and Artist", Penguin Books - 1997.
2. Opdyke H.G. "Art and Nature Appreciation", Macmillan 1932( digitized -2008).
3. Judith Collins, "Techniques of Modern Artists", Chartwell Books - 1997.
4. H. Horvard Arnason, Marla F. Prather, Daniel Wheeler," History of Modern Art: Painting, Sculpture, Architecture, Photography", Prentice Hall Press, 1998

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1102 HISTORY OF ARCHITECTURE -I

L T P C  
2 0 0 2

### Goal

To inform about development of architecture in Europe from pre-historic to Byzantine period-- to study the contributions in various periods with selected examples of buildings and their uniqueness in terms of form, material and construction techniques.

### Objectives

The course should enable the student to

- Understand the progress in civilization leading to the development of shelter and how art and architecture emerged in Egyptian civilization.
- Understand how science emerged during the Sumerian period and how architecture and planning evolved.
- Study the development of art and architecture and the contribution of Greece.
- Understand the concept of republican state and the architectural character of Romans.
- Study the birth & spread of Christianity, its influence on architecture and architectural character during the Roman period.

### Outcomes

The students should be able to:

- Have a comprehensive knowledge about the development of shelter and art and architecture in Egyptian civilization.
- Have a comprehensive knowledge about the development of science during the Sumerian period and the evolution of architecture and planning.
- Express the development of architecture and its contribution towards growth of Greece with the help of sketches.
- Articulate knowledge on the development of republican state and the influences it had on the architectural character during the Roman era.
- Articulate the birth and spread of Christianity and identify its influences on architecture during the Roman period.

### UNIT I PREHISTORIC AGE AND EGYPT

6

Old Stone Age - the Agricultural revolution - The New Stone Age - Development of Shelter. Nature of Art and Architecture - Factors influencing Architecture - Outline of Architectural Character - Great Pyramid of Cheops, Gizeh, Great temple of Ammon, Karnak.

### UNIT II WEST ASIA

4

Evolution of Sumerian, Babylonian and Persian cultures - Factors influencing architecture - Outline of architectural character - Ziggurat, Urnammu, Palace of Sargon, Khorsabad - Palace at Persepolis.

**UNIT III GREECE****8**

Evolution of city states - Development of Art, Sculpture, architecture in the archaic and classic periods - Factors influencing architecture - Outline of architectural character- optical illusion in buildings, Orders in architecture - Doric Ionic and Corinthian, Parthenon; Erechthion, Athens, Theatre Eipdaurous; Tower of Winds.

**UNIT IV ROME****8**

Evolution of Republican states - Factors influencing architecture - outline of architectural Character Forum Romanum; Rome; Thermae of Caraculla; Colloseum Rome; Pantheon, Rome: Circus Maximus, Rome.

**UNIT V EARLY CHRISTIAN AND BYZANTINE****4**

Birth and spread of Christianity - Evolution of church forms - Factors influencing architecture - Outline of Architectural character - St. Clement, Rome St. Sophia, Constantinople; St. Marks, Venice; St. Vitale, Ravenna.

**TOTAL : 30****TEXT BOOK**

1. Sir Banister Fletcher, "A History of Architecture", University of London, The Athlone Press 1996, 20th edition.
2. Percy Brown, "Indian Architecture (Buddhist and Hindu Pd.)"- Tarapore Vala and Sons Bombay 1996.
3. Satish Grover, "The Architecture of India (Buddhist and Hindu Period)", CBS Pub., 2003.

**REFERENCES**

1. Yatin Bandy, "Concepts of Space in Traditional Indian Arch", Mapin, 2005.
2. Mitchell, George (1996) "The Hindu Temple, University of Chicago Press.
3. Spiro Kostof , "A History of Architecture : Setting and Rituals", Oxford University Press, London, 2005 (digitized - 2007).
4. Pier Luigi Nervi, "History of World Architecture Series". Harry N.Abrame Inc. Publication, New York, 1972.
5. Meaning in Western Architecture - Christian Norberg-Schulz-Rizzoli, New York, 1974.

**WEBSITES:**

1. <http://library.advanced.org/10098>
2. <http://www.encylopedia.com/articles/05371.html>
3. <http://www.cup.org/Titles/09/0521094526.html>

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1103 MATERIALS AND CONSTRUCTION - I

L T P C  
2 0 3 3

### Goal

To introduce various components of buildings and conventional materials used in building construction.

### Objectives

The course should enable the student to:

- To understand the basic [STRUCTURAL & FUNCTIONAL] components of a building such as Foundation: walls /Roof/Fenestrations/ and the Materials and method of construction.
- To understand the potential of rural natural building materials namely Mud Bamboo, casurina. To know about stone, variety of stones -their application in Building.
- Study briefly about manufacture of bricks - types of bricks: Properties uses and application and clay products.[tiles, ceramics etc].

### Outcomes

The students should be able to:

- To have a comprehensive knowledge about natural building materials [conventional/rural]
- To understand method of constructions using natural materials.
- To explain the method of construction through drawings.

### UNIT I INTRODUCTION

10

Functional requirements of a building and its components - Drawings of foundations, plinth, superstructure, roofing. Soils - Formation - grain size distribution soil classification systems. Lime - fat/Hydraulic Limes - Their uses and properties Manufacturing process - Mortar, functions - requirements - mix proportions.

### UNIT II RURAL - MATERIALS AND CONSTRUCTION

30

Mud as a building material - Soil stabilization, soil blocks - Drawings of foundations -types, S.S.Block - S.S.Cast in situ walls - flooring - roofing - plastering. Bamboo, casuarinas coconut, palm, hay, coir, jute - properties - uses - fire retardant treatment, insect proofing. Types of foundations - walls - simple roof trusses, floors for rural structures.

### UNIT III STONE

25

Classification of rocks - Building stones - their uses -physical properties - brief study of tests for stone - deterioration - preservation of stone - various stone finishes - cutting and polishing of granites. Drawings of foundations - types of masonry - random rubble/Ashlar, etc. - cavity walls - flooring copings, sills, lintels, corbels, arches.

#### **UNIT IV BRICKS AND CLAY PRODUCTS**

**10**

Bricks - brief study on manufacture of bricks - properties - uses - suitability - types of bricks - uses in buildings, structural tiles, ceramics, terracotta - uses.

**TOTAL : 75**

#### **TEXT BOOKS:**

1. S.C.Rangwala , "Engineering Materials", Charotar Publishing House -Anand 2007
2. Dr.Bala Gopal, "Building Design and Civil Engineering Drawing", Spades Publishers & Distributors, 2008
3. Dr.B.C.Punmia, "Building Construction" Laxmi Publications, 2008.

#### **REFERENCES**

1. W.B.Mckay , "Building Construction", Vol. 1,2,3- Longmans U.K 1992.
2. R.J.S.Spencke and D.J.Cook, "Building Materials in Developing Countries", John Wiley and Sons, 1983.
3. HUDCO "All you want to know about soil stabilized mud blocks", HUD Pub., New Delhi, 1989.
4. D Narayanamurty, United Nations Department of Economic and Social Affairs," Use of bamboo and reeds in construction", UNO Publications,1972.

#### **WEBSITES:**

1. <http://www.baboo-Flooring.com>
2. <http://ag.avizona.edu/SWES>
3. <http://www.angelfite.com/in>
4. <http://www.idrc.ca/library/documents/104800/chapz-e.html>
5. <http://www.angelfite.com/inz/granite>

#### **PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 4 hrs.

Part A: 10 questions X 4 marks = 40 marks (no choice)

Part B: 4 questions X 15 marks = 60 marks (choice for each question)

## AR1104 COMPUTER STUDIO - I

L T P C  
1 0 4 3

### Goal

To introduce the technology of computer system, operation principles, use of other related hardware, with a thrust on 2D Drafting as a necessity for architects. Coverage will be on drawings objects, fitting, setting, size and dimensioning, with a thrust on advanced 2d drafting techniques.

### Objectives

The course should enable the student to

- Inform the student, basic understanding of components, operation system, (windows) application software and other accessories.
- Make a student understand basic tools of ACAD i.e., formatting (limits, units, etc) drawing tools or drafting, modification of the same.
- Make a student to obtain knowledge of advanced tools such as layers, line type, etc,. 2d drafting of building drawings.

### Outcomes

The students should be able to:

- Work on systems with ease of the software understanding the performance of the hardware relatively.
- Create architectural drawings required for their presentations with precision and accuracy. Revising them without spending much time.
- Work at large scale of drawings in terms of Size or complexity in details or levels of a built form.

### UNIT I INTRODUCTION TO COMPUTER

5

Technology of small computer system, computer terminology operation principles of P.C., basic shortcuts in windows, introduction to application software, graphic system, and use of printers, scanner, plotter, File management, etc.

### UNIT II INTRODUCTION TO COMPUTER AIDED 2D DRAFTING

25

Understanding the use of drawing tools, object editing, drawing objects, filling and setting Drawing units, scales, limits that size and dimensioning, texting. Setting up of drawings of various simple architectural objects with complete text and Dimensioning.

### UNIT III ADVANCE COMPUTER AIDED 2D DRAFTING

30

Advance command programming - transparent overlays hatching utilities, assigned colour and line type, use of multilane, style, block and block editing, symbol Library manipulation for Accurate



drawing. Advance exercise in 2D drafting of various complex building drawings, incorporating the above said utilities.

**TOTAL : 60**

**TEXT BOOK**

1. Sham Tickoo, "Autocad 2009; A Problem Solving Approach" Autodesk Press; 1 edition (July 18, 2008)

**REFERENCE**

1. AutoCAD reference manual - Autodesk UNC, 1998.
2. AutoCAD architectural users guide - Autodesk Inc., 1998.
3. Elements of Architecture, Rob Krier , Van Nostrand Rein Hold
4. Architectural colour, Pokter
5. Form and Function and Design, Paul Jacquess Grills
6. Principles of three dimensional design , Wang Wucius , Van Nostrand Rein Hold
7. Principles of Two dimensional design, Wang Wucius, Van nostrand Rein hold.
8. Access by design, George A. Covington & Bruce Hannan , Van Nostrand Rein hold 1996.
9. Design through Discovery, Majore Elliot Bevin, Half Rinehart and Wintan, Newyork 1977.
10. Visual thinking for Architects & Engineers , Ron Kasprisin & James Pettinari - Van Nostrand Rein Hold 1995.

**WEBSITES:**

1. [http://www.sln.fi.edu/-Computer drafting](http://www.sln.fi.edu/-Computer%20drafting)
2. <http://www.ccollege.hccs.cc.tx.us/-Comp.graphic>

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 4 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 1 question X 80 marks = 80 marks (with choice)

## AR1105 ARCHITECTURAL DRAWING - I

L T P C  
2 0 4 4

### Goal

To develop manual sketching and drafting skills through 2D shapes and 3D objects, which is a handy tool to practicing architects.

### Objectives

The course should enable the student to

- Train the students to sketch with pencil & pen drawing and painting both indoor and outdoor using appropriate media.
- To comprehend and draw manually using T' Square, set square or parallel drawing in the form of plates.
- To understand the relation between Elevation, plan, and section of an object, group of objects and 3D views of simple object, and demonstrate through drawings.

### Outcomes

The students should be able to:

- Have a comprehensive knowledge about the sketching and the usage of color media.
- Handle the instruments T square, set square et al manually to draw plan, elevation and section of an object.
- Understand the relationship between elevation, plan and section of the objects.

### UNIT I FREE HAND DRAWING

45

Free hand drawing of object human figures and natural elements - part of building environment, plants, trees, flowers, etc. Outdoor sketching: study of form, their combination balance, etc. Sketching of simple building forms and their relations, simple three-dimensional compositions.

Study of colour, composition, colour rendering of object, plants, interior and exterior spaces. Rendering of objects, built and natural environment with advance presentation skill, surface finishes (human figures, street furniture's, etc.) to communicate meaningfully and effectively.

### UNIT II GEOMETRICAL DRAWING

30

Plane Geometry - scales and angle construction of planes, curves, circles tangent and regular polygon area construction. Solid geometry - simple projections, projection and development of the solid, section of solids, interpenetration of solids and true shape of sections.

### UNIT III ORTHOGRAPHIC PROJECTION

15

Introduction to orthographic projections - isometric and axonometric projections. Drawing of lines, basic shapes in different positions. Orthographic projections of planar surface - geometrical shapes

like square, circle, hexagon, etc. and combination of shapes. Orthographic projection of 3D object - construction of plan, elevation and section of 3D objects and projections in various positions.

**TOTAL : 90**

**TEXT BOOKS**

1. I.H.Morris , "Geometrical drawing for Art Students", Orient Longman, Madras 1982.
2. Albert. O. Halse , "Architectural Rendering Techniques", McGraw-Hill Book Co. New York 1972.

**REFERENCES**

1. Jeremy Gatton "Choosing & Mixing Colours", Quantum Books Ltd., 1997
2. Francis Ching, "Architectural Graphics, Wiley Publications, 2002.
3. Alejandro Bahamon "Sketch Houses", Loft Publications, 2008.
4. Jonathan Andrews, 'Architectural Visions', Brown Publishing AG, 2010
5. Engineering drawing, Bhatt N.D.[1990], Charotar publishing house, Anand, India. Engineering drawing, K.V.Natarajan.

**WEBSITES:**

1. <http://www.cs.brown.edu>
2. <http://www.dtcc.edu/> - document, project info - Arch.dwg.

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 4 hrs.

Part A: 10 questions X 4 marks = 40 marks (no choice)

Part B: 4 questions X 15 marks = 60 marks (choice for each question)

**AR1106 ARCHITECTURAL DESIGN - I**

**L T P C**  
**0 0 10 5**

**Goal**

To introduce the meaning of "design" and relate it to "architecture" through an understanding of basic elements of design, the principles of design relationships and analysis of design elements.

**Objectives**

The course should enable the student to

- Theoretically understand first the various elements of basic design relationship, principles and demonstrate the same through drawing exercises.

- Understand the workshop tools and equipments useful for model making and practically experiment with creative design ideas both in exterior and interior applications.

### Outcomes

The students should be able to:

- Develop abstract and real compositions in drawings.
- Familiarize with doing exercise involving real and abstract models made of match sticks, card boards, wires, wood pieces

### UNIT I BASIC DESIGN I

100

Introduction to Architectural Design through Basic Design. Introduction to elements of design., Properties, qualities, and characteristics of (i) line, (ii) direction, (iii) shape,(iv) size,(v)texture, (vi) value and (vii) colour exercises involving the same including use of the computer. The principles of design relationships -Repetition, Harmony, Contrast. Transformations - Rotation, Reflection, Translation (mirror), Resizing. Symmetry - Reflection symmetry, Rotational symmetry, Point symmetry, Lines of symmetry of plane shapes. Exercises involving the same. The analysis of design elements - Exercises involving the same.

### UNIT II WORKSHOP

50

Use of hand tools and materials in carpentry, masonry and model making. Making mount board models employing cubes, cuboids, square pyramid, cylinder and cones. Space frame models using match sticks, straw, steel wires, bamboo splits. Texture applicability to murals and interior decoration.

**TOTAL:150**

### TEXT BOOK

1. Maitland Graves - The Art of Colour and Design McGraw-Hill Book company Inc. 1951

### REFERENCES

1. Francis D.K.Ching, "A Visual Dictionary of Architecture", John wiley & Sons, Inc. 1997
2. Professor Miles Lewis, "Architecture - Elements of Architectural Style", Global Book Publishing Pvt. Ltd. 2008.
3. Archiworld Co., Ltd., "Object-Creative Idea & Unique Design" Choseok Publishing 2010
4. Edward D.Mills " Planning -The Architects Hand Book" - Butterworth-Heinemann Ltd, London, 1985.
5. V.S.Pramar, "Design fundamentals in Architecture", Somaiya Publications Pvt. Ltd., New Nelhi, 1990.
6. Francis D.K.Ching , "Architecture - Form Space and Order", Van Nostrand Reinhold Co., (Canaa), 1980.

### WEBSITES:

1. <http://infinet.net> - elements of design
2. <http://www.okino.com> - design, visualization, rendering system
3. <http://www.interface-signage.com>
4. <http://www.designcommunity.com> - arch rendering, 3D design

## SYLLABUS FOR II SEMESTER B.ARCH COURSE

### CE1104 MECHANICS OF STRUCTURES - I

L T P C  
3 0 0 3

#### Goal

To sensitize students on how structural resolutions become important in realization of architectural design concept. At this stage, students shall be exposed to forces, moments, and resolution that are to be resolved. Concepts of determinate and indeterminate structures. Thrust shall be on steel and concrete structures, and enable students to solve basic, simple problems.

#### Objectives

The course should enable the student to

- Understand the effect of action of forces on a body and the concept of equilibrium of the body through exercises.
- Determine the internal forces induced in truss members due to external loads by working out problems.
- Calculate the sectional properties (centroid, moment of inertia, section modulus and radius of gyration) for various sections by working out problems.
- Study the stress - strain behaviors of steel and concrete due to axial loads and to determine the stresses and strains developed in solids due to external action through selected problems.
- Derive the relationship between elastic constants and solving problems.

#### Outcomes

The students should be able to:

- Understand action of forces on a body
- Analyze different types of trusses
- Calculate centroid, moment of inertia, section modulus and radius of gyration for a given section
- Solve problems on stress - strain behaviors of steel and concrete due to axial loads and to determine the stresses and strains developed in solids due to external action
- Understand the relationship between elastic constants

#### UNIT I FORCES AND STRUCTURAL SYSTEMS

5

Types of force systems - Resultant of parallel forces - principle of moments - principle of equilibrium - simple problems

#### UNIT II ANALYSIS OF PLANE TRUSSES

10

Introduction to Determinate and Indeterminate plane trusses - Analysis of simply supported and cantilever trusses by Method of joints and Method of sections.

**UNIT III PROPERTIES OF SECTION****10**

Centroid- Moment of Inertia - Section modulus - Radius of gyration - Theorem of perpendicular axis - Theorem of parallel axis.

**UNIT IV ELASTIC PROPERTIES OF SOLIDS****10**

Stress strain diagram for mild steel, High tensile steel and concrete - Concept of axial and volumetric stresses and strains.

**UNIT V ELASTIC CONSTANTS****10**

Elastic constants - Relation between elastic constants - Application to problems.

**TOTAL : 45****TEXT BOOKS:**

1. R.K.Bansal, "A textbook on Engineering Mechanics". Lakshmi Publications Delhi 2008.
2. R.K.Bansal, "A textbook on Strength of Materials" Lakshmi Publications. Delhi 2005..

**REFERENCES:**

1. P.C.Punmia, "Strength of Materials" and "Theory of Structures" Vol. I, Laxmi publications, Delhi, 2005.
2. S.Ramamrutham, "Strength of materials", Dhanpatrai & Sons, Delhi, 1990.
3. W.A.Nash, "Strength of Materials" Schaums Series - McGraw-Hill Book Company, 1999.
4. R.K. Rajput "Strength of Materials", S. Chand & Company Ltd., New Delhi 1996

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1111 THEORY OF ARCHITECTURE - I

L T P C  
2 0 0 2

### Goal

To establish the understanding that architecture is a social/human need and to develop a vocabulary for future design processes in understanding the relation and impacts of Space & Mass, elaborating and discussing aesthetic components in design & finally introducing the use of color in architecture.

### Objectives

The course should enable the student to:

- Understand various definitions of architecture and justifications for architecture creations
- Understand the relationship between function and aesthetics through analysis of selected buildings.
- Understand the relationship between mass, geometrical form and space through analysis of selected buildings.
- Understand the definition and use of components of design by studying representative examples.
- Understand the definition, combination and relationship and symbolism of using color in architecture.

### Outcomes

The students should be able to:

- Define architecture and recognize its influence on society
- Connect function and aesthetic in future design processes
- Recognize the relation between of space and mass and translate it into design
- Develop a design vocabulary for the various aspects of aesthetic components in design and actively apply them.
- Apply color in architecture with the theoretical knowledge about the physical and psychological effects.

### UNIT I INTRODUCTION TO ARCHITECTURE 5

Definition of Architecture - Elements of Architecture backed by need and followed by fulfillment of need.

### UNIT II SCOPE OF ARCHITECTURAL DESIGN 5

Architectural design - An analysis - Integration of aesthetic and function.

### UNIT III ARCHITECTURAL SPACE AND MASS 5

Mass and space, visual and emotional effects of geometric forms and their derivatives -The sphere, the cube, the pyramid, the cylinder and cone.

**UNIT IV AESTHETIC COMPONENTS OF DESIGN**

**10**

Proportion, scale, balance, rhythm, symmetry, hierarchy, pattern and axis with building examples.

**UNIT V APPLICATION OF COLOUR IN ARCHITECTURE**

**5**

Effect of colour in Architecture - Colour symbolism - A case study on colour theory in any famous architectural buildings - A small scale project incorporating all the principles learnt in all the units.

**TOTAL : 30**

**TEXT BOOK:**

1. Francis D.K.Ching, "Architecture-Form, Space and Order", 3rd ed. John Wiley, 2007

**REFERENCES:**

1. V.S.Pramar, "Design Fundamentals in Architecture", Samaiya Publications Private Ltd., New Delhi.
2. Paul Alan Johnson - "The Theory of Architecture - Concepts and themes, Van Nostrand Reinhold Co., New York, 1994
3. Forms and functions of 20th century Architecture - Talbot. Hamlin.
4. The four elements of Architecture - Senner Goltfried - Cambridge University press London. U.K.

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)



## AR1112 HISTORY OF ARCHITECTURE - II

L T P C  
2 0 0 2

### Goal

To inform about development of architecture in India from River-valley civilization to Indo Aryan Period. Exposure will be on selected examples from various historic periods resulting in an understanding of materials, their uses and development of construction technology.

### Objectives

The course should enable the student to:

- Understand contributions to architecture by the river valley, Aryan and Mauryan civilization and the kinds and building materials and techniques adopted by them.
- Understand the influence of Buddhism in northern India and architecture of buildings and caves.
- Study the mythological evolution of Hindu temple during the Gupta and Chalukyan period.
- Understand the rock cut and stone architecture of Dravidian period and later developments in south India.
- Understand the plan forms of Indo Aryan temple.

### Outcomes

The students should be able to:

- Have a comprehensive knowledge about the development of Aryan and Mauryan civilization and identify different building materials & techniques used by them.
- Have a comprehensive knowledge about the development of Buddhist architecture.
- Articulate knowledge on the evolution of Hindu temple during the Gupta and Chalukyan period
- Have a comprehensive knowledge about the rock cut and stone architecture of Dravidian period and trace later developments in South India.
- Express different plan forms of the Indo Aryan temple with the aid of sketches.

### UNIT I ANCIENT INDIA

4

Indus Valley Civilization - Culture and pattern of settlement. Impact of Aryan culture - Vedic village and the rudimentary forms of bamboo and wood, wooden construction under the Mauryan rule.

### UNIT II BUDDHIST ARCHITECTURE

8

Hinayana and Mahayana Buddhism - Interaction of Hellenic & Indian Ideas in Northern India - Architectural Production during Ashoka's rule - Ashokan Pillar, Sarnath, Rock cut caves at Barabar, Sanchi Stupa. Salient features of a Chaitya hall and Vihara, Rock cut architecture in the Western and Eastern ghats - Karli, Viharas at Nasik, Rani gumpha, Udaigiri. Takti Bahai, Gandhara.

**UNIT III HINDU ARCHITECTURE****6**

Evolution of Hindu temple - Early shrines of the gupta and chalukyan periods - Tigawa temple, Ladh Khan and Durga temple, Aihole, Papanatha and Virupaksha temples, Pattadakal.

**UNIT IV DRAVIDIAN ARCHITECTURE****6**

Dravidian culture - Rock cut productions under Pallavas -Shore temple, Mahaballipuram -Dravidian Order - Brihadeeswara Temple, Tanjore - Evolution and form of gopuram - Complexity in temple plan due to complexity in Ritual - Minakshi temple, Madurai.

**UNIT V INDO ARYAN STYLE****6**

Salient features of an Indo Aryan temple - Lingaraja Temple, Bhuvaneswar - Sun temple, Konarak. Kunds and Vavs - Sabali kund vav - Adalaj - Surya kund, Modhera.

**TOTAL : 30****TEXT BOOK**

1. Sir Banister Fletcher, "A History of Architecture", University of London, The Athlone Press 1996, 20th edition.
2. Percy Brown, "Indian Architecture (Buddhist and Hindu Pd.)"- Tarapore Vala and Sons Bombay 1996.
3. Satish Grover, "The Architecture of India (Buddhist and Hindu Period)", CBS Pub., 2003

**REFERENCES**

1. Yatin Bandya, "Concepts of Space in Traditional Indian Arch", Mapin, 2005.
2. Mitchell, George (1996) "The Hindu Temple, University of Chicago Press.
3. Spiro Kostof , "A History of Architecture : Setting and Rituals", Oxford University Press, London, 2005 (digitized - 2007).
4. Pier Luigi Nervi, "History of World Architecture Series". Harry N.Abrame Inc. Publication, New York, 1972.
5. Meaning in Western Architecture - Christian Norberg-Schulz-Rizzoli, New York, 1974.

**WEBSITES**

1. <http://www.greatbuildings.com/gbc-types/styles/hindu.html>
2. <http://indianculture.tqn.com/msub19.htm>
3. [http://web1.arch.hawaii.edu/courses/courses/300/arch371/09\\_04/9-4htm](http://web1.arch.hawaii.edu/courses/courses/300/arch371/09_04/9-4htm)
4. [http://www.hindunet.org/alt\\_hindu/1995\\_Apt\\_1/msg00069.html](http://www.hindunet.org/alt_hindu/1995_Apt_1/msg00069.html)
5. <http://bishop.calpoly.edu/libarts/jwetzels/study/HinduArtOflaterDynasties.htm>

## PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

### AR1113 MATERIALS AND CONSTRUCTION - II

L T P C  
2 0 3 3

#### Goal

To enable the students understand how bricks, clay products and timber are used as building material in foundation walls and roofing systems. Also to learn cost effective technology developed in India for components of buildings.

#### Objectives

The course should enable the student to:

- Understand both in general and in detail innovative method of construction using materials such as Brick and clay products.
- Understand both in general and detail about Timber its properties uses and application [Frame/ roof] and about commercial forms of Timber like plywood/particle board/M.D.F
- Familiarize the students with appropriate materials and method of construction of Foundation/ walls /Roof /Fenestrations etc to achieve cost effectiveness.
- Familiarize students with details in building construction suitable for physically challenged.

#### Outcomes

The students should be able to:

- Have a thorough know-how about innovative [appropriate] material and method to achieve cost effectiveness in Design.[Represent graphically/manual/electronic media]
- Have comprehensive knowledge about timber and allied products and application in the Interior / furniture.
- Incorporate details, conducive to physically challenged.

#### UNIT I BRICKS AND CLAY PRODUCTS

15

Drawings of brick foundations - buildings in brick bonds, walls, columns, corners -structural members in brickwork. Reinforced brick masonry - Arches - Lintels -Corbels - copings. Hollow clay blocks - for walls - partitions - roofs. Roofings -Flat Roofs - Terrace roofs - Sloping roofs.

#### UNIT II TIMBER AND ALLIED PRODUCTS

10

Softwood and hardwood - Secondary timber - Physical properties and uses - Defects, Conversion,

Seasoning, decay and preservation of timber - Fire retardant treatment, anti-termite treatment. Industrial timbers - plywood, block board, particle board, fiber boards. Manufacture and uses - current developments.

**UNIT III TIMBER**

**40**

Drawings of timber joinery for Windows, doors, ventilators. Timber partitions, fixed partitions, sliding, folding, top hung bottom rested false ceiling, - wall panelling. Timber staircases - timber trusses - Lean to - close couple - Kingpost - Queen post. Timber floors- timber built-in-furniture.

**UNIT IV LOW COST BUILDING TECHNOLOGY**

**10**

Drawings of foundations - walling - Roofs - partitions - ceiling panel - doors and windows. Miscellaneous - Drawing of Brick jalis, Screen walls - pavement blocks -Ferro cement water tanks.

**TOTAL : 75**

**TEXT BOOK:**

1. S.C.Rangwala , "Engineering Materials", Charotar Publishing House -Anand 2007

**REFERENCES:**

1. W.B.Mckay , "Building Construction", Vol. 1,2,3- Longmans U.K 1992.
2. Don A.Watson, "Construction Materials and Processes", McGraw Hill Co., 1972.
3. Alanwerth, "Materials", The Mitchell Pub. Co. Ltd., London, 1986.
4. R.Chudleu, "Building Construction Handbook", Butterworth-Heinemann Ltd; 4th Revised edition, 2001.

**WEBSITES**

1. <http://www.ibex-ibex-intl.com>
2. <http://www.inika.com/chitra>
3. <http://www.routbdge.com>
4. <http://www.venturaindia.com>

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 4 hrs.

Part A: 10 questions X 4 marks = 40 marks (no choice)

Part B: 4 questions X 15 marks = 60 marks (choice for each question)

## AR1117 COMPUTER STUDIO - II

L T P C  
1 0 4 3

### Goal

To introduce tools of productivity, concept of object linking and editing session, with a thrust on 3d modeling and 3d rendering as a necessity for architects. Coverage shall be on construction planes, 3d surfaces, use of dynamic projections, techniques of setting to create photo realistic renderings. It also proposed to cover environment setting and image filing as an additional presentation technique.

### Objectives

The course should enable the student to

- Enable the student understand basic interface and editing necessary for creating 3d objects.
- Enable the student an understanding of tools for creating 3d modeling and understanding of modification tools for the same.
- Enable student understanding of finishing and output of the 3d model.
- Familiarize the student with latest software like AUTOCAD, Sketch up etc.,

### Outcomes

The students should be able to:

- Create independent 3d form or convert 2d diagram in to 3d form.
- Edit the 3d forms in the perspective platform for better understanding of the form and its design.
- Visualize the form, color, texture, material application and structural feasibility of the same.
- Compatible with other software to have flexibility in working.

### UNIT I COMPUTER APPLICATIONS IN ARCHITECTURE (Non Graphic) 8

Developing skills in non-graphic applications of computer as required for architectural presentation & documentation, such as word processing, spreadsheets, power point presentations, etc.

### UNIT II PRODUCTIVITY TOOLS 12

Introduction to tools of productivity -blocks, slide facilities, script files, attributes Understanding concepts of V.Port, concept of object linking, and editing session.

### UNIT III INTRODUCTION TO 3D DRAFTING 20

Introduction to 3D modeling technique and construction planes, drawing object, 3D surfaces setting up elevation and thickness, and use of dynamic projections. Solid modeling, with driving primitive command and boolean operation. Use of region modeling, solid modification.

### UNIT IV 3D RENDERING AND SETTING 20

Rendering and scene setting to create a photo realistic image, understanding material mapping,

environment setting and image filing. Modeling of any object or building using above said utilities.

**TOTAL : 60**

**TEXT BOOK:**

1. Sham Tickoo, "3D Max Design, 2009: A tutorial Approach", CAD/CIM Technologies (November 15, 2008)

**REFERENCES**

1. V.Rajaraman, "Principles of Computer Programming" - Prentice Hall of India.
2. Byron S.Gottfried, "Theory and problems of programming with C", .Schaum's outline series, McGraw-Hill Publishing Co.
3. "AutoCAD reference manual" - Autodesk UNC, 1998.
4. "AutoCAD architectural users guide" - Autodesk Inc., 1998.

**WEBSITES**

1. <http://college.hccs.cc.tx.us/>
2. <http://www.ciips.ee.uwa.edu.au/>

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 4 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 1 question X 80 marks = 80 marks (with choice)

**AR1115 ARCHITECTURAL DRAWING - II**

**L T P C**  
**1 0 5 3**

**Goal**

To perceive built environment in terms of their detail, form, colour, texture, so as to present architectural design solutions in a realistic way.

**Objectives**

The course should enable the student to :

- Make the student conversant with architectural drafting using instruments, train him to draw and write with knowledge on composition, of selected components and details of a building.
- Enable a student understand the theory of perspective to draw an object and later on simple buildings in perspective by doing series of exercises.
- Make a student understand the theory and purpose of casting shade and shadows in buildings in simple objects and later in simple building through selected exercises.

## Outcomes

The students should be able to:

- Articulate knowledge on composition and detailing in measured drawing.
- Identify and understand the perspective.
- Understand the casting of shade and shadow on any object.

### UNIT I MEASURED DRAWING

45

Principle of basic architectural drafting - line value lettering basic, multiview projections and sections - presentation formats. Measured drawing of simple objects (like furniture, entrance gates, etc.) and building components (like columns, cornice, door, window, etc.) Detailed measured drawing/ documentation of historic and architectural monument or building.

### UNIT II PERSPECTIVE

30

Characteristics of Perspective Drawings, Perspective systems and methods, Two point perspective of simple objects, outdoor and indoor view of a building, etc. One point and three point perspective of interiors Perspective theory and practice.

### UNIT III SCIOGRAPHY

15

Principles of shades and shadows - Shadows of lines and circles, Shadows of architectural elements, circular solids, buildings, etc.

**TOTAL : 90**

### TEXT BOOKS:

1. T.Jeyapooan "Engineering Graphics 2000" Vikas Publishing House, Pvt. Ltd., 2002.
2. K.V.Natarajan "Engineering Drawing" Vikas Publishers, 1999.

### REFERENCES:

1. Francis D K Ching "Design Drawing", John Wiley & Sons, Inc. 1998
2. Jonathan Andrews "Architectural Visions", Brown Publishing Ag. 2010
3. William Kirby Lockard, "Drawing as a Means to Architecture", Van Nostrand, Reinhold Company, New York.
4. George A.Dinsmore, "Analytical Graphics" - D.Van Nostrand, Company Inc., Canada.
5. Francis Ching, "Architectural Graphics", 4th ed. John Wiley, New York 2003
6. Engineering drawing, Bhatt N.D.[1990], Charotar publishing house, Anand, India.
7. Architectural graphics, C.Leslie Martin, The Macmillan Company, New York.

### WEBSITES

1. <http://www.cs.brown.edu>
2. <http://www.dtcc.edu/-document,project info - Arch.dwg>.

**PATTERN OF QUESTION PAPER**  
(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 4 hrs.

Part A: 10 questions X 4 marks = 40 marks (no choice)

Part B: 4 questions X 15 marks = 60 marks (choice for each question)

**AR1116 ARCHITECTURAL DESIGN - II**

**L T P C**  
**0 0 12 6**

**Goal**

To bring in confidence as to how basic design principles and knowledge are used in solving simple space, small span buildings and create spaces and buildings responding to human anthropometrics and creating environments which are barrier free.

**Objectives**

The course should enable the student to:

- Enable a student understand the basics of anthropometrics, its application in articulating vertical, horizontal space and later on in simple buildings including considerations for physically challenged through a design process resulting in specific typologies, as specified.
- Enable a student to work with hand, details, and simple models of selected elements of components of a building. Later on the students are to be trained to make models of simple buildings and structure, which they design in their exercises.

**Outcomes**

The students should be able to:

- Trained to solve design solutions based on simple typologies
- Present design solution in the form of drawings

**UNIT 1 DESIGN STUDIO**

**100**

The problems involve simple space organization starting with single space single use -small span Horizontal movement - single bay - passive energy type spaces. The study of space standards and anthropometrics related to each problem is stressed upon. Anthropometry as related to physically handicapped and elderly persons are required to be studied.

Examples of exercises include Toilet for a physically handicapped person, hostel room, bedroom, kitchen, Shop, pavilions, snack bar, Residence, petrol bunk, fire station, police station.

**UNIT II WORKSHOP II**

**80**

Elementary models indicating wall surfaces floral designs, ceilings, glass areas, lawn, water bodies, etc. Block models of small campuses using wood, thermacol mount board, soap, cork board, etc.



Detailed model of a small buildings like branch bank, small residences, bus shelter, snack bar, including landscape details.

**TOTAL: 180**

**TEXT BOOKS:**

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time - Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed.By.Quentin Pickard RIBA "The Architects' Hand Book", Bladewell Science Ltd., 2002

**REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K.Ching, John wiley & Sons, Inc. 1997

**WEBSITES**

1. [www.designbasics.com/](http://www.designbasics.com/)-(on house type - Americans)
2. <http://www.geosystems.gatech.edu/> - (on detail design method)
3. <http://www.c.s.berkeley.edu/> - (on bubble diagram builder with interaction)
4. <http://www.plannet.com/resources.htm> - (on resource info)

## SYLLABUS FOR III SEMESTER B.ARCH COURSE

### CE1213 MECHANICS OF STRUCTURES II

L T P C  
3 0 0 3

#### Goal

To impart the students with knowledge about different types of parameters for the design of beam and column

#### Objectives

The course should enable the students to

- Understand shear force and bending moment.
- Understand shear stress distribution and bending moment distribution
- Learn to find slope and deflection of beams
- Understand the behaviour of long and short columns
- Learn the behaviour of continues beams

#### Outcome

The course should enable the students to

- Impart knowledge on shear force and bending moment.
- Learn shear stress distribution and bending moment distribution
- Learn to find slope and deflection of beams
- Understand the behaviour of long and short columns
- Learn the behaviour of continues beams

#### UNIT I SHEAR FORCE AND BENDING MOMENT

10

Concept of shearing forces and bending moments shear force and bending moment diagrams for cantilever and simply supported beams subjected to point load, uniformly distributed loads and their combinations.

#### UNIT II STRESSES IN BEAMS

10

Theory of simple bending bending stresses in beams, shear stresses in beams examples on simple sections. Stress distribution diagrams.

#### UNIT III DEFLECTION OF BEAMS

10

Slope and deflection at a section Double Integration method for calculation of deflection for simply supported and cantilever beams for concentrated loads and uniformly distributed loads.

**UNIT IV THEORY OF COLUMNS****10**

Short and long columns Euler's theory and its limitations Derivations of Euler's formula (for different end conditions) - Rankine's formula for columns (No derivations) - Application to simple problems.

**UNIT V INTRODUCTION TO INDETERMINATE STRUCTURES****5**

Concept in Analysis of continuous beams, fixed beams, and partial frames (No analysis problems).

**TOTAL: 45****TEXT BOOKS**

1. M.M.Ratwani & V.N.Vazirani, "Analysis of Structure", Vol.1, Khanna Publishers - Delhi, 2008
2. A.R.Jain and B.K.Jain, "Theory and analysis of Structures", Vol. 1, Nemchand and Bros, Roorkee, 1987.
3. R.S.Khurmi "Strength of Materials", S.Chand & Company Ltd., New Delhi

**REFERENCES**

1. Dr.V.S.Prasad, "Basic Structural Mechanics", Galgotia Publications.
2. Timoshenko, S.P., and D.H. Young, "Elements of Strength of Materials", Fifth edition, East West Press, 1993.
3. B.C.Punmia, "Strength of Materials and Theory of Structures", Vol.1, Laxmi publications, New Delhi 1994.
4. R.K. Rajput "Strength of Materials", S.Chand & Company Ltd., New Delhi 2007.

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## CE1214 BUILDING SERVICES - I

L T P C  
3 0 0 3

### Goal

To sensitize students that efficiency of building function also depends on integration of services like sewage disposal system, water supply systems, identification of sources, segregation, treatment, augmentation, distribution, the important equipments and gadgets involved, their installation and maintenance.

### Objectives

The course should enable the students to:

- Have knowledge on rainwater harvesting, management, and how to recycle wastewater from the buildings and at city levels.
- Understand theoretical fundamentals of sewage treatment, their collection and disposal at campus level and construction system involved in services.
- Understand other city level disposal collection, conveyance, recycling, and storm water drains and dispersals.
- Understand the need of rain water management and conservation of raw and waste water.
- Understand the selection and choice, installation and maintenance of various types of pumps

### Outcome

The students will be able to:

- Find the type of impurity present in water and the effect of the impurities in human body.
- Know the Fundamentals of sanitation in buildings, various sewage treatment process, and construction details of sewer and connections.
- Know about the collection, conveyance, recycling and disposal of town refuse systems.
- Select, install and maintain the various pumps as available in the Indian market.
- Collect rain water and conserve raw and waste water. Use them for appropriate purposes.

### UNIT I WATER QUALITIES, PURIFICATION, TREATMENT AND DISTRIBUTION 12

Surface and ground water sources quality/quantity nature of impurities treatments water supply systems - treatment systems - centralized treatment - user and treatment - Desalination - ozonisation - reverse osmosis etc. - Distribution system in small towns - Types of pipes used - Laying, jointing, testing internal water supply in buildings - Municipal byelaws, regulations, standards.

### UNIT II RAIN WATER MANAGEMENT AND CONSERVATION OF RAW AND WASTE WATER

6

Water conservation, rainwater collection - methods of harvesting - storm water drains in layouts, towns and cities - Waste water recycling.

**UNIT III FUNDAMENTALS, SEWAGE TREATMENT AND SEWERAGE SYSTEMS 12**

Environmental sanitation Sanitation in buildings. Primary and secondary treatment - Activated sludge Intermittent and trickling sand filters - Arrangement of sewerage systems in Housing, large factories, shopping centers sewage pumping station, sewage disposal, construction details of sewers and connections.

**UNIT IV CITY LEVEL SERVICES AND DISPOSAL 6**

Collection, conveyance, recycling and disposal of town refuse system - sanitation in unsewered areas of cities - alignment of storm water drains in residential areas and cities.

**UNIT V PUMPS AND MOTORS, SANITARY FIXTURES AND FITTING - PRODUCT RANGE 9**

Pumps including reciprocating, centrifugal, deep well, submersible, sewage pumps - their selection and choice, installation and Maintenance.

**TOTAL : 45**

**TEXT BOOKS**

1. K.N.Duggal, "Elements of Environmental Engineering", Chand & Co., 2010
2. P.C.Punmia, "Environmental Engineering 1" Vol I - Water Supply, Vol II Waste water, Laxmi Publication, 2006.
3. S.K.Garg, "Environmental Engineering" Vol I, Khanna Publishers, 2001

**REFERENCES**

1. S.C.Rangwala, "Water Supply and Sanitary Engineering, Charotar Publishing House, Anand 388 601, 2009.
2. G.M.Fair, J.C.Geyer and D.Okun, "Water and Waste Water Engineering", Vol. II, John Wiley & Sons, Inc., New York, 1968.
3. "Manual of Water supply and Treatment", Second Edition, CPHEEO, Ministry of Works and Housing, New Delhi, 1977.
4. "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Works and Housing, New Delhi, 1980.

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## CE1215 SURVEYING, LEVELLING & SITE PLANNING

L T P C  
2 0 3 3

### Goal

To understand the principles of surveying, classification, types of surveys and their applications.

### Objectives

The course should enable the students to:

- Understand the principles of surveying.
- Know about chain surveying and plane table surveying.
- Understand the concepts of levelling and its applications.
- Understand the concept of Theodolite surveying.
- Get exposed to total station surveying, GIS and GPS.

### Outcome

The students will be able to:

- Gain the knowledge about the usage and principles of various surveying instruments with proper care and adjustments.
- Describe the bearing systems and the instruments used in chain surveying and plane table surveying.
- Use the instruments of levelling for levelling and contouring purposes.
- Do the temporary and permanent adjustments of vernier transit, measurement of horizontal and vertical angles using theodolite.
- Know the various uses of total station, GIS and GPS instrument.

### UNIT I CHAIN SURVEY AND LEVELLING 15

Chain survey- principles- classification- instruments used, ranging, reciprocal ranging, Leveling , methods of leveling, booking and reduction of levels, longitudinal leveling, cross sectioning, errors in leveling, problems in leveling, contouring.

### UNIT II THEODILITE SURVEY 15

To understand Theodolite survey, measurement of horizontal and vertical angles, problems tackled like centre line of building, setting out angles, etc.

### UNIT III TOTAL STATION 10

Total Station Survey - Different types - Introduction of GIS and GPS

### UNIT IV SITE ANALYSIS AND TECHNIQUES 10

Importance of site analysis - factors involved in accessibility - site characteristics - land, contours, water shed, climate and topography, preparation of site analysis diagram

## UNIT V ENVIRONMENTAL FACTORS

10

Man made structures, sensuous qualities, cultural data, images and data correlation vegetation plant associations, types and distribution preparation of ecological profile for an area.

**TOTAL: 60**

### TEXT BOOKS:

1. Punmia B.C., "Surveying", Laxmi Publications Private Limited, 2005.
2. Venakaramaiah, "Text Book of Surveying", University Press, 1996.
3. Kevin Lynch, Site Planning, MIT Press Cambridge.

### REFERENCES:

1. Joseph De. Chiarra and Lee Copleman, Planning Design Criteria Van Nostrand Reinhold Co., New York
2. Beer R, Environmental Planning for Site Development, Turner, Landscape Planning and Environmental Impact Design.
3. T.P.Kanetkar, S.V.Kulkarni, "Surveying and Levelling"; Vol.I, Pune Vidhyarthi Griha Prakashan, Pune, 1989.
4. Arora, K.R., "Surveying", Vol.I, Standard Book, New Delhi, 2009.
5. Kanetkar T.P., and Kulkarni .S.V., "Surveying and Levelling (Part- I)", Pune, Vidhyarthi Griha Prakashan.
6. P.B. Sahani, " Modern Surveying", Nemichand & Bros., Roorkee, UP.

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1201 THEORY OF ARCHITECTURE - II

L T P C  
2 0 0 2

### Goal

Understand the principals of organization of forms and spaces, their variations and application in architectural design by highlighting the connection between architecture and society by exposure to character and style of various forms of architectures and the driving forces behind it.

### Objectives

The course should enable the students to:

- Expose student to the relation between form and spaces, resulting in defined relationships and various forms of organization influencing the concept of design.
- Explain selected architectural styles and their characteristic features. Lead the students to understand the reasons and driving forces behind developments and changes in Architectural forms and styles in various cultures over the centuries.
- Expose the students to various principals of composition.
- Highlight the importance of the aspect of movement and circulation and their implications in design with selected samples.
- Expose the students the ideas and concepts and philosophy of contemporary architects through analysis of selected samples.

### Outcomes

The course should enable the students to:

- Identify and apply the vocabulary of organizing form and spaces
- Identify the various styles in architecture and understands the driving forces involved in architectural changes.
- Aware of various principles of composition and can apply them in design
- Understands the aspects of circulation and the need for circulation diagrams and their influence/ importance in the design for specialized buildings.
- Understands concepts and theories behind contemporary architecture.
- Aware that architecture with lasting impact has a theoretical background.

### UNIT I ORGANISATION OF FORMS AND SPACES

5

a) Spatial Relationships: i) Space within space, ii) Interlocking spaces, iii) Adjacent spaces, iv) Space linked by a common space b) Spatial Organization: influencing factors and their types i) Centralized, ii) Linear, iii) Radial, iv) Clustered, v) Grid c) Articulation of forms and spaces types: i) Edges and corners, ii) Surface. A Project on Creation of forms & spaces using the principles learnt.



**UNIT II CHARACTER AND STYLE IN BUILDINGS****9**

Factors influencing the character and style of buildings. Study of examples from Buddhist, Hindu and Islamic Architecture in India Greek, Roman, Gothic Renaissance, Modern and Post Modern Movement.

**UNIT III PRINCIPLES OF COMPOSITION****3**

Unity, harmony and specific qualities of design to include dominance, punctuating effect, dramatic effect, fluidity, climax, accentuation and contrast with building examples.

**UNIT IV CIRCULATION****4**

Function of building circulation components of building circulation The building approach, The building entrance, configuration of the path, path space relationship, form of circulation space with examples. Simple circulation diagram for buildings.

**UNIT V WORKS OF CONTEMPORARY ARCHITECTS****9**

Works of following modern and post modern architects and their ideologies and philosophies in brief Louis Sullivan, F.L.Wright, Louis Khan, Le Corbusier, Philip Johnson, Charles Correa, and Michael Graves.

**TOTAL: 30****TEXT BOOKS**

1. Paul Alan Johnson , "The Theory of Architecture - Concepts and Themes" - Van Nostrand Reinhold Co - 1994.
2. Francis D.K.Ching, "Architecture Form, Space and Order", Van Nostrand Publications, New York, 2007.
3. V.S. Pramdar, "Design Fundamental in Architecture" - Somaiya Publications Pvt. Ltd. New Delhi, 1973.

**REFERENCES**

1. Ernest Burden , "Elements of Architectural Design A visual resource", Van Nostrand Reinhold, 1995.
2. Sir Bannister Fletcher , "A History of Architecture", Architectural Press, 1996.
3. Forms and functions of 20th century Architecture - Talbot. Hamlin.
4. Approach to Architectural design ARG Isaac Butterworth & co. London 1977.
5. The four elements of Architecture - Senner Goltfried - Cambridge University press London. U.K.

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1202 HISTORY OF ARCHITECTURE - III

L T P C  
2 0 0 2

### Goal

To inform the development of architecture of Europe from the Romanesque period to the Renaissance period, (6th - 16th Century AD). To understand the impact of various geographical, cultural, social, religious and political forces on architecture.

### Objectives

The course should enable the student to:

- Understand how religious and civic buildings were constructed with grammar.
- Understand the synthesis of structure and aesthetics during the Gothic period in France.
- Understand the architectural character of Gothic style of buildings with plans, elevations and sections of selected buildings.
- Understand social and cultural influences contributed to Renaissance architecture in Italy.
- Understand the philosophy of renaissance architects of France and England, as to how they designed world renowned buildings.

### Outcomes

The students should be able to:

- Articulate knowledge on the construction of religious and civic buildings with grammar.
- Have a comprehensive knowledge about the development of Gothic Period in France and express the synthesis of aesthetics and structure with the aid of sketches.
- Articulate knowledge on the architectural character of Gothic style of buildings in Europe and express them with sketches of plans, elevations and sections.
- Have a comprehensive knowledge about the philosophy of Renaissance and how they influenced architecture in England and France.

### UNIT I ROMANESQUE

6

The medieval ages learning in the monasteries, evolution of the guilds Factors influencing architecture outline of architectural character in Italy, France and England Examples: Pisa group, Italy Abbey aux Hommes, Caen, Tower of London.

### UNIT II FRENCH GOTHIC

4

Religious and social influences evolution of vaulting and development of structural systems outline of Architectural character Examples: Notre Dame, Paris.

### UNIT III ENGLISH AND ITALIAN GOTHIC

4

Development of English gothic vaulting outline of Architectural character in England and Italy Examples: Westminster Abbey, Hampton Court Palace, London, Doges Palace, Venice, Milan Cathedral.

**UNIT IV ITALIAN RENAISSANCE****8**

The idea of rebirth and revival of art sociological influences in art and architecture Development of thought, emergence of merchant communities and their patronage. Outline of the Architecture during the early Renaissance, High Renaissance and Baroque Periods Features of a typical Renaissance palace, eg. Palazzo Ricardi, Study of life history philosophy, contribution of the following architects; Brunelleschi, Michelangelo, Andrea Palladio.

**UNIT V FRENCH & ENGLISH RENAISSANCE****8**

Outline of the architectural character of French and English Renaissance Domestic Architecture in England Study of the life, philosophy and works of the following architects: Sir Christopher Wren, Inigo Jones.

**TOTAL : 30****TEXT BOOK**

1. Sir Banister Fletcher, "A History of Architecture", University of London, The Athlone Press 1996, 20th edition.
2. Percy Brown, "Indian Architecture (Buddhist and Hindu Pd.)"- Tarapore Vala and Sons Bombay 1996.
3. Satish Grover, "The Architecture of India (Buddhist and Hindu Period)", CBS Pub., 2003

**REFERENCES**

1. Yatin Bandy, "Concepts of Space in Traditional Indian Arch", Mapin, 2005.
2. Mitchell, George (1996) "The Hindu Temple, University of Chicago Press.
3. Spiro Kostof, "A History of Architecture : Setting and Rituals", Oxford University Press, London, 2005 (digitized - 2007).
4. Pier Luigi Nervi, "History of World Architecture Series". Harry N.Abrame Inc. Publication, New York, 1972.
5. Meaning in Western Architecture - Christian Norberg-Schulz-Rizzoli, New York, 1974.

**WEBSITES**

1. <http://www.clr.toronto.edu> - virtual lib.
2. <http://www.lib.virginia.edu/>- Renaissance and baroque
3. <http://2.sjis.umich.edu/> - Image browser

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1203 MATERIALS AND CONSTRUCTION - III

L T P C  
2 0 4 4

### Goal

To introduce knowledge on how cement, concrete and reinforcements are used in various components of buildings like foundations, columns, beams, slabs and staircases. Thrust will also be on use of glass, treatment processes, properties and applications in building industry in buildings. The input is provided as theoretical knowledge base and practical applications in the form of construction drawings as included in objective below.

### Objectives

The course should enable the student to:

- Provide theoretical knowledge about the material cement: Its varieties, properties uses and applications.
- Make the students understand how cement, concrete, reinforcement are used in different components of building.
- Construction of simple framed building using RCC, in footings, columns. beams and slab.
- Details of concrete lintels/sunshade/ arches/shading devices.
- Concrete stairs according to profile namely straight flight, quarter turn, Dog legged open well bifurcated, grand helical and spiral. According to structural system /waist slab, stringer- trimmer, cantilever -beam, spine wall continuous slab and folded plate. [all through site visit, case study and exercises]
- To provide theoretical knowledge about glass, composition, manufacture variety properties, uses and applications in modern buildings.[structural glazing / curtain walling]

### Outcomes

The students should be able to:

- Design medium and large span low rise structure, of RCC
- Design RCC stair case of appropriate form and structural system.
- Incorporate structural glazing /curtain wall in the architectural design of buildings.

### UNIT I CEMENT

6

Varieties of cement, composition, properties and uses tests for cement mortar for various works.

### UNIT II CONCRETE, IT'S INGREDIENTS AND PROPERTIES

16

Ingredients suitability requirements for aggregates, grading of aggregates - water mix in concrete reinforcement admixtures properties of concrete. Concreting process its properties mix proportioning batching, mixing, transporting, placing, compaction, curing, formwork quality control tests for concrete joints in concrete concrete finishes.

**UNIT III CONCRETE CONSTRUCTION****27**

Introduction to framed structures. Concrete in foundations types of footings isolated, combined, continuous, strap. Concrete floors (PCC), walls and partitions. Concrete lintels, sunshades. Concrete beams and columns and slabs - one-way and two-way slabs.

**UNITIV CONCRETE STAIRCASES****15**

Factors involving staircase design types of staircases like straight flight, doglegged, quarter turn, bifurcated, spiral, helical, etc. different support conditions like inclined slab, cranked slab, continuous, cantilever foundations finishes for staircases detailing out of handrails and balusters. Designing and detailing for physically handicapped.

**UNIT V GLASS****11**

Composition of glass brief study on manufacture, treatment properties and uses of glass special types of glass, sheet glass, plate glass, safety glass, tinted and coated glass glass blocks properties and applications in the building industry current developments.

**TOTAL : 75****TEXT BOOKS**

1. Dr.B.C.Punmia, "Building Construction", Firewall Media , 2005.
2. Francis D.K.Ching, "Building Construction Illustrated" ,John Wiley & Sons Inc, 2002.

**REFERENCES**

1. W.B.Mckay , "Building Construction", Vol. 1,2,3- Longmans U.K 1992.
2. S.C.Rangwala, "Engineering Materials", Charotar Publishing House, India, 1997.
3. Alan Banc, "Stairs, Steps and Ramps", Butter worth Heinemann Ltd., 1996
4. M.S.Shetty, "Concrete Technology-Theory and Practice", S.Chand & Co. Ltd., New Delhi, 2005.
5. W.B.Mckay , "Building Construction" , Longmans, UK, 1981.

**WEBSITES**

1. Economy/companies/construction/concrete/materials
3. <http://www.easyads.co.2a/yellow/india/construct>
4. <http://www.concrete.t.v-tokyo.ac.jp>
5. [www.larsentoubro.com](http://www.larsentoubro.com)
6. [www.dalmiacement.com/index.html](http://www.dalmiacement.com/index.html)

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 4 hrs.

Part A: 10 questions X 4 marks = 40 marks (no choice)

Part B: 4 questions X 15 marks = 60 marks (choice for each question)

## AR1204 ARCHITECTURAL DESIGN - III

L T P C  
0 0 14 7

### Goal

To enable the student into the process of design articulate, glorify spaces in respect of buildings of small scale, small span, horizontal and vertical movements (two or three levels), incorporating barrier free elements and details.

### Objectives

The course should enable the student to:

- Enable student to familiarize with the given design topic by choosing, relevant and appropriate case studies within the region, visiting the sites and analyzing the same.
- Expose students to familiarize with the given topic of design by arranging special lectures from architects.
- Expose him/her to knowledge available on the relevant design at international level, through books and websites.

### Outcomes

The students should be able to:

- Learn single level planning in small scale
- Solve design solution and present in the form of drawing.

### UNIT I DESIGN STUDIO

180

Single level planning in small scale, small span, horizontal movement and simple vertical movement, data collection, case studies, analysis and presentation of studies - Data collection with respect to design and detailing for physically handicapped persons - Concepts and presentation of design with scaled models.

Examples: Residential buildings, Institutional buildings: banks, nursery or primary schools, primary health center, school for children with learning disabilities, neighborhood market, etc.

**TOTAL: 180**

### TEXT BOOKS:

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time - Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed.By.Quentin Pickard RIBA "The Architects' Hand Book", Bladewell Science Ltd., 2002

**REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K.Ching, John wiley & Sons, Inc. 1997

**WEBSITES**

1. <http://www.hamptons.com/freshair>
2. <http://www.columbiamedical.com>
3. <http://www.mgarchitects.com>

## SYLLABUS FOR IV SEMESTER B.ARCH COURSE

### CE1217 DESIGN OF STRUCTURES - 1

L T P C  
3 0 0 3

#### Goal

To enable students understand on steel structures. At this stage they would be exposed to the design of riveted and welded joints and steel beams and columns.

#### Objectives

The course should enable the student to:

- Inform to students the need for Steel Structures, the concept of abstract and detailed Design of steel structure.
- Inform the importance and contribution of Bolt Connections , Weld connections
- Make students know about the Design of steel beams & columns.

#### Outcomes

The students should be able to:

- Understand the need for steel structure, and the concept of abstract and detailed Design of steel Structure.
- Calculate the stability of Bolt & Weld Connections.
- Design steel column and beams for the various Support Condition.

#### **UNIT I PROPERTIES OF STEEL & INTRODUCTION TO LIMIT STATE DESIGN 10**

Structural properties of steel - codal provisions and design requirements of steel - Limit state characteristic load and characteristic strength of materials partial safety factor stress strain relationship of steel safety and serviceability requirements.

#### **UNIT II BOLTED JOINTS 5**

Bolted joints-lap joints-butt joints, Analysis and Design.

#### **UNIT III WELDED JOINTS 5**

Types of welding, permissible stresses, Design of fillet welds (excluding eccentric connections)

#### **UNIT IV STEEL BEAMS 10**

Allowable stresses, General specifications, Design of laterally supported beams.

#### **UNIT V STEEL COLUMNS 10**

Allowable stresses, various shapes, built up sections, Design of columns -simple cross sections only.

**TOTAL : 45**



### TEXT BOOKS

1. Ramachandra S., "Design of Steel Structures", Standard Book House, Delhi, 2006.
2. IS 800:2007 General Condition in Steel - Code of practice
3. Comprehensive Design of Steel Structures, Purnia, A.K Jain, 1998
4. Composite Structures of Steel & Concrete: Beams, Slabs, Columns & Frames for buildings, Volume-1, R.P Johnson, 2004.

### REFERENCES

1. "National Building Code of India - 2005", Part VI, Structural Design.
2. Gurucharan Singh, "Design of Steel Structures", Standard Publishers, New Delhi, 1982.
3. L.S Negi "Design of steel Structures", Tata McGraw-Hill Book Company, New Delhi 1997.
4. S.K Duggal, Design of Steel Structures, 2000
5. "Teaching Resources for Structural Steel Design" - Vol I and II - INSDAG Kolkata

### WEBSITE:

1. [www.steel\\_insdag.org](http://www.steel_insdag.org)

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

### AR 1211 HISTORY OF ARCHITECTURE - IV

L T P C  
2 0 0 2

### Goal

To inform the students on the influence of Islamic and British Neoclassical style in India.

### Objectives

The course should enable the student to:

- Understand the emergence of Islamic Architecture with the need for newer typologies of buildings and to know how style is unique in terms of its elements, décor, materials and construction systems.
- Identify and critically discuss the predominant Delhi or imperial style as well as the characteristic features of provincial style through study and drawings of selected buildings.
- Be exposed to various Mughal rulers who contributed to Islamic architecture and the development of its famed landscape design.

- Realize the impact of colonialism in India - the adoption of Neo-classical architecture and the development of the Indo Sarcenic style.

### **Outcomes**

The students should be able to:

- Identify and discuss the finer points and nuances of Islamic architecture and its influence on the development of Architectural sciences and styles.
- Provide an understanding on the various styles and the ruler patrons who influenced the development of this style of architecture.
- Realize the techniques and wonders behind various Islamic architectural and landscaping elements and principles and re-interpret them in today's context.
- Discuss the impact of colonialism and the wealth of architectural legacy the period introduced in India
- Critically evaluate historical principles and methods and impart that learning to create informed and relevant current architectural solutions that are meaningful and rooted in our historic and traditional knowledge and wealth.

### **UNIT I INTRODUCTION TO ISLAMIC ARCHITECTURE 6**

Influences on Islamic Architecture - a Brief study on the Islamic Architectural Character: the mosque, the tomb, and minaret, the madarasa, the palace, the caravanserai, vernacular architecture, the market important principles, elements and character of Islamic architecture in terms of structure materials and methods of construction, elements of decoration, color, geometry, light.

### **UNIT II DELHI OR IMPERIAL STYLE 5**

Development of architectural style during the rule of the slave, Khalji, Tuqlaq, Sayyid and Lodhi Dynasties important examples for each period.

### **UNIT III PROVINCIAL STYLE 9**

Development of the provincial styles in different regions Punjab, Jaunpur, Bengal, Gujarat, Malwa, the Deccan (Bijapur, Golconda, Bidar and Gulbarga) important examples for each style.

### **UNIT IV CONTRIBUTION OF RULERS OF ISLAMIC INDIA 8**

Development of the Mughal style under the different rulers Babur, Shershah, Humayun, Akbar, Jahangir, Shahjahan, Aurangazeb important examples development of the Mughal garden important examples.

### **UNIT V ARCHITECTURE IN COLONIAL INDIA 6**

Colonialism and its impact Early British Neo classical Architecture Indo Sarcenic Architecture and the works of Chisholm P.W.D. and the Institutionalization of Architecture Building New Delhi.

**TOTAL : 30**

### TEXT BOOK

1. Sir Banister Fletcher, "A History of Architecture", University of London, The Athlone Press 1996, 20th edition.
2. Percy Brown, "Indian Architecture (Buddhist and Hindu Pd.)"- Tarapore Vala and Sons Bombay 1996.
3. Satish Grover, "The Architecture of India (Buddhist and Hindu Period)", CBS Pub., 2003

### REFERENCES

1. Yatin Bandya, "Concepts of Space in Traditional Indian Arch", Mapin, 2005.
2. Mitchell, George (1996) "The Hindu Temple, University of Chicago Press.
3. Spiro Kostof, "A History of Architecture : Setting and Rituals", Oxford University Press, London, 2005 (digitized - 2007).
4. Pier Luigi Nervi, "History of World Architecture Series". Harry N.Abrame Inc. Publication, New York, 1972.
5. Meaning in Western Architecture - Christian Norberg-Schulz-Rizzoli, New York, 1974.

### WEBSITES

1. <http://www.islamicart.com/pages/archcrea/index.htm>
2. <http://libraries.mit.edu/rvc/aka/agakhan/index.html>
3. <http://www.greatbuildings.com//types/styles/islamic.html>
4. <http://www.ets.uidaho.edu/arch499/nonwest/Islam1.html>
5. <http://indiagateway.com/culture/architecture.html>

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## CY1203 ENVIRONMENTAL SCIENCE AND ENGINEERING

L T P C  
3 0 0 3

### Goal

To impart basic knowledge on the significance of environmental science for engineers.

### Objectives

The objective of the course is:

- To make the students aware of the existing natural resources such as forest water resources etc. and to educate them to understand the need for preserving the resources.
- To educate the students about the functions of various ecosystems and biodiversity.
- To provide knowledge on the various aspects of different types of pollution such as air pollution, water pollution, soil pollution etc.
- To give a basic knowledge on the social issues such as global warming, acid rain, ozone layer depletion, nuclear hazards etc. and to educate them about the various Environmental Protection Acts.
- To create an awareness among the present generation about the various aspects of human population and their effect on environment.

### Outcomes

Upon successful completion of the course, the outcomes are as follows:

- The students would have understood the effects of over exploitation of water resources, forest resources etc. and their impact on day to day life on earth.
- Knowledge on the functions of several of ecosystems will help the students to design the processes that are eco friendly.
- Knowledge on the different types of pollution will help the young minds to device effective control measures to reduce rate of pollution.
- Exposure on the issues such as global warming, acid rain, ozone layer depletion, and nuclear hazards will make the students understand the significances of sustainable development and the need to enforce Environmental Acts.
- Educating on the various aspects of population explosion will create awareness on population control for effective utilization of the resources and the need to explore new alternate energy resources for a healthy environment.

### UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 10

Definition, Scope and importance - Need for public awareness - Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal peoples - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems - Mineral resources: Use and exploitation, environment effects of extracting and using mineral resources, case studies - Food resources: World

food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies - Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies - Land resources: Land as a resource, land degradation, man included landslides, soil erosion and desertification - Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets - river/forest/grassland/hill/mountain.

## **UNIT II ECOSYSTEMS & BIO-DIVERSITY**

**14**

Concept of ecosystem - Structure and function of an ecosystem - Procedures, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) - Introduction - to Biodiversity-Definition: Genetic, species and ecosystem diversity. Biogeographical classification of India - Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels - India as a mega-diversity nation. Hot-spots of biodiversity - Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Field study of common plants, insects, birds

Field study of simple ecosystems - pond, river, hill slopes, etc.

## **UNIT III ENVIRONMENTAL POLLUTION**

**8**

Definition-Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards - Soil waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Pollution case studies - Disaster management: Floods, earthquake, cyclone and landslides.

Field Study of local polluted site - Urban / Rural / Industrial / Agricultural

## **UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT**

**7**

From Unsustainable to sustainable development. - Urban problems related to energy - Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people; its problem and concerns, Case studies - Environmental ethics: Issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies - Wasteland reclamation - Consumerism and waste products. Environmental protection Act. Air (prevention and control of Pollution) Act - Water (prevention and control of Pollution) Act - Wildlife protection Act - Forest conservation Act - Issues involved in enforcement of environmental legislation - Public awareness.

## **UNIT V HUMAN POPULATION AND THE ENVIRONMENT**

**6**

Population growth, variation among nations - Population explosion - Family Welfare Programme -

Environment and human health - Human rights - Value education - HIV/AIDS - Women and Child Welfare - Role of information Technology in Environment and human health. Case studies.

**TOTAL: 45**

**TEXT BOOKS**

1. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0,2004.
2. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. 1971
3. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, 1999
4. Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications, 1998.

**REFERENCES**

1. Bharucha Erach, The Biodiversity of Indian, Mapin Publishing Pvt. Ltd., Ahmedabad India, 2004.
2. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol.I and II Enviro Media.
3. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
4. Wager K.D., Environmental Management, W.B.Saunders Co., Philadelphia, USA, 1998.

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

**AR1217 ADVANCED COMPUTER GRAPHICS**

**L T P C**  
**3 0 0 3**

**Goal**

To inspire the students with theories of digital media, along with, using the high-end software for developing the conceptual designs. The students are also to be exposed to current trends in presentation using latest software.

**Objectives**

The course should enable the student to:

- Provide information on historic and contemporary theories and developments in the digital era.

- Enable the students to use the Digital Media, not just as a drafting tool but also as a design process and presentation tool.
- Make the students understand the need for the visualization and latest presentation techniques.

### **Outcomes**

The students should be able to:

- Know how isms evolved over a period of time affecting architecture.
- Evolve design as a process thru digital media or computational methods.
- Provide complete solution using the digital media to compete in the architectural field.

### **UNIT I INTRODUCTION 5**

Past trends and theories of digital media - the influence of digital media on the perception of space and architecture, Virtual spaces.

### **UNIT II VISUALIZATION STUDIO 12**

Role of visualization as a tool in the interpretation of design- development of conceptual models - design wall, windows, openings, roofs, staircase, design library, generate - elevations, sections, perspective views - schedule tables - layer management- exercises involving the same.

### **UNIT III ADANCED 3 D MODELLING 8**

Enhancing the virtual model with the application of light, color, materials, texture, environments - introducing cameras.

### **UNITIV ANIMATION AND PRESENTATION 10**

Working with key frames, time configurations, converting as media files (avi, jpeg, etc.) - high-resolution photo rendering and photo realistic images - exercises involving the same.

### **UNIT V CONTEMPORARY DESIGN PROCESS 10**

Formal and functional abstraction - Development of conceptual design models - design development - documentation and presentation.

**TOTAL: 45**

### **TEXT BOOKS**

1. Watt, Fundamentals of Three Dimensional Computer Graphics, Addison - Wesley, Massachusetts, 1989.
2. Sham Tikoo, Autocad 2000, A Problem solving approach, Leaming 1999.
3. Contemporary Architecture and the Digital Design Process-Peter Szalapaj, 2005

### **REFERENCE:**

1. L. Conway et.al. Virtual Architecture, Batsford, 1985.
2. John Beckman, The Virtual Dimension, Architecture, Representations and crash culture, Princeton Architecture Press, 1998.

3. User Guide, Architectural Desktop 2004.
4. User Guide, 3D studio max.
5. Google sketch up
6. Omura George, Mastering AutoCAD, BPB Publications, New Drelhi.
7. Kolareric Branko, Architectural Rendering and Modelling with AutoCAD, John Wiely, New York, 1998.
8. Synder James, Architectural Construction Drawings with AutoCAD, John Wiely, NewYork, 1998.

### **PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 4 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 1 question X 80 marks = 80 marks (with choice)

### **AR1218 CLIMATE AND BUILT ENVIRONMENT**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

#### **Goal**

To create an awareness that architecture to a large extent gets influenced by climate, by exposing the student to factors of climate, climatic zones, heat flow through materials and buildings, the resultant ambience and finally leading to design considerations.

#### **Objectives**

The course should enable the student to:

- Provide information on factors that contribute to climate and what is a comfort zone.
- Enable students to understand the movement of the sun, its paths, angles, the radiation levels and how to overcome the harmful effects through shading devices.
- Make student understand the transfer of heat into buildings through materials and building elements.
- Expose the students to air movements in and around buildings and the resulting effects.
- Provide information on various design considerations and parameters that are required for various climatic zones and as to how landscape could be integrated into building designs.

#### **Outcomes**

At the end of the course the students will:

- Have a broad knowledge of climate and human and building interactions with details regarding the movement of the sun and its effect.



- Be aware of the physics of heat transfer through materials and building elements.
- Be familiar with the dynamics of air-movements in and around buildings.
- Be able to place this specialized knowledge in the context of the design of buildings and the wider subject
- Be able to critically evaluate the wider implications of how human beings interact with their environment
- To be able to think in an innovative and creative way
- Be able to address particular practical issues such as designing of shading devices based on sun path diagram.

**UNIT I CLIMATE AND THERMAL SENSATION 6**

Factors that determine climate Components of climate Characteristics of climatic types Body heat balance -Effective temperature - Comfort zone.

**UNIT II SOLAR CONTROL 6**

Solar geometry solar chart Sun angles and shadow angles Design of solar shading devices.

**UNIT III HEAT FLOW THROUGH MATERIALS 4**

Basic principles of Heat Transfer Performance of different materials 'U' value Time lag and decrement of building elements.

**UNIT IV AIR MOVEMENT 6**

Wind rose Wind shadows Air movement around and through buildings Stack effect Thermally induced Air currents.

**UNIT V SHELTER DESIGN IN TROPICS 8**

Design considerations for warm humid, hot dry, composite and upland climates Heavy rainfall regions Landscape and climatic design.

Case studies of climate responsive building design in India for the various climate types.

**TOTAL: 30**

**TEXT BOOKS**

1. O.H.Koenigsberger and others, "Manual of Tropical Housing and Building Climatic Design," University press, Chennai, 2010.
2. Donald Watson and Kenneth Labs., "Climatic Building Design : Energy Efficient Building Principles & Practices", McGraw-Hill Book Company New York 1983.

**REFERENCES**

1. Arvind Krishnan, "Climate Responsive Architecture - A Design handbook for Energy efficient buildings", Tata Mc.Graw Hill publications Co., Ltd., New Delhi, 2001, Reprinted 2004
2. Mili Majumdar, "Energy Efficient Buildings in India", Teri press, New Delhi, 2002.
3. M.Evans , "Housing, Climate and Comfort", Architectural Press, London, 1980.

4. Joseph de chiara and Le Copplemann, "Planning and Design Crieteria", McGraw-Hill, New York 1983.
5. B.Givoni, Man, "Climate and Architecture, Applied Science", Banking, Essex, 1982.

#### **WEBSITES**

1. [www.teriin.org/](http://www.teriin.org/)
2. [www.wiki.naturalfrequency.com/wiki/sun-path\\_diagram](http://www.wiki.naturalfrequency.com/wiki/sun-path_diagram)
3. <http://www.imdchennai.gov.in>

#### **PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

#### **AR1215 MATERIALS AND CONSTRUCTION - IV**

**L T P C**  
**2 0 4 4**

#### **Goal**

To enable the students to understand that Ferrous metals and Non-Ferrous metals are equally important in construction industry by studying their manufacturing process, properties, applications and uses and current trends in terms of theory and through drawings as indicated in objective below.

#### **Objectives**

The course should enable the student to:

- Study ferrous metals in detail and their role in construction industry.
- Study structural steel construction in detail
- Study aluminum alloys, copper, brass, tin and lead.
- Study aluminium doors, windows, partitions etc. Use of copper, bronze, brass in architectural construction.

#### **Outcome**

The students should be able to:

- Understand the progressive achievements of castiron to steel, types of steel, its properties, application in construction industry and present developments.
- Understand the steel in foundation, columns, beams and roofs. Details on steel stair cases, doors, windows and furniture.

- Understand properties and use of non ferrous metals in building industry.
- Understand in detail how aluminum, its alloys and its products are used in construction industry.

**UNIT I FERROUS METALS 10**

Brief study on manufacture, properties and uses of cast iron, wrought iron, pig iron and steel anticorrosive measures for steel mechanical and heat treatment of steel market forms of steel structural steel, stainless steel, steel alloys properties and uses current developments.

**UNIT II STEEL CONSTRUCTION 32**

Structural steel sections types of connections in steel steel in foundations, columns and beams different types of steel roof trusses including north light truss space frames materials for roof covering.

Steel staircases and handrails, balusters - Doors and windows openable, sliding collapsible gates rolling shutters.

**UNIT III NON FERROUS METALS 8**

Aluminium and Aluminium Alloys brief study on properties and uses Aluminum products extrusions, foils, castings, sheets, etc. brief study of other non ferrous metals like copper, bronze brass, tin and lead, properties and uses current developments.

**UNIT IV CONSTRUCTION USING NON FERROUS METALS 25**

Aluminum doors openable, sliding.

Aluminum windows openable, sliding, fixed.

Aluminum partitions, false ceiling, shop front handrails, curtain walling.

Use of other nonferrous metals like copper, bronze, brass, etc. in architectural construction. Detailing and specification for physically handicapped.

**TOTAL : 75**

**TEXT BOOK**

1. S.C.Rangwala, Engineering Materials, Charotar Publishing House, India, 1997.

**REFERENCES**

1. W.B.Mckay, "Building Construction", Vol. 1,2,3- Longmans U.K 1992.
2. B.C.Punmia, "Building Construction", Laxmi Publications Pvt. Ltd., New Delhi, 1993.
3. Arthur Lyons, "Materials for Architects and Builders An Introduction" Arnold, London, 1997.
4. Harold B.Olin, Construction Principles Materials and Methods, The Institute of Financial Education, Chicago, 1980.
5. Time Saver Standards for Architectural Design Data, Calendar JH, McGraw-Hill, 1974.
6. Don A. Watson, Construction Materials and processes, McGraw Hill Co., 1972.

## WEBSITES

1. <http://www.britmetfed.org.uk/frmedu.html>
2. <http://www.indiabusinessonline.com>
3. <http://www.nrwas.com>
4. <http://www.arcadiaproducts.com>
5. <http://www.sail.com.in>

### **PATTERN OF QUESTION PAPER (To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration:4 hrs.

Part A: 10 questions X 4 marks = 40 marks (no choice)

Part B: 4 questions X 15 marks = 60 marks (choice for each question)

### **AR1216 ARCHITECTURAL DESIGN - IV**

**L T P C**  
**0 0 14 7**

#### **Goal**

To enable the student into the process of design in different context (Urban and Rural) by choosing relevant topics of community or civic importance. Thrust will be on rural materials, construction techniques and design details. Exposure to Computer usage is to be given importance.

#### **Objectives**

The course should enable the student to:

- To enable students to familiarize with given topic of design by choosing appropriate case studies through visits and documentation.
- To give additional input on the topic of design by organizing special lectures from expert architect.
- To enable students understand the knowledge available at international level through books, literatures and websites.

#### **Outcomes**

The students should be able to:

- Understand more about rural materials, construction techniques and design details
- Convert the details into drawings using appropriate software

#### **UNIT I DESIGN STUDIO**

**60**

Problem related to multi room, single use, small span multiple story, Horizontal and vertical movement, Active cum passive energy, conventional and frame type buildings. Examples: Departmental store,

Library, higher secondary school, campus students center, etc. The projects will consciously provide for movement and use by the physically handicapped and elderly.

## **UNIT II DESIGN STUDIO - RURAL STUDY**

**120**

Problems related to Rural Housing Visits to selected village surveys on socio economic, physical, housing and surveys, etc. to study existing conditions analysis of survey data preparation of report, documentation and presentation in a seminar preparation of design brief solutions for housing and community facilities.

**TOTAL : 180**

### **TEXT BOOKS:**

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time - Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed.By.Quentin Pickard RIBA "The Architects' Hand Book", Bladewell Science Ltd., 2002

### **REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K.Ching, John wiley & Sons, Inc. 1997

### **WEBSITES**

1. <http://www.focusnet.co.uk/cib/library/physdishous94.htm>
2. <http://www.ourvirtualmall.com/cloth.htm>
3. <http://www.ddimagazine.com/>
4. <http://www.atlasmagazine.com/photo/lande6>

## SYLLABUS FOR V SEMESTER B.ARCH COURSE

### CE1313 DESIGN OF STRUCTURES - II

L T P C  
3 0 0 3

#### Goal

To introduce design of reinforced cement concrete structures by working stress and limit state design methods based on IS codes IS 456 for design of beams and slabs.

#### Objectives

The course should enable the students to :

- Be familiar with the knowledge of limit state design method for concrete structures and also know about partial safety factor, stress- strain relationship of concrete.
- Be acquainted with the knowledge of limit state design of beam including singly reinforced, doubly reinforced and flanged beam.
- Gain knowledge of limit states design of R.C.C slab using IS code.
- Be familiar with the limit state method of design of R.C.C column of rectangular and circular section.
- Gain knowledge of working stress design of foundation. Isolated pad footing and combined footing.

#### Outcome

The students will be able to:

- Develop knowledge about of limit state design methods for concrete structures.
- Use the limit state design methods to design RCC beam.
- Use the limit state method to design R.C.C slabs.
- Use the limit state methods to design RCC column.
- Use working stress method to design footing for foundation.

#### UNIT I LIMIT STATE DESIGN FOR CONCRETE STRUCTURE - INTRODUCTION 5

Limit state characteristic load and characteristic strength of materials partial safety factor - stress-strain relationship of concrete safety and serviceability requirements.

#### UNIT II LIMIT STATE DESIGN OF BEAMS 10

Design of rectangular sections for bending singly reinforced, doubly reinforced and flanged sections

#### UNIT III LIMIT STATE DESIGN OF SLABS 10

Design of one-way and two-way slabs using IS Code coefficient for various edge conditions.

**UNIT IV LIMIT STATE DESIGN OF RCC COLUMNS****10**

Behaviour of Columns - Code provisions Design of axially loaded short columns of rectangular and circular sections ties and spiral reinforcements. Concept of Long columns (No Design calculations).

**UNIT V WORKING STRESS DESIGN OF FOUNDATION****10**

Types of foundations Isolated pad footings for simple design problems -Structural Concept of combined footings (No Design calculations)

NOTE: Reference to IS codes and tables be permitted in the examination.

**TOTAL: 45****TEXT BOOKS**

1. P.C.Varghese, "Limit state Design of Reinforced Concrete", Prentice Hall of India , 2004.
2. Limit State Design of Reinforced Concrete, B.C.Punia, A.K Jain, 2007
3. Reinforced Concrete Design, N.Krishnaraju & R.N. Pranesh, New Age International Publications, 2006.

**REFERENCES**

1. S.N. Sinha, "Reinforced Concrete Design", Tata McGraw-Hill, New Delhi 1998.
2. Dr.B.C.Punia, Reinforced Concrete Structures, Laxmi publication, Delhi, 1992.
3. P.Dayaratnam, "Design of Reinforced Concrete Structures", Oxford and IBH Publishing Co., 1983.
4. S.Unnikrishnan Pillai & Devados Menon, "Reinforced Concrete Design", Tata Mc.Graw Hill 2003.
5. N.C.Sinha and S.K.Roy, "Fundamentals of Reinforced Concrete", S.Chand & Co., New Delhi, 1983.

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## CE1314 ESTIMATION AND SPECIFICATION

L T P C  
3 0 0 3

### Goal

To enable students understand that economic viability of a project is equally important in design through exposing him/her to procedures involved in estimating quantities of materials and works, various costs and various financial institutions involved in it. Simple projects will be introduced for preparation of estimates.

### Objectives

The course should enable the student to:

- Inform to students the need for estimation, the concept of abstract and detailed estimates based on measurements of materials and works.
- Inform the importance of BOQ, cost control and budgeting, and norms and standards involved.
- Make students know about the various financial agencies and institutions involved in land and building development and effecting financial control at various stages of the projects.

### Outcomes

The students should be able to:

- Understand the need for estimation, and the concept of abstract and detailed estimates.
- Prepare BOQ and know to control cost and budget within the norms and standards.
- Acquaint themselves about the various financial agencies and institutions.

### UNIT I SPECIFICATION AND TENDER

8

Data - Schedule of rates - Analysis of rates - Specifications - sources - Detailed and general specifications - Tenders - Contracts - Types of contracts.

### UNIT II INTRODUCTION TO ESTIMATION

10

Types and purpose, approximate estimate, detail estimate of building, Bill of quantity format. Quantity survey Principle of measurement and billing, elementary billing and measurement of basic materials like brick wood, concrete, etc. - Analysis of rates.

### UNIT III ESTIMATE OF BUILDING

8

Load bearing and framed structures - Calculation of quantities of Earthwork excavation, foundation, brick work, RCC, PCC, Plastering, white washing, colour washing and painting for shops, rooms residential building with flat roof.

(Problems should be simple eg. Sump, water tank, shop, a room etc.,)

### UNIT IV VALUATION

10

Valuation - purpose - Income and outgoings - Depreciation - Methods of depreciation - valuation of building - Methods of valuation - Calculation of Standard rent - Mortgage - Lease

(Questions preferably of theory based, if Problems introduced it should be simple and direct)



## UNIT V BUSINESS ENVIRONMENT AND FINANCE

9

The business environment, and its structure in practice, financial control and management for building construction - role of various financial agencies for building and land development.

**TOTAL : 45**

### TEXT BOOKS

1. Dutta B.N., Estimation & Costing in Civil Engg., UBS Publishers and Distributors. Pvt. Ltd 2003.
2. S.C.Rangwala, "Elements of Estimating and Costing", Charoter Publishing House, India.
3. "Estimating Costing Specification & Valuation In Civil Engineering", M.Chakrabarti
4. Kohli D.D. & Kohli R.C., "A Text book of estimating & Costing (Civil) S.Chand & Company Ltd. 2004.

### REFERENCES

1. W.H.King and D.M.R.Esson, "Specification and Quantities for Civil Engineers", The English University Press Ltd.
2. "Tamil Nadu Building Practice", Vol.1, Civil, Govt. Publication.
3. "P.W.D. Standard specifications", Govt. Publication.

### WEBSITES

1. <http://www.builderdata.com/>
2. <http://www.building.ca/>

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR 1306 BUILDING SERVICES - II

L T P C  
2 0 0 2

### Goal

To educate the student the importance of Building services in attaining a holistic Architectural Design and explore integration of all the allied building services into their Architectural Design.

### Objectives

The course should enable the student to:

- Expose the students on the basics of acoustics and its relation with the building profile.
- Expose the students on basics of mechanized transportation in buildings and complex services.
- Give detailed input on low and high voltage supplies, precautionary methods required for safety, electrical circuit supply and distribution and knowledge on Sub-station required for public buildings and campuses.
- Enable students to understand the importance of lighting in buildings for visual appreciation, factors and laws involved in illumination.
- Give additional knowledge on sources of light, its classification and intensities required for various types of gadgets, their advantages and disadvantages in usage.
- To Educate them to explore all the fundamentals, byelaws, Rules and Regulations, Codes and understand the importance of references and Recommendations. Example: National Building Code, National Plumbing code, National Electrical Code, EGBC for Lighting and International Lighting Codes.

### Outcomes

The students should be able to:

- Exercise on Soundscape and Acoustical Design brief for a Design Context like Lecture Halls, Classrooms, Conference room, Theatres and Auditoriums.
- Browse catalogues of various vendors of Elevators, Escalators, Dumpwaiters, Car Lifts, Freight Lifts and Hospital Lifts, Fire Lifts and provide a comparative Statement on the Technical specification of selected Vendors.
- Understand Electrical Symbols used in Electrical Layouts and understand reading an Electrical layout as SLD and understand the technical design brief for an Electrical Design for a Building. Understand the concept of Safety, Security and control in Electrical System.
- Understand the Design of Lighting and Integration of same with Architectural Design and explore all the fundamentals of Lighting in arriving at a technical Design brief for a Building.
- Understand the Selection criteria of Lighting fixtures and fittings based on comparison of technical specification of various vendors available in the Market.

**UNIT I ACOUSTICS****6**

Acoustic fundamentals - Properties of sound and waves - Sound sources - Sound field in Enclosures, Sound propagation and transmission inside the building.

Noise control criteria and regulations - Instrumentation - Noise sources - Room acoustic - walls, barriers and enclosures.

**UNIT II MACHINERY AND EQUIPMENT****4**

Mechanized transportation in buildings: Lifts, escalators, Conveyors, Traveletors. Hot water boilers, diesel generators, Essential services in Hospital, Hotels, Labs - Gas, water, air and electricity.

**UNIT III ELECTRICAL SYSTEMS AND INSTALLATIONS****7**

Basics of electricity Single/Three phase supply Protective devices in electrical installations Earthing for safety Types of earthing ISI specifications. Types of wires, wiring systems and their choice Planning electrical wiring for building Main and distribution boards transformers and switch gears Layout of substations.

**UNIT IV PRINCIPLES OF ILLUMINATION****5**

Visual tasks - factors affecting visual task - Modern theory of light and colour - synthesis of light - Additive and subtractive synthesis of colour - Utilization factor - depreciation factor - MSCP - MHCP - Laws of illumination.

**UNIT V LIGHTING DESIGN****8**

Classification of lighting Artificial light sources spectral energy distribution luminous efficiency colour temperature colour rendering.

Design of modern lighting Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

**TOTAL: 30****TEXT BOOKS**

1. E.R.Ambrose, "Heat Pumps and electric heating", John and Wiley and Sons, Inc., New York, 1968.
2. R.G.Hopkinson and J.D.Kay, "The Lighting of buildings", Faber and Faber, London, 1969.

**REFERENCES**

1. "Architectural Acoustics" by David Egan.
2. Philips, "Lighting in Architectural Design", McGraw-Hill, New York, 1964.
3. "Light Architecture" - New Edge city, Cianni Ranulo, Birkhauser - Publishers for Architecture 2001

4. "Lighting Design", Ulrike Brandi Light, 2006, Institute for International Architectural Documentation GMBH & Co. KG.
5. "Road Lighting for Safety", Da.Schrender, Dr.Ir, Dr.Schreuder, 1998

**PATTERN OF QUESTION PAPER**  
(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

**AR1511 SUSTAINABLE ARCHITECTURE**

**L T P C**  
**3 0 0 3**

**Goal**

To enable student understand how architecture is related to Sustainable and green building concept in the planning process; how the environment has an impact on the society: the conventions which binds the nations; the global agenda to tackle it; and how architects can contribute to building and planning concept through understanding of climate resilient materials, technologies, credit points of Architecture and Planning an more of greener society.

**Objectives**

The course should enable the student to:

- Enable student understand the meaning, definition and relationship between Architecture, Environment, climate and its impact on the spaces
- Critically evaluate how spaces have been organized and utilized by using the concept of sustainable materials and technologies
- Examine the usage and selection of spaces for designing, the global conventions, Eco system balance and environment friendly buildings
- Enable students understand the concept of Green Architecture, LEEDS rating and Griha rating of buildings and public involvement, in the planning process.
- Make students know about the policies and actions of Government and awareness and case studies.

**Outcomes**

The students should be able to:

- Have a comprehensive knowledge on the evolution and impact of environmental aspects and sustainable issues
- Be equipped to handle the architectural design process from the studies, analysis, interpretation and design in accordance to the case studies done on the green building concepts.

- Have a knowledge on the Government policies and actions towards the Sustainable society and the latest technologies involved in the Building process
- Have knowledge on the organic and sustainable Building materials used in the design and execution.

**UNIT I INTRODUCTION 10**

Concept and Definition - 1970; Stock home Declaration - 1972 ; Brunt land commission - 1987; Earth summit - 1992 (UCED).

Environmental impact on human development related activities due to population growth, pace of urbanization, increase in consumption of energy, natural resources, waste generation, deforestation and pollution.

**UNIT II IMPACT OF CONSTRUCTION INDUSTRY ON ENVIRONMENT 10**

Depletion of Earth's resources, minerals and energy, towards anthropogenic Climatic changes- towards hotter and drier, Desertification, Coastal flooding and erosion, Water shortage - decline in water quality, Food security- threatened, Imbalance in Eco system.

**UNIT-III GLOBAL INITIATIVE AND MAJOR ACHIEVEMENTS RIO DECLARATION 5**

Agenda - 21 - Forest principles - legally binding conventions, the need: Governments' commitments -priority areas.

**UNIT IV ACTION PLANNING TOWARDS SUSTAINABLE ARCHITECTURE 10**

Appropriate Policy framework for sustainable planning and development, Selection of land for human settlement and quarrying, Reduction of construction activities in eco sensitive zone. Selection and use of timber from sustainability managed forest. Integrated waste management policy and system- segregation, collection, recycling, treatment and disposal at sustainable managed site. Integrated Energy, water, construction materials and technology, management policy, framework for built environment waste management policy framework. Sustainable building material Technology options. Application of concept of Green architecture, Agile architecture, LEEDS rating., TERI rating system, Building automation etc.

**UNIT V SUSTAINABLE PLANNING AND POLICIES 10**

Government policies, programmes and actions - Action by architects and designers, Action by builders/ promoters - Awareness programme - Case studies /workshops Sustainable City Planning initiatives.

**TOTAL : 45**

**TEXT BOOKS**

1. Manik & Girish Komisva, IIPA, " Keeping Cities Clean and Green", Uppal Publishing House, 1997.
2. Anne Beer, "Environment Planning for Site Development", E & Fn Spon 1994.
3. Sustainable Building Design Manual - Vol 1 & Vol 2, Published by Energy & Resources.

## REFERENCES

1. "Bioclimatic Architecture" ENEA and IN/ARCH Publication Edition, 1990.
2. "Wealth from waste" - TERI, 2005.
3. Steele, James (1997) Sustainable architecture: principles, paradigms, and case studies, McGraw Hill.
4. Gauzin-Muller, Dominique (2002) Sustainable Architecture and Urbanism: Concepts, Technologies and Examples, Birkhauser
5. Vallero, Daniel and Brasier, Chris (2008) Sustainable design : the science of sustainability and green engineering, Hoboken, N.J. : John Wiley
6. Mostaedi, Arian (2002) Sustainable architecture: low tech houses, Carles Boto I Comera
7. Wright, Richard T. (2008) Environmental science : toward a sustainable future, Upper Saddle River, NJ : Pearson
8. Guest editor Jay Yang [eBook] (2008) , Bradford, England : : Emerald Group Publishing

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR 1305 CONTEMPORARY ARCHITECTURE

L T P C  
2 0 0 2

### Goal

To expose to students the knowledge about impact of industrialization, invention of new materials, revolutionary thinking and philosophies of Architects, emerging schools of thought, and contributions made by architects of international fame.

### Objectives

The course should enable the student to

- Be exposed to various architectural movements and manifestoes over the past century
- To study the work of pioneering architects and institutions and comparing varied schools of thought.
- Understand the impact of technological and philosophical progress which produced radical new thoughts such as the deconstructivist theory, digital architecture and Fractile geometry.
- Be aware of architecture and urban design in post independent India, including both works of foreign architects and Indian masters.

## Outcomes

The students should be able to:

- Provide considerable insight on the progress of architectural philosophies globally over the past century and discuss current trends and theories knowledgeably.
- Independently research trends in architecture and form critical opinions on differing ideologies and schools of thought.
- Look beyond singular history text books and develop an understanding of 'why' things happen and what their impact can be, more than simply 'what' happened.
- Practice in India with an understanding of what the architectural community has been developing in the country after independence and sharing a common vision for the benefit of all.

### **UNIT I INTRODUCTION 4**

Brief on Neo Classicism Enlightenment Architects: Boullée and Ledoux. Industrial Revolution; Invention of Materials and Technologies and their influence on Architecture.

### **UNIT II ARCHITECTURAL MOVEMENTS 6**

Art Nouveau and the works of Gaudí, Horta, Macintosh - A brief study of the Early works of F.L. Wright, Adolf Loos; Futurists Movement Manifestos and the works of Sant'Elia Expressionism and the works of Mendelsohn, Taut, Polzeig Cubism and Constructivism and its influence on Architecture Destijl: Ideas and works.

### **UNIT III INSTITUTIONS 6**

Werkbund and Bauhaus/Works of Behrens and Gropius Canonising Modernism International Style CIAM Congresses and Declarations. Works and Ideas LeCorbusier Mies Later Works of Wright Alvar Alto

### **UNIT IV MODERNISM, POST MODERNISM AND LATER 8**

Brief on critiquing modernism, through writings of Venturi, Jane Jacobs, Aldo Rossi Christopher Alexander. Historic Revivalism Pop Architecture Critical Regionalism Deconstructive Theory and Practice - their limitations. Later Ideas and selected Works of - Fathy Baker Ando Soleri Bawa. works of Zaha Hadid, Frank O Gehry, Peter Eisenman, Rem Koolhaas, Skidmore, Owings and Merrill, Michel Graves - study of concepts like Digital Architecture - Fractile Geometry and influence of Digitization and Globalisation on Architecture.

### **UNIT V POST INDEPENDENT ARCHITECTURE IN INDIA 6**

Chandigarh and Bhuvaneshwar experiments Influence of Corbusier, Louis Khan, Koenigsberger The formation of Institutions Debates on Tradition as a source and burden works and ideas: Nari Gandhi Doshi Kanvinde Correa A. Rajee U.C. Jain Stein Housing and the issues of Appropriate Technology Architecture in the Horizon.

**TOTAL : 30**

## TEXT BOOKS

1. Bill Risebero, "Modern Architecture and Design", MIT Press ,1985.
2. Kenneth Frampton, "Modern Architecture: A Critical History", Tahmes and Hudson, London, 1994.
3. James Steele, "The Complete Architecture of Balakrishna Doshi", Thames and Hudson,1998.
4. "McMillan's Encyclopedia of Architecture" ,Macmillan Publications,1990.

## REFERENCES

1. Thomas Metcalf, "An Imperial Vision", Oxford University Press,2002.
2. Manfredo Taferi/Franceso dal co., "Modern Architecture", Faber and Faber/Electa, 1986.
3. Sigfried Giedion, "Space Time and Architecture: The Growth of a New Tradition", Havard University Press, 1978.
4. Aldo Rossi, "The Architecture of the City", MIT Press, Massachusetts, 1982.
5. Charles Jencks, "The Language of Post Modern Architecture", Rizzoli, 1984.
6. Christopher Alexander, "Pattern Language", Oxford University Press, 1977.
7. Jon Lang, Madhavi Desai , "Architecture & Independence - India 1880 to 1980" paper bags, Oxford India 1997.
8. Derek Avery, "Modern Architecture", Chaucer Press ,London , 2003.

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

### AR1303 MATERIALS AND CONSTRUCTION - V

L T P C  
2 0 4 4

#### Goal

To educate students on protective, preventive and corrective actions, to be taken in a building with regards to various materials, details, and stages in construction, for comprehensive understanding of practices to cover water proofing, types of insulation, covering, paints and enamels. Relevant construction drawings are stressed, as shown in objective.

#### Objectives

The course should enable the student to

- Understand causes & methods of various damp / water proofing



- Understand general principles of heat gain and heat loss. To educate students on the prevailing methods and materials used for thermal insulation
- Understand general principles of acoustics and to educate the current trends in market for sound insulation and optimum sound quality.
- Understand different types of floor & wall coverings. Properties uses and its laying methods.
- Understand different types of paints and its applications

### **Outcomes**

The students should be able to:

- Understand present practices and materials for damp & water proofing including in basements, swimming pools, terraces etc.
- Understand the causes for heat gain & heat loss how effectively the insulation helps in keeping the comfortable heat levels in buildings.
- Understand major defects and possible rectification is understood. The commonly used acoustic treatments with the thrust on recording studio & auditorium
- Understand the floor & wall covering materials in detail.
- Recognize how to differentiate various types of paints and its properties.

### **UNIT I DAMP AND WATER PROOFING**

**20**

Damp proofing hot applied and cold applied Emulsified asphalt, Bentonite clays, butyl rubber, silicon, vinyl's, Epoxy resins and metallic water proofing materials properties, uses. (Water proofing membranes such as rag, asbestos, glass, felt plastic and synthetic rubber vinyl, butyl rubber, neoprene polyvinyl chloride (PVC) prefabricated membranes sheet lead, asphalt properties and uses. Application of the above under various situations basement floors, swimming pool, terraces, etc. Market study of current developments.

### **UNIT II THERMAL INSULATION**

**15**

Heat transfer and heat gain by materials vapor barriers and rigid insulation. Blanket, poured and reflective insulation properties and uses of spun glass, foamed glass, cork, vegetable fibers, mineral fibers, foamed plastics, and vermiculite and glass fibers. Gypsum manufacture, properties and uses, plaster of paris and hydride gypsum. Construction details of the material application of floor, walls and roofs.

### **UNIT III ACOUSTIC INSULATION**

**15**

Porous, Baffle and perforated materials such as acoustic plastic, acoustic tiles, wood, partial board, fiber board, cork, quilts and mats Brief study on properties and uses of the above current developments.

### **UNIT IV FLOOR AND WALL COVERINGS**

**10**

Floor coverings flooring softwood, hardwood Resilient flooring Linoleum, Asphalt tile, vinyl, rubber, cork tiles terrazzo properties, uses and laying. Wall coverings Porcelain, enameled metal, wood veneer, Vinyl, plastic surfaced paneling properties, uses and lying. Wall and floor tiles

Ceramic glazed, mosaic, quarry and cement tiles properties, uses and lying. Detailing for physically handicapped. Market study of current developments.

#### **UNIT V PROTECTIVE AND DECORATIVE COATINGS**

**15**

Paints Enamels, distempers, plastic emulsions, cement based paints properties, uses and applications Painting on different surfaces defects in painting.

Clear coatings and strains Varnishes, Lacquer, Shellac, Wax Polish and Strains Properties, uses and applications.

Special purpose paints Bituminous, Luminous; fire retardant and resisting paints properties, uses and applications.

**TOTAL : 75**

#### **TEXT BOOKS**

1. S.C.Rangwala, "Building Construction" , Charotar Publishing House, Anand, India, 2008.
2. B.C.Punmia, "Building Construction", Laxmi Publications Pvt. Ltd., New Delhi, 1993.
3. Francis. D. K. Ching, "A Visual Dictionary of Architecture", Van Nostrand Reinhold - 1997.
4. Arora S.P. and Bindra S.P., Building Construction Planning Techniques and Method of Construction, Dhanpat Rai Sons, 1997.

#### **REFERENCES**

1. W.B.Mckay , "Building Construction", Vol. 1,2,3- Longmans U.K 1992.
2. Jack M.Launders, "Construction Materials, Methods", Careers pub, J.Holland, Illinois Wileox Co., Inc. 1983.
3. Arthur R.Llons, "Materials for architects and builders An introduction", Holder Headline group, Great Britain, 1997.
4. Don.A.Watson, "Construction Materials and Processes", McGraw-Hill Book Co., 1972

#### **WEBSITES**

1. <http://www.bwpda.co.uk>
2. <http://www.spectrumpaints.com>
3. <http://www.soundesigns.net>
4. <http://www.bmtpc.com>

#### **PATTERN OF QUESTION PAPER (To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration: 4 hrs.

Part A: 10 questions X 4 marks = 40 marks (no choice)

Part B: 4 questions X 15 marks = 60 marks (choice for each question)

## AR1304 ARCHITECTURAL DESIGN - V

L T P C  
0 0 14 7

### Goal

The students will be further oriented on design of small complexes or buildings involving technology, structural clarity and services in terms of lighting, ventilation, movement, fire safety, security, water supply, sewage etc.

### Objectives

The course should enable the students to :

- Train the student to gather knowledge on the given design project based on books / literature and websites.
- Students are to be exposed to expert lecture from expert architect, for each project or design.
- Make the student understand the complexity, functioning and salient features of the design project through organizing field visit, train them to document and present the findings.

### Outcome

The students should be able to:

- Work on multi planning and mass problems involving building technology
- Use computer for drawing and presentation skills using appropriate softwares.

### UNIT I DESIGN STUDIO

180

Small complexes concept of multi planning and circulation analysis massing problems involving building technology, - Design and detailing for movement of physically handicapped and elderly persons within and around buildings.

Examples: Shopping centers (Commercial) Home for aged, apartments (residential) Health centers, Nursing homes (institutional) Etc.

**TOTAL : 180**

### TEXT BOOKS:

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time - Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed.By.Quentin Pickard RIBA "The Architects' Hand Book", Bladewell Science Ltd., 2002

**REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K.Ching, John wiley & Sons, Inc. 1997

**WEBSITES**

1. <http://wwwtest.library.ucla.edu/libraries/arts/websites/www.des.htm>
2. <http://www.clr.toronto.edu/VIRTUALLIB/ARCH/proj.html>
3. <http://www.thehub.net.au/%7Emorrisqc/architext>
4. <http://www.archinet.co.uk/>
5. <http://archinform.de/start.en.htm>
6. <http://www.plannet.com/>

## SYLLABUS FOR VI SEMESTER B.ARCH COURSE

### CE 1315 DESIGN OF STRUCTURES - III

L T P C  
3 0 0 3

#### Goal

To impart the students with the knowledge about the design of column, foundation which may be applied in architectural design projects and building construction details.

#### Objectives

The course should enable the students to :

- Understand designing and detailing of short RC column by limit state design.
- Know about continuous beams and slabs using IS code coefficients.
- Understand design of circular slab and flat slab
- Understand detailing of seismic resistant structures
- Learn design concepts of raft foundation and pile foundation.

#### Outcome

The students should be able to:

- Develop knowledge about limit state design methods for continuous beam.
- Use the limit state design methods to design and analyze of bricks masonry.
- Use the limit state design methods to design circular slabs.
- Gain the knowledge about seismic resistant structures
- Gain the knowledge about wind Engineering.

#### **UNIT I LIMIT STATE DESIGN OF CONTINUOUS BEAMS 10**

Limit State Design of continuous beams and slabs using code coefficients.

#### **UNIT II MASONRY 10**

Analysis and Design of brick masonry, load bearing walls codal requirements.

#### **UNIT III CIRCULAR SLABS 10**

Design of RCC Circular slabs simply supported and fixed slabs with uniformly distributed loads. Design concept of flat slabs -code provisions.

#### **UNIT IV DETAILING SEISMIC RESISTANT STRUCTURES 10**

Introduction to detailing of Seismic Resistant Structures - IS 13920:1993 codal provisions - R.C.C. Structures and Masonry Structures.

## UNIT V INTRODUCTION TO WIND ENGINEERING

5

Terminology - Wind Data - Gust factor and its determination - wind Speed Variation with height - Shape factor - Aspect Ratio - Drag and Lift.

**TOTAL: 45**

### TEXT BOOKS

1. Limit State Design of Reinforced Concrete, B.C Punmia, A.K Jain, 2007
2. A.S Arya Structural Design in Steel, Masonry & Timber, Nemchand & Bros, Roorkee, 1978
3. Pankaj Agarwal, Manish Shrikhande, Earthquake Resistant Design of Structures, 200

### REFERENCES

1. S.Unnikrishnan Pillai & Devados Menon, " Reinforced Concrete Design", Tata Mc.GrawHill 2003.
2. N.L. Shinha and S.K. Roy, "Fundamental of Reinforced Concrete", S.Chand and Company, New Delhi, 1983.
3. P.Dayaratnam, Design of Reinforced Concrete Structures, Oxford and IBH Publishing Co., 1983.
4. Ashok K. Jain, "Reinforced Concrete Limit State Design", Nemchand and Bros., Roorkee, 1983.
5. Reinforced Concrete Design . N.Krishnaraju & R.N. Pranesh, New Age International Publications 2006.
6. IS 13828 (1993) - Indian Standard Guidelines for improving Earthquake
  - a. Resistant low strength masonry building.
  - b. RCC Structures subjected to seismic forces.
7. IS 13920 (1993) - Indian Standard Code of practice for ductile detailing
8. IS 875-1987(Part3)- Indian Standard code for Wind Loads on Buildings and Structures.

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR 1316 HUMAN SETTLEMENT PLANNING

L T P C  
2 0 0 2

### Goal

To understand the evolution and application of the planning concepts for the improvement of environment through which the betterment of human living and welfare is achieved.

### Objectives

The course should enable the student to:

- Understand the evolution and growth of human settlements in the nature and its elements.
- Understand about the various planning principles and theories followed by various town planners through the history.
- Know about the urban and rural housing conditions in India, and the road geometries which will influence the built environment.
- Understand how planning activities are regulated in the state at various levels.
- Know about the futuristic ideas of modern proposed cities and its development.

### Outcomes

The students should be able to:

- Have a comprehensive knowledge about the history of human settlements
- Have a complete knowledge about the various planning thoughts proposed by the scholars and its successful effects
- Understand and analysis the various housing conditions of the people and the road geometries of our cities.
- Look at the role and activities of the various nodal agencies who regulate the city growth in our state.
- Examine the various futuristic models proposed by the scholars at present.

### UNIT - I INTRODUCTION TO HUMAN SETTLEMENTS

6

Introduction to human settlements - elements of human settlement - context and examples - major aspects in spatial planning. Classification of human settlements - Growth and decay of human settlements: Factors influencing the growth and decay, growth pattern of urban settlements during the last one-century in our country. Structure and form of human settlements - physical and functional

### UNIT - II PLANNING THEORIES

5

Planning Theories enunciated by Ebenezer Howard, Patrick Geddes, Doxiadis, Le-Corbusier & Clarence Arthur Perry, their relevance to Indian Planning.

**UNIT - III PLANNING ACTIVITIES****6**

Urban and Rural Housing: Assessment of housing need and demand, Meaning of housing units - built units and plots - approved, unapproved - developed, undeveloped and serviced. Roads - Classification, cross - section elements - their geometry and functions, Intersection - conflicting points and channelisers.

**UNIT - IV URBAN, REGIONAL PLANNING AND LOCAL GOVERNANCE****8**

Aim, Objective, Scope and content of Regional Plan, Master Plan, Zonal Plan and Urban renewal plan. Objectives, Functions, Responsibilities and Organizational structure of Village Panchayats, Municipalities, Corporations and Urban Development Authorities.

**UNIT - V SETTLEMENT SYSTEM IN A CHANGING WORLD****5**

Human settlement in space. Regionalism and regional approach to human settlements growth. Global city, Information Technology & Communication - the city of the future and future of the cities. Utopian concepts.

**TOTAL: 30****TEXT BOOKS:**

1. Gallion Arthur B & Eisna Simon, "The Urban Pattern: City Planning and Housing", Cbs, 2005.
2. L. R. Kadiyali, "Traffic Engineering and Transport Planning", Khanna Publishers, New Delhi, 2000.
3. Peter Geoffrey Hall, "Urban and Regional Planning", Fourth Edition, Routledge, 2002.

**REFERENCES:**

1. De witt Douglas Kilgore, "Astrofuturism: science, race, and vision of utopia in space", University of Pennsylvania Press, 2003.
2. Frederic P. Miller etall, "Ekistics: Ekistics, Konstantinos Apostolos Doxiadis, Human Settlement, Urban Planning, Architectural Theory, Settlement Hierarchy, Arcology, Conurbation, Consolidated City-county, Global City", Alphascript Publication, 2010.
3. Government of India, "Report of the National Commission on Urbanisation", 1988.
4. Scott Campbell and Susan S. Fainstein, "Readings in Planning theory", Wiley Blackwell, 2003.
5. Thodupuzha M. Jospeh, "Local Governance in India: Ideas, Challenges and Strategies", Concept Publishing Company. 2009.

**Websites:**

1. <http://www.virtualref.com/uncrd/558.htm>
2. [http://www.unescap.org/huset/m\\_land/index.htm](http://www.unescap.org/huset/m_land/index.htm)
3. <http://www.esa.un.org/subindex/prviewsites.asp?termcode=GH.05>
4. <http://www.abuildnet.com>
5. <http://www.buildernews.com/>



**PATTERN OF QUESTION PAPER**  
**(To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

**AR1314 BUILDING SERVICES - III**

**L T P C**  
**3 0 0 3**

**Goal**

To educate the students to integrate all the allied Building services with Architectural with a prime focus on Air- conditioning, Fire safety and Firefighting Techniques and recent trends in Building Automation, Energy rating, Energy Management and Energy efficient techniques as Recommended by Indian Green Building Council, Bureau of Energy Efficiency and Energy Conservation Building Codes.

**Objectives**

The course should enable the student to:

- Inform the students on the basics of building automation and control systems and the various components and gadgets used in it.
- Enable the students to understand the importance of energy, its demand, the need, conserving techniques and its management.
- Inform students on basic knowledge on thermodynamics principles, transfer of heat in buildings, regulating temperature inside buildings, liquid refrigerants used in air-conditioning, refrigeration cycle and AHU's.
- To enable students understand the various types of air-conditioning systems available and their applications and choice based on the typology of building and loads.
- To inform students on the cause of fire, standards and norms involved, fire detection and fighting through gadgets, warning systems and various considerations in planning and making it barrier free.

**Outcomes**

The students should be able to:

- Case study on a Live Commercial Complex to understand the concepts of Building Automation allied to Building Services and understand the safety, security and control systems integrated to Building Management system.
- Understand the importance of Energy in Construction Industry and explore Energy conservation and Energy efficient techniques in current trend. Understand the Energy estimate involving

Construction, Operation, Maintenance, Performance phase and explore the concepts of Energy Management.

- Exercises on IGBC, ECBC, BEE, USGBC, etc.
- Understand thermal comfort; explore the fundamentals of Refrigeration and Air Conditioning. Understand Reverse Carnot Cycle and browse the technical design brief of various vendors for all the types of Air conditioning systems available for different utilities.
- Exercises on selection of various Air conditioning system based on utilities to say like Air conditioning for Data centres, Operation Theatres, Auditoriums, hotels, etc.
- Impart Knowledge on Fire safety, security and firefighting systems. Industrial visit for a live mock up on Fire escape and fire safety and fire fighting provisions

**UNIT I BUILDING AUTOMATION AND CONTROL SYSTEMS 8**

Concept of Building Automation, scope, the need, the significance. various automation systems in buildings - telecom systems - computer systems and networking - security and surveillance system - cable management. Introduction to automatic control systems. elementary local loop and complete control systems.

**UNIT II BUILDING ENERGY CONSERVATION TECHNOLOGIES AND MANAGEMENT 12**

Trends in energy consumption. Energy audit - weather normalization methods, measurements, impact of people behaviour. approaches, materials and equipments, operating strategies, evaluation methods of energy savings. Renewable energy sources - Optimum selection of energy sources - use of computer models. Fundamental of Energy conservation, Energy Management, Basics of Energy Demand and Supply, Principles of Economic analysis in the Energy Management and Audit Programme.

**UNIT III BASIC REFRIGERATION PRINCIPLES 10**

Thermodynamics - Heat - Temperature, measurement transfer - Change of state - Sensible heat - Latent heat of fusion, evaporation, sublimation - Saturation temperature - Super heated vapor - sub cooled liquid - pressure temperature relationship for liquids - Refrigerants - Vapor compression cycle - Air handling units.

**UNIT IV AIR-CONDITIONING SYSTEM AND APPLICATIONS 6**

Centralized systems - Types - Packed air conditioning - Window air conditioning - Air conditioning systems for various types of buildings.

**UNIT V FIRE SAFETY, FIRE DETECTION AND FIGHTING INSTALLATIONS 9**

Causes of fire in buildings Fire protection, standards - NBC - Multi Storied Building. Special features required for physically handicapped and elderly in building types - Fire Detectors - Alarm Systems - Automatic Sprinklers - Fire Fighting - Dry and Wet Risers.

**TOTAL: 45**

### TEXT BOOKS

1. Steve Doty & Wayne C. Turner, (2009), "Energy Management Handbook", Seventh Edition, The Fairmont Pres, USA.
2. Ibrahim Dincer & Marc. A. Roren, (2007), "Exergy - Energy, Environment and Sustainable Development", Elsevier, USA.
3. William H. Severns and Julian R. Fellows, Air-conditioning and Refrigeration, John Wiley and Sons, London, 1988.

### REFERENCES

1. Bejami Frakli, "Feedback control of dynamic systems", PHI Publications 2002.
2. Katsuhiko Ogata, "Modern Control Engineering", Prentice Hall, 2001.
3. C.L. Wadhwa, "Generation and Utilization", New Age Publication 1997.
4. A. F. C. Sherratt, "Air Conditioning and Energy Conservation", The Architectural Press, London, 1980.
5. "National Building Code of India, 2005, Part-8", Bureau of Indian Standards.

**PATTERN OF QUESTION PAPER**  
**(To be distributed uniformly among all the units)**

Max. Marks: 100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

**AR1315 PROFESSIONAL PRACTICE & ETHICS - I**

**L T P C**  
**2 0 0 2**

### Goal

To create an awareness about the profession ethical values & commitments to the society

### Objectives

The course should enable the student to :

- Architects role in this society, his major contributions in various areas like academic and professional practice
- Engagement of architect by the client and for the building and other services. Fees as laid down by COA
- Types of competitions - assessors - as per the guideline given by COA & IIA
- Architects Act 1972 - building bylaws of CMDA. Parchayat rules of 1942. Heritage act
- Urban act commissions architectural control.

## Outcomes

The students should be able to:

- Get a proper understanding of the role played by an architect. Various types services that an architect can provide to this society
- Role of COA with regards to architect fees for different types of services will enable the students to understand the architect/client and contractor relationship.
- The important role played by the COA & IIA in the matters of conducting competitions
- The important act 1972 gave architect greater recognition and importance. Building bylaws gives a guidance for proper built environment and value of the heritage building
- The urban art commissions are functioning well at Delhi and other important cities in India for better architectural control and thereby preserving the importance of heritage valued building

### **UNIT I ARCHITECT AND PROFESSION 7**

Role of architect in society - relationship with client and contractor - code of conduct - management of an architect's office - elementary accountancy.

### **UNIT II ARCHITECT'S SERVICES AND SCALE OF FEES 7**

Conditions of engagement of an architect - normal additional, special and partial services - scale of fees for various services - claiming of fees.

### **UNIT III ARCHITECTURAL COMPETITIONS 4**

Open and closed competitions - appointment of assessors - duties of assessors - instructions to participants - rejection of entries - award of premium - guidelines prescribed by COA & IIA for promotion and conduct of competitions.

### **UNIT IV LEGISLATION 8**

Salient features of various Acts such as Architects' Act 1972, Chennai Corporation Building Rules 1972, The Panchayat Building Rules 1942, The Tamil Nadu Factory Rules 1950, Development control Rules for Chennai Metropolitan Area 2008, Heritage Act, ECBC code, etc.

### **UNIT V EMERGING AREAS OF IMPORTANCE 4**

Role of urban Arts Commissions - need for special rules on architectural control and development.

**TOTAL : 30**

## TEXT BOOKS

1. Derek Sharp, The Business of Architectural Practice William Collins Sons & Co. Ltd, 8 Erafton St., London W1 1986.
2. Publications of COA IIA Hand book on Professional Practice, The Architects publishing Corporation of India, and Bombay 1987.

## REFERENCES

1. J.J. Scott, Architect's Practice, Butterworth, London 1985.
2. Architects' Act 1972. and Architects Professional Regulation 1989.
3. Handbook of Professional Documents - Council of Architecture.
4. Handbook of Professional Practice - IIA.
5. Architectural Practice in India - Prof.Madhav Deobhakta.
6. Government of Tamil Nadu publications on Various building rules ,1972.
7. Development Control Rules , CMDA.

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

### AR1312 MATERIALS AND CONSTRUCTION - VI

L	T	P	C
2	0	4	4

#### Goal

To gain knowledge on vertical movement systems in multi - storied and high-rise buildings and to know the recent construction technology developed by leading research organizations in India.

#### Objectives

The course should enable the student to:

- Study the construction system innovated through research organization
- Study different foundation for high rise building in various soils
- Study about mass vertical movements in high rise buildings and the equipments used in building industry
- Study various types of escalators, conveyors & moving walkways.
- Study innovative structures for large spans

#### Outcomes

The students should be able to:

- Understand how to innovate and better techniques through research
- Understand advanced techniques in foundations with a thrust in pile foundations.
- Understand various types of equipments and their installation details

- Understand the novel systems in escalators, conveyors and moving walk ways through basic theory
- Understand shell structures, domes, space frame etc. The aesthetic appeal and general efficiency of such structures.

**UNIT I CONSTRUCTION SYSTEMS DEVELOPED BY RESEARCH ORGANISATIONS 20**

Study of construction system innovated through research organizations like CBRI, NBO, SERC, etc. Floor, wall and roofing systems. Ferro cement its properties, uses and application in building construction including the techniques of preparation, casting, curing, etc.

**UNIT II FOUNDATIONS 15**

Pile foundation, different types of piles, precast and cast insitu with reinforcement details for different types of grids, details of pile capping, jointing of precast piles and columns.

**UNIT III VERTICAL MOVEMENT EQUIPMENTS IN BUILDINGS 15**

Elevators Historical development of elevators or lifts. Elevators size, capacity, speed, mechanical safety method, positioning of core under planning grid. Types of elevators Electric, hydraulic passenger, hospital, capsule, freight, etc. Dumb waiters, details of lift shaft and other mechanism. Detailing and fitting for physically handicapped.

**UNIT IV ESCALATORS AND CONVEYORS 10**

Parallel and criss-cross escalators, horizontal belt conveyors, horizontal moving walkways concern for physically handicapped mechanical safety systems and automatic control .

**UNIT V MISCELLANEOUS STRUCTURES 15**

Shell structures, domes, space frame, shell barred vault, folded plate structures, tensile structures, pneumatic structures, and etc.

**TOTAL: 75**

**TEXT BOOKS**

1. J.H.Callender, "Time Saver Standard for Architectural Design Data", McGraw-Hill, 1994.
2. James Ambrose, "Building Construction, Service Systems", Van No strand Reinhold, New York, 1992.

**REFERENCES**

1. W.B.Mckay , "Building Construction", Vol. 1,2,3- Longmans U.K 1992.
2. H.A Thiruvananthapuram , "Hand Book on Elevators", Printing and Publishing co - 1997.
3. United Technologies, " - OTIS -Tell me About Escalators" - Printed in USA - 1990.
4. Pamphlets supplied and other literatures from N.B.O., SERC, CBRI, 1970 onwards.
5. R.Chudley, "Construction Technology", Richard Clay (Chaucer Press) Ltd., Suffolk, 1987.

## WEBSITES

1. <http://www.nas.otis.com>
2. <http://www.hugo.lib.ryerson.ca/marion>
3. <http://www.ibex.intl.com>
4. <http://www.tridelta.com>
5. <http://www.pilebrick.com>

## PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration: 4 hrs.

Part A: 10 questions X 4 marks = 40 marks (no choice)

Part B: 4 questions X 15 marks = 60 marks (choice for each question)

## AR1313 ARCHITECTURAL DESIGN - VI

L T P C  
0 0 14 7

### Goal

To prepare student to confidently design large complex buildings and campuses, which involves structural synthesis, effective movement systems, within and around buildings, complying with all rules and regulations demonstrated in at least two large projects.

### Objectives

The course should enable the student to:

- To train the student to gather knowledge on the given design project based on books/ literature and websites.
- The students are to be exposed to expert lecture from expert architect, for each project or design.
- To make the student understand the complexity, functioning and salient features of the design project through organizing field visit, train them to document and present the findings.

### Outcomes

The students should be able to:

- Design multi use multi span and multi level buildings involving technology and service
- Use computer for drawing and presentation skills using appropriate softwares.

## UNIT I DESIGN STUDIO

180

Design of large structures Multiuse, multispan, multilevel (six to eight floors) building types involving technology and services - Design and detailing for movement and use by physically handicapped people within and around building.

**Examples:** College office buildings (Institutional) Large Commercial Complex (Commercial) Resorts (Recreational) Mixed Residential Developments (Residential) etc. Working drawings for any one design Using Computer for presentation Skills.

**TOTAL : 180**

**TEXT BOOKS:**

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.
3. Time - Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed.By.Quentin Pickard RIBA "The Architects' Hand Book", Bladewell Science Ltd., 2002

**REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K.Ching, John wiley & Sons, Inc. 1997

**WEBSITES**

1. <http://wwwtest.library.ucla.edu/libraries/arts/websites/wwwdes.htm>
2. <http://www.clr.toronto.edu/VIRTUALLIB/ARCH/proj.html>
3. <http://www.thehub.net.au/%7Emorrisqc/architext>
4. <http://www.archinet.co.uk/>
5. <http://archinform.de/start.en.htm>
6. <http://www.plannet.com/>



## SYLLABUS FOR VII SEMESTER B.ARCH COURSE

### AR1507 URBAN DESIGN AND RENEWAL

L T P C  
3 0 0 3

#### Goal

To enable student understand how architecture is related to urban design in the planning process; how cities have aesthetic and visual impacts, how cities could be visualized as an act of will and how architects can contribute to city's re building and renewal through understanding of space articulation in cities of east and west; analysis of various implementation techniques and involving public in the process

#### Objectives

The course should enable the student to:

- Enable student understand the meaning, definition and relationship between Architecture, urban design and town planning and the urban environment.
- Critically evaluate how spaces have been organized and articulated in cities of west and east by documenting selected case studies.
- Examine how space in contemporary cities are organized and articulated in various land use zones through selected case studies.
- Enable students understand the concept of urban renewal, community development and public involvement, in city building process.
- Know about the imageability of towns and cities, the policies required at town level

#### Outcomes

The students should be able to:

- Have a comprehensive knowledge on the evolution of urban planning and its relation today.
- Be equipped to handle the urban design studio project at a town/city, region level from the studies, analysis, interpretation and design in accordance to the jurisprudence.

#### UNIT I INTRODUCTION

5

Study of the relationship between architecture, urban design and town planning - Definition of urban design (broadly) - Scope and content of urban design in India and in the West.

#### UNIT II THEORY AND LITERATURE

10

Study of literature - Townscape: Gordon Cullen; Image of the city: Kevin Lynch; Death and Life of great American Cities: Jane Jacobs; and other authors - Christopher Alexander, Aldo Rossi, Camillo Sitte - Three theories of urban spatial design: Roger Transick.

#### UNIT III PUBLIC DOMAIN DESIGN THROUGH HISTORY

10

Comparative analysis of the design of public spaces through history; covering ancient, medieval,

renaissance, colonial and contemporary cities - Analysis of socio - cultural, economic and political forces acting on the evolution of these spaces.

**UNIT IV URBAN FORM AND SPACE**

**10**

Space articulation through conscious design of residential, commercial, industrial and recreational areas - Comparative analysis of evolved functions versus designed functions - Urban form and morphology as discussed by Rob Krier, Spiro Kostof and Edmund Bacon.

**UNIT V CONTEMPORARY PRACTICES**

**10**

Objectives of Urban Renewal; methods of survey -Examples of Urban Renewal and Redevelopment - Transit oriented development - Concept of community participation - Implementation: policies, bye laws, regulations, DCR - Role of civic bodies in the implementation of urban design.

**TOTAL : 45**

**TEXT BOOK**

1. Gosling and Maitland URBAN DESIGN St.Martin's Press, 1984.
2. "Time Saver Standards for Urban Design", Donald Watson, Alan Plattus, Robert Shibley 2003.
3. "Urban Design Reader", Mathew Carmonia (ed.) and Steve Tiesdell (ed.) 2007

**REFERENCES**

1. Gordon Cullen , "The concise TOWNSCAPE", The Architectural Press - 1995.
2. Kevin Lynch - Image of the City, Joint centre of Urban Studies, 1992.
3. "A Concise Townscape", Gordon Cullen, 2004.
4. Edmund Bacon - Design of cities, Penguin Books, 1976.
5. Gallion & Eisner - The Urban Pattern, D.Vau, Nostrand, 1963.
6. Jonnathan Barnett - Introduction to Urban Design, Harper &Row, Publishers, 1982.
7. Jave Jacobs, "Death & Life of Great American Cities", Random House, 2002.

**WEBSITES**

1. [www.Tribnet.com/News/projects/Rudat](http://www.Tribnet.com/News/projects/Rudat)
2. [www.Megranahan.com/Rudat98/Report/Report.html](http://www.Megranahan.com/Rudat98/Report/Report.html).
3. [www.Dom.Gov.an/climate/environ/design/design-d/shtml](http://www.Dom.Gov.an/climate/environ/design/design-d/shtml).
4. <http://iesd-dmu.oc.uk/ecadap/projects.htm>

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1501 LANDSCAPE AND ECOLOGY

L T P C  
3 0 0 3

### GOAL

To understand basics of ecology, planting design, site planning and landscaping of functional areas.

### Objectives

The course should enable the student to:

- Acquire knowledge on ecology and conservation
- Know about common plants and the use in landscape design
- Evolution of garden design during different periods and countries.
- Acquire knowledge to do a comprehensive landscape development plan for various landscape functional areas.

### Outcomes

The students should be able to:

- Learn about basics about ecology and conservation and reclamation of derelict areas.
- Learn to identify common and popular plants, contextual to the region and to work with guidelines.
- Learn about historical landscapes, planning styles and elements used in landscapes
- Learn to do landscape plan for recreational spaces, housing development, water front areas and urban centers considering the planning aspects and elements that has to be used in design.

### UNIT I INTRODUCTION 6

Introduction to ecology, landscape conservation, reclamation and landscaping of derelict areas.

### UNIT II PLANT MATERIALS 6

Notes on basic plant data for plant selection and planting design, in the Indian context.

### UNIT III GARDEN DESIGN 8

A brief description of Mughal gardens of India, Japanese gardens and Italian gardens. Basic principles of landscape design and the visual aspects of plant forms.

### UNIT IV SITE PLANNING 10

Site investigation appraisal and site planning neighborhood parts, Children's parks toilets and sports area.

### UNIT V LANDSCAPING OF FUNCTIONAL AREAS 15

Landscaping for various types of housing areas. Landscape design for waterfront areas and functional areas in urban centers. Principles of urban landscape, urban design and architectural control.

**TOTAL : 45**

### **TEXT BOOKS**

1. "Landscape Ecology", Jim Sanderson & Larry D Harris by CRC press LLC, 2000.
2. "Landscape Architect's Portable Handbook", Nicholas T Dines & Kyle D Brown, 2001 by Mc Graw Hill Companies, Inc.
3. The Living Landscape - An Ecological approach to Landscape Planning", Frederick Steiner by the Mc Graw Hill Companies, Inc, 2000.

### **REFERENCES**

1. "Tropical Garden Plants", William Warren, Thames & Hudson Ltd, London, 1997.
2. "the Landscape of Man", Geoffrey & Susan Jellicoe, Thames & Hudson Ltd, London, 1995.
3. "The Practical Encyclopedia of Garden Planning Design & Decoration", Peter Mc Hoy & Tessa Eveleigh, Anness Publishing Ltd., 1999.
4. "Time - Saver Standards for Landscape Architecture", Charles W Harris & Nicholas T Vines by Mc Graw Hill, Inc, 1998
5. "Contemporary Trends in Landscape Architecture", Steven L. Cartor by John Wiley & Sons, Inc, 1997.

### **PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1503 URBAN ECONOMICS AND SOCIOLOGY

L T P C  
2 0 0 2

### Goal

To give input in terms of sciences and humanities as an integral part of architecture, that architect is a humanist and social reformer and that architecture can flourish and be practiced with an understanding of urban economics.

### Objectives

The course should enable the student to :

- Have general idea about the economic principles and their relevance to Architecture and construction industry.
- Have a clear understanding about urbanization, their problems and the remedial measures taken.
- Understand the relevance of land economics and its applicability in the building execution and also in the various programmes like urban design, urban renewal, urban housing, etc.
- Understand the evolution of the society, its growth, its needs and requirements for a sustained development.
- The environmental issues and impact of the development programmes in our Indian cities.

### Outcomes

The students should be able to:

- Have a comprehensive knowledge on the basic principles of economics
- Understand how urbanization happens, its positive and negative effects and the governmental measures to regulate it.
- Know the intricate details of real estate and the reasons for such major shifts and changes.
- Have a complete knowledge on the formation and the existence of the society
- Have a idea about the different social development programmes happening in the country and its impact on the people life.

### UNIT I GENERAL ECONOMICS

6

Subject matter of Economics as related to built environment - relevant economic theories to urban development - Principles of consumption, production and distribution - demand and supply - laws of returns.

### UNIT II URBANIZATION

6

Origin, growth and influence of cities. Definition of urbanization - Reason for existence of cities - factors influencing urbanization - Migration and its impact on urbanization. Review of Planning Commission Reports. Social problems of urbanization - problems relating to public health, public transport and public housing, sociological understanding of slums.

**UNIT III URBAN LAND AND BUILDING ECONOMICS 7**

Demand and supply of urban land - Land value - speculation - factors influencing urban land values - Municipal taxes -Construction labor market, economic evaluation of urban renewal & housing.

**UNIT IV SOCIOLOGICAL CONCEPTS AND SOCIAL CHANGES 6**

Concept of society, community, group and culture, institution organization, social stratification, role of status, social norms, social structure and social changes.

**UNIT V ECOLOGICAL PROCESS AND DEVELOPMENT IMPACTS 5**

Ecological process and land use structures of the cities, impact of urbanization and development programmes on social development.

**TOTAL:30**

**TEXT BOOKS**

1. Arthur O'sullivan. Urban economics, McGraw-Hill/Irwin, 2009.
2. Gopal Bhargava (ed) Urban Problems and policy perspective, Abhinav Publications New Delhi 1981.
3. John. F. McDonald and Daniel. P. Mcmillen, "Urban economics and real estate - Theory and Practice" 2nd edition, John wiley and sons, 2010.

**REFERENCES**

1. David M. Newman, "Sociology - Exploring the architecture of everyday life", Ping forge press, 2009.
2. Government of India, "Report of the National Commission on Urbanisation", 1988.
3. Nath,. V, "Urbanisation, urban development and Metropolitan cities", edited by surrender. K. Agarwal, concept publishing company, 2007.
4. Subramanian, K.K.et.al. Construction Labour Market : A study in Ahmedabad, Conceptpublishing Co, New Delhi, 1982.
5. Unmareddy Venkateswarlu, "Urbanisations in India: Problems and prospects", New age international, 1998.

**Websites:**

1. [www.nwmisseuri.Edn/nwcourses/martin/urban](http://www.nwmisseuri.Edn/nwcourses/martin/urban)
2. [www.solent.ac.uk/socscilmf/urban1.html](http://www.solent.ac.uk/socscilmf/urban1.html)
3. <http://directorysearch.mozilla.org/science/social-sciences/Economics/urban-economics>
4. <http://11cs.uop.edu/cop/economics/econ15/.html>

**PATTERN OF QUESTION PAPER  
(To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1505 PROFESSIONAL PRACTICE & ETHICS - II

L T P C  
3 0 0 3

### Goal

To create a total awareness about the architectural practice.

### Objectives

The course should enable the student to :

- Types of easement and their implications
- Basic objectives of tender preparation of tender documents
- After acceptance of tender and it becomes a contract between client and the contractor.
- Advantages of having arbitrator to resolve the disputes between the client and the contractor.
- Environmental acts & laws in all situations like hill coastal and heritage etc.

### Outcomes

The students should be able to:

- Understand the properly and its implications to the owner of the property
- The issues regarding tenders architects and client role towards the contract.
- The role played by various agencies within the contractual clauses. Duties of sub contractor payments, etc.
- Disputes between client and contractor areas of disputes likely to arise - Arbitral award to be final & binding.
- Learn about the laws regarding environment along with the building norms which are already available.

### UNIT I EASEMENTS 4

Definition - types of easement - acquisition extinction and protection of easements

### UNIT II TENDER 12

Calling for tenders - tender documents - open and closed tenders - item rate, lumpsum, labour and demolition tender - conditions of tender - submission of tender - scrutiny and recommendations.

### UNIT III CONTRACT 15

Conditions of contract - Form of contract articles of agreement - Contractor's bill certification

### UNIT IV ARBITRATION 6

Arbitration in disputes - arbitration agreement - sole arbitration - umpire - excepted matters and - award

## UNIT V LEGISLATION

8

Environmental Acts and Laws - Special Rules governing Hill Area Development - coastal area development and management - Heritage Act of India - Consumer protection act and their relevant provisions.

**TOTAL : 45**

### TEXT BOOKS

1. Publications of COA IIA Hand book on Professional Practice, The Architects publishing Corporation of India, and Bombay 1987.
2. Roshan Namavathi, Professional Practice, Lakshmi Book Depot, Mumbai 1984

### REFERENCES

1. J.J.Scott, Architect's Practice, Butterworth, London 1985
2. D.C. Rules for Chennai Metropolitan Area 2008.
3. T.N.D.M. Building Rules, 1972
4. Chennai City Corporation Building Rules 1972
5. Derek Sharp, The Business of Architectural Practice William Collins Sons & Co. Ltd., 8 Erafton St., London W1 1986
6. The Tamil Nadu Hill Areas Special Building Rules - 1981
7. Environmental Laws of India - by Kishore Vanguri, C.P.R. Environmental Education Centre, Chennai.

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)



## AR1504 ARCHITECTURAL DESIGN - VII

L T P C  
0 0 16 8

### Goal

To prepare students to be conversant with all challenges in large complex design, in group, multi storied developments covering structural innovations, energy conservation, awareness to costing of projects and legal implications.

### Objectives

The course should enable the student to :

- Make the student realize that architectural design process become more and more complex at advanced level and could be understood by analyzing live case studies - appropriate documentation and presenting the same.
- Create awareness among students through organized expert lectures and various aspects of design.
- Strengthen the knowledge base on architectural design processes thro' works of international and national architects referred from libraries, available literature and websites.

### Outcomes

The students should be able to:

- Design advanced and complex problem comprising of group and multi stories structures and infrastructures.
- Use computer for drawing and presentation skills using appropriate softwares.

### DESIGN STUDIO

180

Design of advanced and complex problems comprising of group and multi storied structures and infrastructure with regard to climatic conditions, orientation, services, circulation problems relating to large developments Design and detailing for movement and use by handicapped persons within and around building.

**Examples:** Multi storied Residential flats, campus design, urban centers, Housing Senior citizens' neighborhood, Transport terminals etc, and Time problem using computer-aided design shall be introduced.

**TOTAL : 180**

### TEXT BOOKS:

1. De. Chiara and Callender, "Time-saver Standards for Building Types", McGraw-Hill Co., New York, 1973.
2. The Handbook of Building Types., NEUFERT ARCHITECTS DATA, New International edition, second international edition. BSP Professional Books. Oxford (1980) Blackwell scientific Publications.

3. Time - Saver Standards for Architectural Design Data, seventh edition. The reference of architectural fundamentals McGraw hill international edition, architectural series (1998).
4. Ed.By.Quentin Pickard RIBA "The Architects' Hand Book", Bladewell Science Ltd., 2002

#### **REFERENCES:**

1. Handbook on Building Construction Practices (Excluding Electrical Work). Bureau of Indian Standards, New Delhi, 1997
2. National Building book of India 2005, Bureau of Indian Standards, New Delhi
3. Macmillan Encyclopedia architects, Vol II, The free press, London, 1982
4. A visual dictionary of Architecture, Francis D.K.Ching, John wiley & Sons, Inc. 1997

### **AR1506 DISSERTATION**

**L T P C**  
**0 0 4 2**

#### **Goal**

To prepare the students for formal report writing systematically on a particular topic related to architecture

#### **Objectives**

The course should enable the student to :

- Widen and enrich the literature pertaining to the topic of interest
- Prepare for their thesis

#### **Outcomes**

The students should be able to:

- Impart indepth knowledge on selected topics on their interest through wide literature study.
- Focus and orient for the thesis

Dissertation is a formal report written systematically on a particular topic as related to Architecture. This exercise is taken up as to widen and enrich the literature pertaining to a topic of interest in Architecture. It may focus upon cross section of literature of a topic with or without research hypothesis. The material written systematically may be useful for the thesis in tenth semester when the same topic with literature reviewed systematically be confined as a part of thesis.

Their will be three reviews conducted internally and at the end of the semester their will be a viva voce conducted by the university comprising of a panel with one external member.

## SYLLABUS FOR VIII & IX SEMESTER B.ARCH COURSE

### AR1507 PRACTICAL TRAINING

L T P C  
0 0 70 24

#### Goal

To provide adequate knowledge on the practice of Architectural Profession to learn the administration, managerial and professional skills and demonstrate the same in future architectural design study.

#### Objectives

The course should enable the student to :

- Learning office procedure and management.
- Preparation of architectural drawings including detailed and working drawings.
- Supervision of project site or sites.
- Critical appraisal of one of the projects dealt by the student.
- Selection of possible areas / themes thesis topics for approval.

#### Outcomes

The students should be able to:

- Know what is happening in the field or in actual practice
- Go to various construction sites, learn and experience
- Understand the system of working and management in the office.

The choice of the place of training shall be Architectural Firms, Organizations, Development Authorities, etc. which are headed by architects. The Dean, School of Architecture, shall approve the choice of the office.

#### The final evaluation of the practical training will be based on the following features.

- i. Architectural office training
- ii. Site supervision and training
- iii. Critical study of project built
- iv. Field Documentation of Architectural details and working drawings.

Students should send their joining report, monthly progress reports (in the prescribed format) and completion report during the period of practical training. Students should prepare the portfolio of the work done during this period.

There will be an end semester viva voce conducted by the university comprising of a panel with one external member to assess the work done by the students.

**30 WEEKS**

**SYLLABUS FOR X SEMESTER B.ARCH COURSE  
AR1512 THESIS**

**L T P C  
0 0 32 16**

**Goal**

To test whether a student has acquired the requisite skill and competence in architecture before becoming a full fledged architect.

**Objectives**

The course should enable the student to :

- Undertake a detailed investigation on a topic of his/her choice
- Come out with comprehensive design proposals

**Outcomes**

The students should be able to:

- Handle large scale design problems
- Manage the profession at ease.

**TOTAL : 450**

**TOPICS OF STUDY**

The main areas of study and research shall be Architecture, Urban design, Urban renewal, Urban and Rural Housing and settlements, Sustainable and Environmental Design, Conservation, Landscape Design etc. However, the specific thrust shall be on architectural design and environment context with full understanding.

**PRESENTATION REQUIREMENTS**

The Thesis Project shall be submitted in the form literature and case study report, presentation drawings, models, reports, slides and CD's as required for the project.

Periodic reviews will be conducted internally consisting of a panel and at the end of the semester there will be a viva voce conducted by the university comprising of panel with two external members.

**TEXT BOOKS & REFERENCES**

As per requirement of Topic and as suggested by the supervisor of Thesis.

**The final evaluation of the thesis (project) will be based on the following factors.**

1. Periodic review by guide and external members.
2. Critical analysis of the project
3. Final submission of detailed drawings and model

There will be an end semester viva voce conducted by the university comprising of a panel with one external member to assess the work done by the students.

## ELECTIVE

### AR1353 THEORY OF INTERIOR DESIGN

L T P C  
2 0 0 2

#### Goal

To impart knowledge on basics of interior design and building aesthetics.

#### Objectives

The course should enable the student to:

- Deal in details with various aspects of space interiors.
- Give an opportunity to understand qualities of spaces
- Design for functional and meaningful space interiors.

#### Outcomes

The students should be able to:

- Have a complete idea about interior design and its relation to human behavior and their response to interior spaces.
- Make wonderful colour schemes for the interior spaces in order to make them aesthetically pleasing.
- Identify the different possibilities in order to make a functional yet meaningful interior spaces.

#### UNIT I INTRODUCTION TO INTERIOR DESIGN

5

Meaning and significance of interior design, Historical review of interiors as regards to concept, interior design trends in India and abroad, style, fashion, decoration etc.

#### UNIT II PRINCIPLES OF INTERIOR DESIGN

5

Visual composition, theory of Colors, Function and character for space.

#### UNIT III THEORY OF AESTHETICS

9

Understanding aesthetics and its importance and the underlying theories explaining the term Introduction to the subject, Introduction to the western aesthetics and Indian Aesthetics. Relating the spaces, surfaces and interior designing with Aesthetics For this, a study of the relation between the traditions of Architecture and aesthetics, Understanding the concept of 'Critical Judgement'.

#### UNIT IV PERCEPTION OF INTERIOR SPACES THROUGH LITERATURE

6

Effects of design movements and various schools of thoughts on interior environment from historical period till date and its impact on lifestyle, art and crafts.

## UNIT V PROMINENT INTERIOR DESIGNERS AND THEIR WORKS

5

Differentiation between individual Design and design as evolution process of culture, tradition and society.

**TOTAL:30**

### TEXT BOOK

1. Ching, Francis D. K. (2005) Interior Design Illustrated 2nd Edition, John Wiley & Sons
2. Lewis, Susan A. (1998) Interior Design Sourcebook: A Guide to Resources on the History and Practice of Interior Design (Design Reference Series), Omnigraphics

### REFERENCES

1. Riley, Noel and Bayer, Patricia (2003)The Elements of Design: A Practical Encyclopedia of the Decorative Arts from the Renaissance to the Present, Free Press.
2. Beacham, Cindy V., McFall, Barbara S. and Park-Gates, Shari (2007) Designing YOUR Future: An Introduction to Career Preparation and Professional Practices in Interior Design, Prentice Hall
3. Znoy, Jason (2004) Professional Interior Design: a career guide, ASID Illinois
4. Calloway, Stephen (1991)The Elements of Style: A Practical Encyclopedia of Interior Architectural Details from 1485 to the Present, Simon and Schuster.
5. Pile, John (2005) A History of Interior Design, Laurence King Publishing Ltd
6. Interior Design in the 20th Century by Allen Tate, C.Ray
7. Interior Graphic & Design Standards by S.C.Reznikoff.

### **PATTERN OF QUESTION PAPER** **(To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1359 ENERGY EFFICIENT ARCHITECTURE

L T P C  
2 0 0 2

### Goal

To understand the importance of Energy conservation in general and solar energy particularly and to incorporate energy efficient techniques in Planning, design and detailing of buildings.

### Objectives

The course should enable the student to:

- Trace out evolution of energy conscious buildings and techniques from historic period based on climatic zone of the world.
- Enable students understand solar geometry and heat transfer mechanism in buildings and energy conservation.
- Study methodologies to incorporate solar passive heating system in buildings through selected case studies with stress on materials and techniques.
- Study ways to incorporate solar passive cooling systems thro' selected examples with stress on materials and techniques.
- Enable student to understand importance of site planning, vegetation types, water bodies as factors inspiring concepts of design.

### Outcomes

At the end of the course the students will:

- Have a broad knowledge of the evolution of energy conscious buildings in various climatic zones a historical context.
- Be aware of the physics of heat transfer through materials and building elements and aware of the patterns of movement of the sun and its implications.
- Have comprehensive knowledge of passive (heating and cooling) design features, systems and strategies.
- Have a good understanding of the role of site planning strategies, vegetation types and water bodies in energy efficient architecture.
- Be able to place this specialized knowledge in the context of the design of buildings and the wider environment.
- Be able to critically analyze the implications of energy efficient architectural design in a given specific context and the wider environmental context.
- To be able to think in an innovative and creative way.
- Be able to address particular practical issues such as incorporation of passive design features and strategies in the design process.

<b>UNIT I CLIMATE AND SHELTER</b>	<b>6</b>
Historic buildings pre-industrial, post-industrial and modern architecture examples from different climatic zones.	
<b>UNIT II SOLAR ENERGY AND BUILDINGS</b>	<b>6</b>
Thermal comfort Heat Transfer Heating and cooling loads Energy estimates Conservation Day lighting Water Heating and Photo voltaic system.	
<b>UNIT III PASSIVE SOLAR HEATING</b>	<b>6</b>
General principles Direct gain Thermal storage wall sunspace convective air loop examples?	
<b>UNIT IV PASSIVE COOLING</b>	<b>6</b>
General principles Ventilation Radiation Evaporation and Dehumidification Mass effect examples.	
<b>UNIT V SITE PLANNING AND DEVELOPMENT</b>	<b>6</b>
Landform vegetation type and pattern water bodies open spaces and built spaces urban scape design strategies.	

**TOTAL: 30**

**TEXT BOOKS**

1. A.Konya, Design Primer for Hot Climates, Architectural Press, London, 1980.
2. Energy Efficient Buildings in India - Published by TERI - 2001
3. Fuller Moore, "Environmental Control Systems", McGraw-Hill, Inc., New Delhi, 1993.

**REFERENCES**

1. "Climatically Responsive Energy Efficient Architecture", PLEA/SPA, New Delhi 1995.
2. Ms.Sudha, N.K.Bansal and M.A.S.Malik, "Solar Passive Building", Pergamon Press.
3. V.Gupta , "Energy and Habitat" Wiley Eastern Limited, New Delhi , 1984.
4. Donald Watson, "Climatic Building Design- Energy Efficient Building Principles and Practice", McGraw-Hill, 1993.
5. Energy Conservation Building Code

**WEBSITES**

1. [www.terin.org/](http://www.terin.org/)
2. <http://solstice.crest.org/efficiency/index.shtml>
3. <http://www.envinst.conu.edu/~envinst/research/built.html>



**PATTERN OF QUESTION PAPER**  
(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

**AR 1354 CONSTRUCTION EQUIPMENTS AND METHODS**

**L T P C**  
**2 0 0 2**

**Goal**

To provide an insight into construction practices and equipment used for various construction activities.

**Objectives**

The course should enable the student to:

- Be aware of the basics of practical building construction and the process of construction work at a site
- Be sufficiently informed of various construction techniques and practices that are used in specific and special sub-structures and superstructures.
- Have an understanding of Building damage and repair.
- Have reasonable knowledge on various construction equipment used.

**Outcomes**

The students should be able to:

- Understand how a design is practically executed and thus handle site decisions and project management accordingly.
- Have reasonable knowledge about various construction procedures involved in various types of sub-structures and special superstructures that the basic courses do not necessarily cover.
- Assess and identify causes of building damage and decide on suitable measures for the building's damage control, retro-fitting and rehabilitation.
- Exhibit awareness on the availability, specialty and usage of various equipment needed for different types of construction work.
- Work knowledgeably and independently on large scale construction projects, exhibiting a detailed understanding of practical site considerations, usual construction procedures, special constructions and the latest equipment available.

**UNIT I CONSTRUCTION PRACTICES**

**6**

Specifications, details and sequence of activities and construction co-ordination - Site Clearance - Marking - Earthwork - masonry - flooring - damp proof courses - Building foundations - basements -

temporary shed - centering and shuttering sheet piles - slip forms - scaffoldings - frames - braced domes - weather and water proof - roof finishes.

**UNIT II SUB STRUCTURE CONSTRUCTION 5**

Techniques of Box jacking - Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques - Piling techniques- shoring for deep cutting- Dewatering and stand by Plant equipment for underground open excavation.

**UNIT III SUPER STRUCTURE CONSTRUCTION 8**

In-situ pre-stressing in high rise structures, aerial transporting handling - erecting light weight components on tall structures -erection of transmission towers - Construction sequences in cooling towers, silos, chimney, sky scrapers, Support structure for heavy Equipment and conveyors -Erection of articulated structures, braced domes and space decks.

**UNIT IV REPAIR AND REHABILITATION 4**

Study on causes of building damage and deterioration - Assessment of materials and methods of repair and restoration.

**UNIT V CONSTRUCTION EQUIPMENT 7**

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers - Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling, drilling, blasting - dewatering and pumping equipment - Transporters.

**TOTAL : 30**

**TEXT BOOKS**

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.
2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, 1997.

**REFERENCES**

1. Jha J and Sinha S.K., Construction and Foundation Engineering, Khanna Publishers, 1993.
2. Sharma S.C. "Construction Equipment and Management", Khanna Publishers New Delhi, 1988.
3. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi, 1988.
4. Dr. Mahesh Varma, "Construction Equipment and its Planning and Application", Metropolitan Book Company, New Delhi-, 1983.

**PATTERN OF QUESTION PAPER**  
(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

**AR 1359 VISUAL COMMUNICATION AND ARCHITECTURE**

**L T P C**  
**2 0 0 2**

**Goal**

To make students understand that visual communication was simultaneous developing with architecture and it is a source of inspiration to application to Architecture.

**Objectives**

The course should enable the student to:

- Learn the need and importance of visual communication and theories and philosophies related to it.
- Learn the elements of design, materials, techniques and tools of graphic design.
- Learn the way finding in built environment and outdoor using advanced computer applications.
- Learn Digital sculpture and installation
- Learn various techniques behind architectural photography.

**Outcomes**

The students should be able to:

- Understand the basic relationship between visual communication and architecture.
- Understand the basic concept behind graphic design.
- Familiarize with mobile augmented reality and use of GPRS & GPS.
- Understand about installation art and architecture.
- Perception and visual documentation of architectural projects.

**UNIT I INTRODUCTION TO VISUAL COMMUNICATION**

**4**

Need for and the Importance of Human and Visual Communication. Communication an expression, skill and process. Relation between visual communication and architecture. Theories and Philosophies of Visual Communication.

**UNIT II GRAPHIC DESIGN**

**6**

Basics of Graphic Design. Definition, Elements of GD, Design process-research, a source of concept, the process of developing ideas-verbal, visual, combination & thematic, visual thinking. Problem

associated with editing and manipulation of image/pictures using PhotoShop/Corel Draw. Associative techniques, materials, tools (precision instruments etc.) design execution, and presentation.

**UNIT III WAY FINDING IN ARCHITECTURE 8**

Basics of Way finding in complex built environments. Study of semiotic theory. Study of signs and signages and their application in built environment. Use of advanced computer applications such as mobile augmented reality and RFID tagging in process of way finding in indoor environment. Use of GPRS and GPS for way finding in outdoor environment.

**UNIT IV INSTALLATION ART AND ARCHITECTURE 5**

Introduction to Digital sculpture and installation art and their association to architecture. Integration of Open spaces and public spaces with installations. Study of works of Contemporary Installation artist. Conceptual design of Installation for place architecture.

**UNIT V ARCHITECTURAL PHOTOGRAPHY 7**

Human Eye and Camera. Basics of Camera and its operations. Types of Camera. Visual Perception. Perception of Colour, depth, lighting, foreground, mid ground, and background in architectural photography. Visual Documentation of Architectural projects. Image processing, Editing/Post production. Preparation of port folio.

**TOTAL: 30**

**TEXT BOOKS**

1. Graphic Designers, and Artists, 1982, Astragal Books. London
2. Louis Smith, Kenneth (2005) Handbook of Visual Communication: Theory, Methods and Media, Lawrence Erlbaum Associates.

**REFERENCES**

1. Schildgen, T (1998). Pocket Guide to color with digital applications. Thomsom Learning
2. Picture this: Media Representation of Visual Arts and artists. University of Luton Press
3. Lester, Paul Martin, (2010) Visual Communication: Images with Messages, Thompson Wadsworth, USA
4. O Huck, Fedrick, Fales.L.Carl and Rahman, Zia-Ur (2010) Visual communication: an information theory approach, Kluwer Academic Publishers.
5. Edited by Anna Bentkowska-Kafel, Trish Cashen and Hazel Gardiner. (2009) Digital visual culture : theory and practice, Intellect :Bristol,UK
6. Hembree, Ryan (2008) The complete graphic designer : a guide to understanding graphics and visual communication, Beverly, Mass. : Rockport Publishers

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR 1360 LANDSCAPE CONSTRUCTION

L T P C  
2 0 0 2

### Goal

To make the students learn about the elements used in landscape design

### Objectives

The course should enable the student to:

- Acquire knowledge about contours, slope analysis and to manipulate grading plans
- Create awareness on landscape elements and surfaces and the construction details of the elements.
- Learn about historical recount of water gardening, the types and the details of water features in landscape.
- Provide ideas of how to do garden lighting, the purpose about outdoor lighting and the types of outdoor lighting

### Outcomes

The students should be able to:

- Learn to do contour manipulation, slope analysis and to do grading plan.
- Acquire knowledge about different landscape elements and their use in the landscape design.
- Have a comprehensive knowledge on types of water features, selection of materials and construction details of water features.
- Learn about the purpose, types of lights available in the market, its use and will be doing a lighting plan.

### UNIT I SHAPING THE LANDSCAPE

8

Grading and the soil-maps for grading-representation of landform -contour interpretation -classifying the landform. The six cardinal laws of contours-contour manipulation -grading around building and structures. Evenly sloped surfaces, Roadways, drainage etc., Grading standards -calculating grades. The grading plan-calculation of cut and fill.

### UNIT II CONSTRUCTION OF ELEMENTS

10

Construction details - vehicular and pedestrian paving. Garden steps and ramps. Edge treatment, Markers, Walls, Trellises, Pergolas, Planters, Kerbs and Drainage channels, Types of fencing -Simple Fencing, Agricultural Fencing, Security Fencing, Palisade Fencing, Railings and gates.

### UNIT III LANDSCAPE SURFACES

4

Soft surfaces - Flexible surfaces - Cellular and curb paving - Firm surfaces - Garden paving - Timber paving - Other surfaces - Construction of sport ground surfaces, highways, parking areas, Tree pits and tree surroundings.

#### **UNIT IV WATER GARDEN**

**4**

A Historical recounting of water gardening - General guidelines for designing a water garden - Brief over view of formal and informal styles - Basic Data`s - Materials selection,Edging option, making a site plan etc., Construction details - Lined in-ground pond, Pre formed in-ground pond, Streams and Waterfalls, Fountains and Lighting,Bridges and Stepping stones,Wetland or Bog garden.

#### **UNIT V GARDEN LIGHTING**

**4**

Types of Garden lighting - Garden lighting purpose, Features and its effects - Brief overview of the lighting design for the indoor and outdoor landscapes - Planning the lighting system - Implementation and installation.

**TOTAL:30**

#### **TEXT BOOKS**

1. "Landscape Ecology", Jim Sanderson & Larry D Harris by CRC press LLC, 2000.
2. "Landscape Architect's Portable Handbook", Nicholas T Dines & Kyle D Brown, 2001 by Mc Graw Hill Companies, Inc.
3. The Living Landscape - An Ecological approach to Landscape Planning", Frederick Steiner by the Mc Graw Hill Companies, Inc, 2000.

#### **REFERENCES**

1. "Tropical Garden Plants", William Warren, Thames & Hudson Ltd, London, 1997.
2. "The Landscape of Man", Geoffrey & Susan Jellicoe, Thames & Hudson Ltd, London, 1995.
3. "The Practical Encyclopedia of Garden Planning Design & Decoration", Peter Mc Hoy & Tessa Eveleigh, Anness Publishing Ltd., 1999.
4. "Time - Saver Standards for Landscape Architecture", Charles W Harris & Nicholas T Vines by Mc Graw Hill, Inc, 1998
5. "Contemporary Trends in Landscape Architecture", Steven L. Cartor by John Wiley & Sons, Inc, 1997.

#### **PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## CE1487 BUILDING MAINTENANCE AND RETROFITTINGS TECHNIQUES

L T P C  
2 0 0 2

### Goal

To familiarize students with the technique of building maintenance and retrofitting.

### Objectives

- To learn defects in buildings due to environmental effects.
- Learn about different natural disasters and building failures
- Learn about preventive maintenance and retrofitting
- Learn about different materials techniques for building repair

### Outcomes

- Study about the factors affecting the durability of buildings
- Students will be able to diagnose building failures due to disasters.
- Students Will be able to give solution for preventive maintenance and retrofitting.
- The students will be able to suggest appropriate material and techniques for building repair.

### UNIT I ENVIRONMENT AND BUILT FORM 5

Durability of buildings - environmental effects, corrosion and natural deterioration - effect of chemical elements and pollution - damage due to biological agents

### UNIT II NATURAL DISASTER -EFFECT ON BUILTFORM 7

Natural disasters - buildings failures, diagnosis and techniques of assessment.

### UNIT III MAINTENANCE AND REPAIR STRATEGIES 5

Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedures for evaluating a damaged structure. Causes of deterioration.

### UNIT IV MATERIALS AND TECHNIQUES FOR REPAIR 8

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebar's during repair, foamed concrete, mortar and dry pack, vacuum concrete, unite and shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning, Methods of corrosion protection, corrosion inhibitors, corrosion resistance steels, coatings and cathodic protection.

## UNIT V REPAIRS AND RETROFITTING

5

Repairs to overcome low member strength Deflection, Cracking, Chemical disruption, Weathering corrosion, wear, fire, leakage and marine exposure.

**TOTAL: 30**

### TEXT BOOKS

1. "Belen Garcia; - Earthquake Architecture 2000 - Loft Publications, NY
2. Naseem Ahmed - Managing Disasters - Kilaso Books N.Delhi, 2003.
3. Tarnath BS; Wind and Earthquake resistant buildings - Marcel Dekkar, 2005

### REFERENCES

1. Philip H Perki : " Concrete Structures ", 1978, E & FN Spon, London
2. S.Champion, "Failures and Repair of Concrete Structures", 1961, Contractors record, London.
3. Jacob Feld "Construction Failures", 1968, John Wiley.
4. Peter H Emmens, "Concrete Repair and Maintenance illustrate"
5. Eldridge H J, "Common Defects in Buildings", 1976, Her Majesty Stationery Office, London.
6. Mathews M S, "Conservation Engineering"

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1361 BUILDING INTERIOR MATERIALS AND CONSTRUCTION

**L T P C**  
**2 0 0 2**

### Goal

To study the physical, behavioral and visual properties of the various components of interior architecture and learn about their construction techniques and uses.

### Objectives

The course should enable the student to:

- Enable the student to have a profound knowledge of the properties, uses and construction techniques of various materials used for the interior design components like walls, floors, ceilings, doors and windows, staircase etc.
- Market survey, case studies and site visits to be conducted to understand system of construction and details.



## Outcomes

The students should be able to:

- Have a profound knowledge about the properties uses and construction techniques used in interior design.
- Conduct material survey and also produce detailed reports of the same.
- Make detailed construction drawings for their designs.

### UNIT I FOUNDATION

7

General introduction to various elements of building from foundation to roof Masonry : Standard terms in brick and stone masonry, English and Flemish bond, piers, types of stone walls, composite and curved walls, lintels and arches, copings etc.

### UNIT II DOORS AND WINDOWS

6

Paneled door in timber, joints in frame, styles, rails, panels, Moldings, fixtures and fastenings. Fully glazed window in timber, fixing of glass, double-glazing, fixtures and fastenings.

### UNIT III FLOORS AND WALLS

4

Study of flooring different floor finishes and cladding materials, wooden paneling and wainscoting, glass and metals etc.

### UNIT IV SUSPENDED CEILINGS

9

Design, considerations, methods of construction, materials used, catwalks concealed lighting A.C. ducts inlets and outlets, patent systems like Gypboard, Luxalon,. Joily board ceilings etc, space dividers, screens, partitions in interiors.

### UNIT V CIVIL WORK

4

services, special services and its integration with interior design scheme. Rate analysis of various items of work

**TOTAL: 30**

## TEXT BOOKS

1. B.C.Punmia, "Building Construction", Laxmi Publications Pvt. Ltd., New Delhi, 1993.
2. Interior design illustrated by Francis D.K.Ching

## REFERENCES

1. Jack M.Launders, "Construction Materials, Methods", Careers pub, J.Holland, Illinois Wileox Co., Inc. 1983.
2. Arthur R.Llons, "Materials for architects and builders An introduction", Holder Headline group, Great Britain, 1997.
3. Don.A.Watson, "Construction Materials and Processes", McGraw-Hill Book Co., 1972.
4. W.B. McKay, " Building construction", Longman, U.K,1970.

**PATTERN OF QUESTION PAPER**  
**(To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

**AR 1362 URBAN ECOLOGY**

**L T P C**  
**2 0 0 2**

**Goal**

To enable the students understand how ecology related with the urban design, contributes the rebuilding & renewal of architecture in city scale and how cities have aesthetic & visual impacts; analyzing the various implementation techniques and involvement of all the living beings in the ecological process.

**Objectives**

The course should enable the student to :

- Understand the basics of ecology & land features for positive interventions.
- Make the students study the urban design that enhances and enriches the built environment in the overall context of ecology.
- Make the students know about the imageability of towns and cities in various landuse zones through selected case-studies.

**Outcomes**

The students should be able to:

- Identify and study the basic of ecological features and interventions.
- Implicate in urban design planning aspects and to give ecological planning concepts.
- Articulate the knowledge on the causes of execution in urban landuse, scales and planning.

**UNIT I ECOLOGY**

**5**

Definition - Ecological niche - Community ecology : Foodweb, keytone species - Biome & Biosphere  
- Ecology & Evolution - Historical roots of ecology.

**UNIT II INTRODUCTION TO URBAN ECO SYSTEM**

**6**

An overview of the term Ecosystem - Examples of ecosystems - classifications - function & biodiversity  
- Urban ecosystem legal rights & services.

**UNIT III ECOLOGICAL FOOT PRINT & SUSTAINABILITY**

**8**

An overview of ecological foot print - Definition - Understanding & analysis of Ecological foot print -  
Definition of sustainability - Principles & concepts - Environment, Economic & social dimensions.

**UNIT IV WATER SHED AND STORM WATER MANAGEMENT****6**

An overview of watershed and definition - Drainage basins - Study on watersheds of Chennai - Storm water management model - model parameters.

**UNIT V DESIGN OF URBAN ECOLOGICAL SYSTEM****5**

The study of Ecosystem - Ecosystem dynamics - Ecosystem ecology - Design of an urban ecological system of any metropolis in India.

**TOTAL: 30****TEXT BOOKS**

1. "Landscape Ecology", Jim Sanderson & Larry D Harris by CRC press LLC, 2000.
2. "Landscape Architect's Portable Handbook", Nicholas T Dines & Kyle D Brown, 2001 by Mc Graw Hill Companies, Inc.
3. The Living Landscape - An Ecological approach to Landscape Planning", Frederick Steiner by the Mc Graw Hill Companies, Inc, 2000.
4. Gosling and Maitland URBAN DESIGN St.Martin's Press 1984
5. Gordon Cullen THE CONCISE TOWNSCAPE The Architectural Press 1995

**REFERENCES**

1. "Tropical Garden Plants", William Warren, Thames & Hudson Ltd, London, 1997.
2. "The Landscape of Man", Geoffrey & Susan Jellicoe, Thames & Hudson Ltd, London, 1995.
3. "The Practical Encyclopedia of Garden Planning Design & Decoration", Peter Mc Hoy & Tessa Eveleigh, Anness Publishing Ltd., 1999.
4. "Time - Saver Standards for Landscape Architecture", Charles W Harris & Nicholas T Vines by Mc Graw Hill, Inc, 1998
5. "Contemporary Trends in Landscape Architecture", Steven L. Cartor by John Wiley & Sons, Inc, 1997.
6. John O. Sinurds EARTHSCAPE McGraw Hill Book New York 1878
7. Clift Tandy THE URBAN ECOLOGY The Architectural Press London 1971

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR 1363 CONSTRUCTION QUALITY & COST CONTROL

L T P C  
2 0 0 2

### Goal

To familiarize students with quality control techniques, quality management methods and cost control measures.

### Objectives

The course should enable the student to :

- Provide introduction fundamental concepts of construction quality
- Give input on bench marking quality policy and standards
- Learn to prepare construction cost, project organization and cost control for loose scale projects

### Outcomes

The students should be able to:

- Finalize with total quality management
- Enhance students understanding of the complexities of bench marking application of policy and standards for construction.
- Understand construction planning and cost control techniques currently in use

### UNIT I CONSTRUCTION QUALITY 6

Construction Quality, Inspection and Testing, Quality Control, Quality Assurance, Total Quality Management, Critical Factors of TQM; TQM in Projects

### UNIT II BENCHMARKING AND POLICY, STANDARDS FOR CONSTRUCTION 4

Benchmarking, concepts of quality policy, standards, manual, third party certification.

### UNIT III CONSTRUCTION AND CONTRACT MANAGEMENT 6

Project cost estimation, rate analysis-labour, materials and equipment production, Overhead charges, Bidding models and strategies, Qualification of bidders.

### UNIT IV CONSTRUCTION PLANNING 8

Project Organization, Bar Charts, Work Breakdown Structure, Time estimates, Applications of CPM and PERT- Scheduling, Monitoring and Updating. Line of Balance Scheduling.

### UNIT V COST CONTROL 6

Resource Planning-leveling and Allocation. Time-Cost Trade-off. Cost Control in Construction. Material Management- Purchase management and inventory control.

**TOTAL: 30**

## TEXT BOOKS

1. N. Logothetis, "Managing for Total Quality"-Prentice Hall.
2. David Gold Smith, "Safety Management in Construction and Industry", Mc Graw Hill.
3. K.N.Vaid, "Construction Safety Management"- NICMAR, Bombay.

## REFERENCES

1. Roshan Namavathi, "Professional Practice"
2. Gajaria GT, "Law Relating to Building & Civil Engg. Contracts in India"
3. Collier, Kieth, "Managing Construction Contracts"
4. Peurifoy. R L, "Construction Planning, Equipment and Methods"- Mc Graw Hill.
5. Srinath L.S, "PERT and CPM", East West Press Pvt Ltd New Delhi.
6. Frank Harris and Roland McCaffer, "Modern Construction Management"- 4th Ed. Blackwell Science Ltd.

### **PATTERN OF QUESTION PAPER** **(To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

### **AR1554 URBAN HOUSING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

#### **Goal**

To sensitize students to the need for housing in India; contributing factors and various typologies for the design of housing; and to expose them to the role and machinery of housing agencies in the country.

#### **Objectives**

The course should enable the student to :

- Bring about an understanding about need, demand, supply and other market forces in housing.
- Create awareness about the social and economic factors influencing housing design and design options for the types of design as a resultant of this.
- Discuss the impact of standards, regulations, laws and acts on contemporary practices that shape the housing market of the country today.

## Outcomes

The students should be able to:

- Identify and study the needs, demand and supply and implicate in the process of urban housing planning.
- Articulate the knowledge on the different types of planning concepts.
- To understand the standards, regulation on practices in the present.

### **UNIT I INTRODUCTION 7**

Need and Demand - Socio- economic aspects and contributing factors to the design of housing - Maslow/Hierarchy Theory.

### **UNIT II HOUSING AGENCIES AND PROCESS 10**

National Housing policy - Housing agencies and their role - Community participation - Housing process and management - Stages and tasks in project development.

### **UNIT III HOUSING DESIGN 10**

Traditional patterns - Row housing, cluster housing, Gated communities - Layout concepts - Use of Open spaces - Utilities and common facilities - Case studies - High Rise Building - Township.

### **UNIT IV HOUSING STANDARDS 8**

Standards and Regulations - DCR relevant to Housing - Methodology of formulating standards - Performance standards.

### **UNIT V CONTEMPORARY SCENARIO AND PRACTICES 10**

Environmental aspects - Sustainable Housing Design - Technology - Slum Rehabilitation/Upgradation/ Resettlement - Sites & Services scheme - Case studies: works of B.V. Doshi, Charles correa and Kukreja.

**TOTAL:45**

## TEXT BOOKS

1. Joseph de chiara & others "Time Saver Standards for Housing and Residential development", McGraw-Hill Co., New York, 1995.
2. Karnataka state Housing Board - MANE - Publication - 1980.

## REFERENCES

1. Richard Untermanu & Robert Small, "Site Planning for Cluster Housing", Van Nostrand Reinhold Company, London/New York, 1977.
2. Forbes Davidson and Geoff Payne, "Urban Projects Manual", Liverpool University Press, Liverpool, 1983.
3. Christopher Alexander, "A Pattern Language", Oxford University Press, New York 1977.
4. "Housing for the Low income", Sector Model, HUDCO Publications

## WEBSITES

1. [www.hudcoindia.com](http://www.hudcoindia.com)
2. [www.indiabuildnet.com/arch/sangath-8.htm](http://www.indiabuildnet.com/arch/sangath-8.htm)

### **PATTERN OF QUESTION PAPER** (To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

### **AR1551 DISASTER MITIGATION AND MANAGEMENT**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

#### **Goal**

To create awareness about natural and manmade hazards, prepare for it, consequence of disasters and post disaster and the social responsibility of individuals during disaster.

#### **Objectives**

The course should enable the student to :

- To learn about natural and manmade hazards - cause & consequences
- To learn about vulnerability assessment and solution for the same.
- To learn about legal and financial issues related to disaster

#### **Outcomes**

The students should be able to:

- Make out the type of disasters. Prone areas and impacts of disasters.
- Understand seismic repairs and retrofitting.
- Apply during the occurrence of disasters

#### **UNIT I NATURAL HAZARDS AND BUILDING SAFETY 10**

Natural hazards - Brief description on cause and formation of flood, cyclone, earthquake, tsunami and landslides. Zoning and micro zoning of vulnerable areas- Vulnerability atlas of India.

#### **UNIT II MAN MADE HAZARDS AND BUILDING SAFETY 5**

Man made hazards - Fire, gas, chemical leakages, pollution, and health hazards. - vulnerability analysis and risk assessment.

#### **UNIT III SEISMIC UPGRADATION OF DIFFERENT EXISTING BUILT FORM 10**

Introduction of seismic repairs and Retrofitting- Vulnerability assessment of existing built form - Damaged buildings.- Undamaged buildings- Cost- benefit and decision making about retrofitting.

**UNIT IV ISSUES IN EARTHQUAKE PRONE AREAS****5**

Techno- Legal and Techno- Financial issues . Proposed amendments to Town Planning Act-implications and accountability.

**UNIT V DISASTER MANAGEMENT, CASE STUDIES****15**

Pre disaster phase - Disaster phase - Post disaster Phase - Case studies - Social responsibilities of Architects.

**TOTAL:45****TEXT BOOKS**

1. "Belen Garcia; - Earthquake Architecture 2000 - Loft Publications, NY
2. Naseem Ahmed - Managing Disasters - Kilaso Books N.Delhi, 2003.
3. Tarnath BS; Wind and Earthquake resistant buildings - Marcel Dekkar, 2005

**REFERENCES**

1. Mary C Comerio; Disaster Hits Home, New policy for Urban Housing recovery, Oxford University press, London 2001
2. Proceedings - Learning from practice - Joint US and Italy Workshop - October 18-23 ; 1992 National Science Foundation ; US.
3. Earthquake Resistant Design and Construction of buildings - Code of Practice - Bureau of Indian Standards ; 1993
4. S.L.Goel, Encyclopedia of Disaster Management Policy and Administration, Vol.I, Deep of Deep Publication Pvt. Ltd., New Delhi, India.
5. S.L.Goe, Encyclopedia of Disaster Management Policy and Administration, Vol. II, Deep of Deep Publication Pvt.Ltd., New Delhi, India.
6. HUDCO Publications.

**PATTERN OF QUESTION PAPER**  
**(To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)



## AR1555 CONSERVATION OF BUILT VERNACULAR

L T P C  
3 0 0 3

### GOAL

To understand various manmade, natural and cultural forces behind the evolution of traditional architecture and the methods to conserve these traditional buildings for further generations

### Objectives

The course should enable the student to :

- Study different approaches, concepts and typologies of vernacular architecture.
- Understand the various elements, materials, influences , building systems and regional expression through case studies
- Understand the various threats and deterioration mechanism associated with traditional buildings
- Establish the need and purpose for conservation
- Study the various tools, technologies, methods, materials and systems available for conserving traditional buildings.
- Understand the effective application of the tools for conserving the built vernacular

### Outcomes

The course should enable the student to :

- Understand and appreciate the uniqueness of Indian vernacular architecture

### UNIT I INTRODUCTION TO VERNACULAR ARCHITECTURE 5

Approaches and concepts to study vernacular architecture- Different typologies or classifications of vernacular architecture- Study of vernacular architecture by various fields.

### UNIT II TRADITIONAL BUILDING SYSTEMS 14

Traditional building materials, structural building systems, construction technology, ornamentation, influences and regional cultural expressions through case studies in India.

### UNIT III DEFECTS AND DETERIORATION OF VERNACULAR BUILDINGS 8

Various cause and defects in traditional building materials and building systems- methods to identify and monitor the defects and damage.

### UNIT IV INTRODUCTION TO ARCHITECTURAL CONSERVATION 8

Introduce conservation methodology, various assessment methods, implementation tools and mechanisms (documentation, community participation, legislation, valuation, statement of significance, grading, listing etc)

### UNIT V CONSERVATION TECHNOLOGIES 10

Study various methods, techniques, technology, and application of modern materials in rectifying the defects, causes and agent of deterioration required to conserve the vernacular buildings with an

appropriate case study of one building and also the effective application of traditional construction systems and crafts.

**TOTAL:45**

#### **REFERENCES**

1. Guideline for conservation of Historic buildings - Sir Bernard Feilden
2. Repair and Maintenance of Historic Building- C. A. Berbbia
3. House ,form and culture - Amas Rapport
4. ICOMOS charter on Built Vernacular
5. Practical Building Conservation: Traditional Building Materials, Their Repair and Conservation - John Ashurst; Nicola Ashurst.

#### **PATTERN OF QUESTION PAPER (To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

#### **AR1559 INTERIOR ACCESSORIES AND FURNITURE DESIGN**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

#### **Goal**

- To impart unique design, synthesis and expression of a furniture (product) through skills in drawing.
- To study the materials and technique search to evolve alternatives in design.

#### **Objectives**

The course should enable the student to

- Create general awareness of role of ergonomics in work effectiveness & efficiency and system design approach through furniture design.

#### **Outcomes**

The students should be able to:

- Have a comprehensive knowledge about the furniture's and their standards
- Handle the design problems independently.
- To understand the necessity and importance about materials

**UNIT I ELEMENTS OF INTERIOR DESIGN 12**

Interior design elements such as flooring, carpets, tapestry, color, texture, plants, sculptures, paintings, murals, lighting fixtures etc. Accessories & Coordinating Accessories

Floor coverings-Carpets, rugs and other resilient floor coverings Upholstery materials - Inner Construction of upholstered furniture Window treatment - Curtains, Draperies, Blinds.

**UNIT II INTERIOR SPACES 6**

Qualities and settings of interior space, historical settings, Regional & ethnic settings, Contemporary interiors for creating image identity.

**UNIT III TERMINOLOGIES OF ERGONOMICS 10**

Biomechanics - Comfort zone - Elements of comfort zone - Noise, motion, temperature, colour, humidity, light etc. Analysis and designing furniture (forms)based on ergonomics, materials, working parameters and visual perception for furniture as single form and as a system in a given interior space.

**UNIT IV SPATIAL PLANNING 8**

General awareness of the role of ergonomics in work effectiveness and efficiency. Understanding the environmental factors contributing to performance of work. System design approach and space planning through furniture as Elements of design.

**UNIT V MODULAR COORINDATION IN INTERIORS 9**

Modular furniture design through materials evolving coordinated system for entire space. Modular approach and multiple use of furniture forms.

Exploration of wood, metal, glass, plastics and FRP as material for system design. Dimensional study of various interface platforms - kitchen, wardrobes, storage unit, toilets.

**TOTAL:45**

**TEXT BOOK**

1. Ching, Francis D. K. (2005) Interior Design Illustrated 2nd Edition, John Wiley & Sons
2. Lewis, Susan A. (1998) Interior Design Sourcebook: A Guide to Resources on the History and Practice of Interior Design (Design Reference Series), Omnigraphics

**REFERENCES**

1. Riley, Noel and Bayer, Patricia (2003)The Elements of Design: A Practical Encyclopedia of the Decorative Arts from the Renaissance to the Present, Free Press
2. Beacham, Cindy V., McFall, Barbara S. and Park-Gates, Shari (2007) Designing YOUR Future: An Introduction to Career Preparation and Professional Practices in Interior Design, Prentice Hall
3. Znoy, Jason (2004) Professional Interior Design: a career guide, ASID Illinois

4. Calloway, Stephen (1991) The Elements of Style: A Practical Encyclopedia of Interior Architectural Details from 1485 to the Present, Simon and Schuster.
5. Pile, John (2005) A History of Interior Design, Laurence King Publishing Ltd
6. Interior Design in the 20th Century by Allen Tate, C. Ray
7. Interior Graphic & Design Standards by S.C. Reznikoff.

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

**AR1560 LANDSCAPE SERVICES AND EIA**

**L T P C**  
**3 0 0 3**

**Goal**

To create awareness on basic knowledge on the landscape services and the procedures and systems of Environmental Impact Assessment.

**Objectives**

The course should enable the student to:

- Enables the students to govern the special projects and protect the rights.
- Have a comprehensive knowledge in various methodologies and assessments in the execution of Landscape projects.
- Understand the various environmental management plan.
- Design projects as per Indian bye-laws
- Comprehend the methods that causes pollution and their control systems.

**Outcomes**

The students should be able to:

- Create awareness in students about the environmental policies, acts and their rules & regulations on a broader scale.
- Provide comprehensive knowledge in various assessments and understand the methodologies involved.
- Make the students understand on the documentation of EIA and environmental management plan.
- Create awareness in students on the bye-laws as per Indian constitution they have to adhere to.
- Provides a broad knowledge on the various pollutants and methods to control pollution.

<b>UNIT I INTRODUCTION TO LANDSCAPE SERVICES</b>	<b>10</b>
National environmental policies - precautionary principle & polluter pays principle - Concept of absolute liability - Montreal Protocol, Kyoto protocol Rio declaration.	
<b>UNIT II ENVIRONMENTAL IMPACT ASSESSMENT</b>	<b>8</b>
Evolution of EIA - Concepts - Methodologies - Screening - Scoping - Base line Studies - Mitigation - Matrices - Check list.	
<b>UNIT III ENVIRONMENTAL MANAGEMENT</b>	<b>10</b>
Assessment of impacts - Air - Water - Soil - Noise - Biological.	
Socio cultural environment - Public participation - Resettlement and rehabilitation	
Documentation of EIA - Environmental Management Plan - Post project monitoring - Environmental Audit - Life cycle assessment - EMS - Case studies in EIA.	
<b>UNIT IV ENVIRONMENTAL SERVICES &amp; ACTS</b>	<b>9</b>
Environmental protection Act 1986 - Water Act 1974 - Air act 1981 - Relevant provisions of Indian forest Act - Public interest Litigation - Wret petitions.	
<b>UNIT V PRINCIPLES OF WATER &amp; WASTE WATER TREATMENT</b>	<b>8</b>
An overview of pollutants in water and waste water - Physical treatment methods - Biological pollution control system.	

**TOTAL:45**

**TEXT BOOKS**

1. "Landscape Ecology", Jim Sanderson & Larry D Harris by CRC press LLC, 2000.
2. "Landscape Architect's Portable Handbook", Nicholas T Dines & Kyle D Brown, 2001 by Mc Graw Hill Companies, Inc.
3. The Living Landscape - An Ecological approach to Landscape Planning", Frederick Steiner by the Mc Graw Hill Companies, Inc, 2000.
4. Anne Beer ENVIRONMENT PLANNING FOR SITE DEVELOPMENT E & Fn Spon 1994
5. Prof. Madhav Deobhakta LANDSCAPE PRACTICE IN INDIA Council of Architecture

**REFERENCES**

1. "Tropical Garden Plants", William Warren, Thames & Hudson Ltd, London, 1997.
2. "The Landscape of Man", Geoffrey & Susan Jellicoe, Thames & Hudson Ltd, London, 1995.
3. "The Practical Encyclopedia of Garden Planning Design & Decoration", Peter Mc Hoy & Tessa Eveleigh, Anness Publishing Ltd., 1999.
4. "Time - Saver Standards for Landscape Architecture", Charles W Harris & Nicholas T Vines by Mc Graw Hill, Inc, 1998

5. "Contemporary Trends in Landscape Architecture", Steven L. Cartor by John Wiley & Sons, Inc, 1997.
6. JJ Scott Architects Practice Butterworth London 1985.
7. Environmental Impact assessment, Govt of India, 1982.

**PATTERN OF QUESTION PAPER**  
(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

**AR1561PROJECT MANAGEMENT**

**L T P C**  
**3 0 0 3**

**Goal**

To establish and develop project management skills and network techniques. At this stage, the student are exposed to network logic and to develop alternaic siralogics.

**Objectives**

The course should enable the student to

- Learn traditional management system.
- Learn project programming and unidimensional management techniques.
- Understand CPM network analysis and network logic.
- Learn probabilistic time estimate and PERT network analysis.

**Outcomes**

The students should be able to:

1. Have a comprehensive knowledge about the management of projects as per the requirement of the industry.
2. Handle the management problems independently and effectively, to the occasion.

**UNIT I INTRODUCTION TO PROJECT MANAGEMENT**

**5**

Introduction to project Management concepts background of management, purpose, goal and objectives, characteristics of projects and different aspects of management. Traditional management system, Gantt's approaches load chart, progress chart, bar chart merits and limitation. Schedule, time estimates units

**UNIT II PROJECT TEAM**

**4**

The actors involved in a project ,Project team, Basic understanding of the role of individual actors, The role of architect at various stages of a project

**UNIT III PROJECT PROGRAMMING****6**

Project programming, resources balancing, phasing of activities, programmes, scheduling, project control, reviewing, updating and monitoring. Introduction to modern management, concepts, unidimensional management techniques Introduction to PERT and CPM introduction to network concepts, network elements and inter relationships.

**UNIT IV NETWORK TECHNIQUES****15**

Network techniques, network logic interrelationships, activity information, data sheets, and development of network. CPM for management, CPM network analysis, identification of critical path floats computation result sheets. PERT network, Introduction to Theories relating to the activities of PERT network .

**UNIT V PROJECT COST****15**

Introduction to two dimensional network analyses, activity cost information. Cost time relationship, crashed estimates for the activities, compression potential, cost slope, utility, data sheet, project direct cost and indirect cost.

Crashed programmes, network compression least cost solution least time solution, optimum time solution. Network techniques, PERT/CPM, generating alternative strategies using computers.

**TOTAL : 45****TEXT BOOKS**

1. Dr. B.C. Punmiya and K.K. Khandelwal Project Planning and Control with PERT\CPM Laxmi Publications, New Delhi, 2009.
2. S.P. Mukhopadyay, Project Management for Architects and Civil Engineers, IIT, Kharagpur, 1974.
3. Project management: a systems approach to planning, scheduling, and controlling , Harold Kerzner, John wiley & sons, 2006

**REFERENCES**

1. Jerome D. Wiest and Ferdinand K. Levy, A Management Guide to PERT/CPM, Prentice Hall of Indian Pub. Ltd. New Delhi, 1982.
2. SR.A. Burgess and G. White, Building production and Project Management, The Construction Press, London 1979.
3. Dr. P. N. Modi, "PERT and CPM", standard Book House, 2009.
4. Fundamentals of project management , James P. Lewis, AMACOM, 2007.

**PATTERN OF QUESTION PAPER**

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1562 INTERIOR LIGHTING AND LANDSCAPE

L T P C  
3 0 0 3

### GOAL

To understand the importance of landscape and lighting design in landscape.

### Objectives

The course should enable the student to:

- Make students aware about importance of site planning and landscaping and treatment of outdoor spaces.
- Acquire knowledge on lighting, types of lighting systems its uses and calculation of intensity of artificial lights.
- Ideas about indoor lighting, lighting design of various areas.

### outcomes

The students should be able to:

- Learn about ecology relationship between architecture, interior design and landscape and elements of landscapes, their use and construction details.
- Learn about the purpose, types of lighting systems available in the market and the calculation of intensity of lights its use and will be doing a lighting plan.
- Learn about types of indoor lights, lighting systems its use and lighting design for Offices, Shops, Showrooms, Hotels Auditorium and Cinema halls, Industries etc.

### UNIT I INTRODUCTION TO LANDSCAPE ARCHITECTURE 9

Definitions, importance, need and scope. Levels of landscape planning and design. Landscape architecture and ecology. Relationship between landscaping, architecture and interior design.

### UNIT II LANDSCAPE ELEMENTS 12

Different factors and components of a landscape. Social and economical factors. Psychological considerations of spaces and enclosures. Brief idea about man made components like walls, fences, entrances, gates, barriers, screens, planters, roads & pathways, street furniture, signage, services-electrical, water supply and drainage. Basic natural components - land, trees, water and climate.

### UNIT III LIGHT SOURCES 8

Light and its properties. Artificial light calculation by Lumen Method and Point y point method. Light sources, various types of Lamps and their characteristics.

### UNIT IV LIGHTING SYSTEM 8

Types of lighting systems, task lighting, accent lighting, general lighting, lighting for mood etc. Luminaries, their types , properties and uses.



## UNIT V INDOOR LIGHTING

8

Indoor lighting design for Offices, Shops, Showrooms, Hotels Auditorium and Cinema halls, Industries etc.

**TOTAL: 45**

### TEXT BOOK

1. Ching, Francis D. K. (2005) Interior Design Illustrated 2nd Edition, John Wiley & Sons
2. Lewis, Susan A. (1998) Interior Design Sourcebook: A Guide to Resources on the History and Practice of Interior Design (Design Reference Series), Omnigraphics.

### REFERENCES

1. Landscape Architecture By J.O.Symonds. McOraw Hill Publications.
2. Earthscape by J.O,Symonds,McGraw Hill Publications,
3. Architecture-A manual of site planning and design by J.O.Symonds, McgrawHill Publications,
4. Site Planning by Kevin Lynch,
5. Site Planning by R.Genebrooks, Prentice Hall.
6. Architectural Illumination by Dr.R.G.Edkie, Ekweera Prakasan.

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1563 LANDSCAPE SYSTEM INTEGRATION

L T P C  
3 0 0 3

### Goal

To graduate and sensitize the students on the process of landscape system integration through management techniques and the study of various landscape strategies

### Objectives

The course should enable the student to:

- Provides a broad knowledge on Institutional and legal support and landscape strategies.
- Understand the green building concepts and approach. To also learn the various evaluation system involved in rating green building.
- Give an indepth knowledge on the application of digital techniques in Landscape design
- Learn about the various principles in Landscape planning.
- Explore and apply the various parameters for sustainable and Green building design.

## Outcomes

The students should be able to:

- Get an idea on Landscape strategies and in many different scenario.
- Aware in the current trends and on how to apply it in their designs.
- Understand the role of digital media and the application of GIS in Urban Landscape projects.
- Understand the global planning systems and principles through examples.
- Gain the practical application of sustainable design development through various urban scenarios.

### **UNIT I LANDSCAPE PLANNING & MANAGEMENT 8**

Components of environment - Institutional & legal support in management of landscape and environment  
- Environmental policies - Landscape strategies in landuse, transportation, Infrastructure planning & Management.

### **UNIT II GREEN CONSTRUCTION & ENVIRONMENTAL QUALITY 8**

Sustainable architecture & Green building definition - Green building Evaluation systems; LEED certification; Green Globe certification ; Case studies which look at the environmental approach. (Indian & International).

### **UNIT III APPLICATION OF DIGITAL TECHNIQUES IN LANDSCAPE DESIGN 12**

Depiction of urban spaces in digital media - Role of digital media in reconfiguring landscape space - case studies - Application of GIS, diagramming & 3D modeling tools in urban design.

### **UNIT IV PLANNING SYSTEM & PRINCIPLES 7**

Principles in landscape planning - Landscape planning systems in India -Comprehensive Landscape Development Plan (CLDP) - Comparison of planning systems in UK & USA.

### **UNIT V SUSTAINABLE & GREEN BUILDING DESIGN STUDIO 10**

This studio will explore the collaborative learning to explore, investigate, apply various parameters of sustainability for design development projected buildings - Urban scenarios

**TOTAL:45**

## TEXT BOOKS

1. "Landscape Ecology", Jim Sanderson & Larry D Harris by CRC press LLC, 2000.
2. "Landscape Architect's Portable Handbook", Nicholas T Dines & Kyle D Brown, 2001 by Mc Graw Hill Companies, Inc.
3. The Living Landscape - An Ecological approach to Landscape Planning", Frederick Steiner by the Mc Graw Hill Companies, Inc, 2000.

## REFERENCES

1. "Tropical Garden Plants", William Warren, Thames & Hudson Ltd, London, 1997.
2. "The Landscape of Man", Geoffrey & Susan Jellicoe, Thames & Hudson Ltd, London, 1995.
3. "The Practical Encyclopedia of Garden Planning Design & Decoration", Peter Mc Hoy & Tessa Eveleigh, Anness Publishing Ltd., 1999.
4. "Time - Saver Standards for Landscape Architecture", Charles W Harris & Nicholas T Vines by Mc Graw Hill, Inc, 1998
5. "Contemporary Trends in Landscape Architecture", Steven L. Cartor by John Wiley & Sons, Inc, 1997.
6. Landscape Architecture Construction by Harlow C. Landphair, Fred Klatt, Jr.
7. Landscape Construction and Detailing by Alan Blanc
8. Landscape Detailing - Surfaces - Volume 2 by Michael Littlewood.
9. Complete guide to water gardens by Kathleen Fisher.
10. Garden Lighting by John Raine.
11. Site sections and Details by David J. Ciaccio

### PATTERN OF QUESTION PAPER

(To be distributed uniformly among all the units)

Max. Marks: 100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)

## AR1564 INFRASTRUCTURE PLANNING AND MANAGEMENT

L	T	P	C
3	0	0	3

### Goal

Planning for the infrastructure is an integral part of a settlement. Planning and Management of infrastructure is being given top priority throughout the world.

### Objectives

The course should enable the student to :

- Understand the importance of infrastructure in the economic development of the country and our countries current scenario.
- Understand the overall framework on the planning, implementation and the techniques employed to plan the infrastructure.
- Know how to manage and maintain the existing infrastructure facilities

- To know the current trends in the infrastructure development models like PPP, BOOT, BOT, etc.
- Have a overview of the major infrastructural facilities like water supply, storm water drainage, sewerage, solid waste, roads, pavement, bridges, etc

### Outcomes

The students should be able to:

- Have a comprehensive knowledge on the importance and the need for infrastructure development in our country
- Have a complete knowledge on how the major infrastructure facilities are planned, and the various techniques adopted in the planning stage.
- Know the various techniques employed to maintain and manage the existing infrastructure facilities
- Understand the various models currently used to build the mega infrastructure projects and the reasons for the development of such models.
- Have a basic idea of all the major infrastructure facilities essential for the development of the city.

### **UNIT I INTRODUCTION 12**

Definition of basic terminologies, role of infrastructure in economic development, types of infrastructure, measurement of infrastructure capacity, bases for quantification of demand and supply of various types of infrastructure, Indian scenario in respect of adequacy and quality

### **UNIT II INFRASTRUCTURE PLANNING 12**

Goals and objectives of infrastructure planning; Identification and quantification of the casual factors influencing the demand for infrastructure; review and application of techniques to estimate supply and demand for infrastructure; use of econometric, social and land use indicators to forecast the demand and level of service of infrastructure and its impact on land use; critical review of the relevant forecasting techniques; infrastructure planning to identify and prioritize preferred areas for development;

### **UNIT III INFRASTRUCTURE MANAGEMENT 6**

Concepts, Common aspects of urban and rural infrastructure management systems; pavement and bridge management systems, integrated infrastructure management.

### **UNIT IV EMERGING TRENDS IN INFRASTRUCTURE 6**

Overview of Public-Private Sector Participation in infrastructure projects, Understanding stakeholders concerns, regulatory framework, risk management in infrastructure projects, public policy for infrastructure

### **UNIT V SECTORAL OVERVIEW 9**

Highways, railways, waterways, airports, urban and rural infrastructure: roads, housing, water supply, sanitation and electricity.

**TOTAL:45**

### **TEXT BOOKS**

1. George Rainer, "Understanding Infrastructure: a guide for architects and planners", Wiley-Interscience, 1990.
2. James Parkin and Deepak Sharma, "Infrastructure Planning", Thomas Telford, 2009.
3. Luis Andrews et al, "The impact of private sector participation in Infrastructure: Lights, shadows and the road ahead", World Bank Publications, 2008.
4. Robert D. Cigolini et al, "Recent advances in Maintenance and Infrastructure Management", Springer Publication, 2009.

### **REFERENCES**

1. Jeffrey Delmon, "Private sector investment in infrastructure: Project finance, PPP Projects and risks", Kluwer Law International, 2009.
2. Neil S. Grigg, "Infrastructure Engineering and Management", John Wiley and Sons, 1988.
3. W. Ronald Hudson, Ralph Haas and Waheed Uddin, "Infrastructure Management: Design, Construction, Maintenance, Rehabilitation, Renovation", McGraw Hill Co., 1997
4. W. Ronald Hudson, Ralph Haas and Zeniswki, "Modern Pavement Management", McGraw Hill and Co, 1994.

### **PATTERN OF QUESTION PAPER (To be distributed uniformly among all the units)**

Max. Marks:100

Exam Duration: 3 hrs.

Part A: 10 questions X 2 marks = 20 marks (no choice)

Part B: 5 questions X 16 marks = 80 marks (choice for each question)