DEPARTMENT OF ARCHITECTURE

Deenbandhu Chhotu Ram University of Science and Technology, Murthal (Sonepat)

MASTER OF ARCHITECTURE
FULL TIME (2 YEARS)

ORDINANCE
SCHEME OF EXAMINATION & SYLLABUS
APRIL 2013

Deenbandhu Chottu Ram University of Science & Technology Murthal, Sonepat
DEPARTMENT OF ARCHITECTURE
ORDINANCE FOR CREDIT BASED SYSTEM
for
MASTER OF ARCHITECTURE
(w.e.f. academic session 2013-14)

1. Introduction

1.1 This ordinance shall apply to the Post Graduate programme, Master of Architecture in the University.

Duration of the Course			
Course		**Normal duration**	**Extended duration**
M. Arch.	Full time	Two years (04 semesters)	Four years (08 semesters)

(a) However, a student, who having passed the second semester examination discontinues her/ his studies, for some justified reasons may be permitted to join the third semester within one year of her/his passing the second semester examination.

(b) An academic year shall consist of two semesters (odd & even) of approximately 20 weeks duration inclusive of the period of examination and semester break. The eligibility criteria for admission to the programme, fee structure, academic calendar, scheme of studies and examinations, examination schedule, sports calendar and cultural activity calendar etc. for the academic year shall be published in the University prospectus.

2. Ordinance: Master of Architecture

Notwithstanding anything contained in any other ordinance with regard to the matter hereunder, the courses of study for the degree of Master of Architecture and the conditions for admission thereto shall be as under:

2.1 Eligibility Criteria for Admission

(a) B.Arch. or any other equivalent degree recognized by the Council of Architecture with not less than 50% marks in the aggregate or equivalent grade of a recognized university or an examination recognized as equivalent thereto by this University. Relaxation up to 5% in the qualifying examination marks shall be provided to SC / ST candidates as per Haryana Government rules.

(b) Before accepting the admission, the candidate must also ensure that she/he fulfills the minimum eligibility conditions as laid down herein and by the University for admission to the programme.

(c) The admission would be made on the basis of the merit of the qualifying examination or as per the criteria decided by the University from time to time. The reservation would be according to the Haryana Government/University norms notified in the admission brochure.

(d) The reserved seats remaining vacant in the first counseling shall be carried forward to the second counseling and filled from respective categories of candidates. The above categories of reserved seats still remaining vacant shall be converted into general category seats in the third counseling and filled out of the merit list of general category candidates in the third counseling.

(e) Fresh merit list will be prepared for each counseling.

(f) Only those candidates who present themselves personally on the specified date and time along with the originals of all the documents will be considered for admission.

(g) The admitted candidates will be required to deposit semester fees (non-refundable), securities (refundable) etc. of amount as decided by the University in cash/ D.D. on the spot at the time of admission.

2.2 At the end of the each semester, there shall be an examination wherein candidates shall be examined in the courses studied by them in that semester. Each semester examination shall be designated as First Semester Examination, Second Semester Examination, and Third Semester Examination and so on.

2.3 The Examination for all semesters will normally be held in December/January and also in May/ June on such dates as may be fixed by the Controller of Examination as per the Schedule provided by the University. The date(s) of commencement of examination as well as the last date(s) for the receipt of examination forms and fees shall also be notified by the Controller of Examinations to the concerned University Teaching Departments.

2.4 The courses of study and the subjects of examinations shall be as approved by the Academic Council from time to time. The medium of instruction and examination shall ordinarily be English except otherwise decided by the Academic Council. The question paper will be set in English, except otherwise decided by the Board of Post Graduate Studies and Research, Department of Architecture and approved by the Academic Council. Every candidate shall be examined in the subjects as laid down in the syllabus approved by the Academic Council from time to time. The credits for each subject as also the contact hours per week will be mentioned in the scheme of studies approved by the Academic Council.

2.5 The Chairperson of the department shall appoint a faculty member with post graduate qualification as M. Arch. coordinator; who shall have the full responsibility for coordinating the minor tests, evaluation work, awarding of grades and attendance compilation.

2.6 Evaluation Process

2.6.1 Sesssionals:

Sessional work shall be evaluated by the teachers of the various subjects based on the work done during semester on the basis of the following weightage:

S. No.	Components of Minors	Weightage
A)	**Theory Courses**	
1.	Minor Test – I	20 %
2.	Minor Test – II	20%
3.	Assignment / Mini Project / Term paper	30 %
4.	Quiz/Tutorial/Class Test	30 %
B)	**Architectural Design Studio Courses**	
1.	Seminar	20%
2.	Programme formulation	20%
3.	Concept	20%
4.	Preliminary Design	40%
C)	**Practical Training**	60%
D)	**Dissertation**	
1.	Synopsis	10%
2.	Mid term submission	50%
3.	Prefinal submission	40 %
E)	**Thesis**	
1.	Synopsis	10%
2.	Programme formulation	30%
3.	Concept	20%
4.	Preliminary Design	40%

(a) Theory courses:

Every student has to appear in both the minor tests. If a student does not take a minor test, he/she shall be awarded zero marks in that test.

(b) Architectural Design Studio Courses:

The evaluation of Architectural Design Studio courses will be through presentation and digital and print submissions.

(c) Dissertation:

The evaluation of Dissertation will be through presentation and digital and print submissions.

(d) Thesis:

The evaluation of Thesis will be through presentation and digital and print submissions. It will be done by a jury constituted by the Chairperson of the Department. The jury will comprise of Chairperson/M. Arch. coordinator, thesis guide and one external examiner.

The marks obtained in sessionals of theory/design studio/ dissertation/thesis courses are to be submitted to the Examination Branch duly signed by the M. Arch. coordinator and Chairperson of the department before the close of semester examination or a date fixed by the Controller of Examination. The examination branch shall convert the marks in to equivalent grades as per the grading procedure.

If a candidate, after attending the classes for the course of studies in the Department, but has failed in sessionals of one or more courses of studies, she or he can appear for such sessionals at subsequent semesters without attending a fresh course of studies for that semester. Such a candidate may, in the meantime, pursue her or his studies for the next semester(s) and appear in the examination(s) for the same along with the examination for the lower semester(s).

2.6.2 End semester Examinations

(a) Theory examination:

The theory papers shall be set by external/internal paper setters selected by the Vice-Chancellor from a panel of paper setters and examiners supplied by the Chairperson of the department and duly approved by the Board of Post Graduate Studies and Research of the Department. The evaluation of theory papers will be done by examiner(s) as per the University norm and notified by the Controller of Examinations. If there is more than one examiner in a course, the grading will be done through mutual consultation among the examiners to maintain uniformity of grades.

There shall be a different set of external examiners for each subject every year having Masters or Ph.D. or equivalent degree in Architecture or relevant disciplines. If a different set of external examiners for each subject every year is not available, alternate set of examiners may be selected by the Vice Chancellor from a panel of paper setters and examiners supplied by the Chairperson of the Department and duly approved by Board of Post Graduate Studies and Research.

An external examiner for any subject of examination shall have a minimum of 5 years of teaching / professional experience in his / her specific field of study.

(b) Architectural Design Studio Examination:

Portfolio evaluation in Architectural Design Studio shall be through viva-voce and digital and print submissions. It shall be conducted jointly by the external and internal examiners. If an external examiner is not available to come, alternate examiner (including those of the same

University department) may be appointed by the Chairperson of the concerned department with the intimation to the Controller of Examinations in the following preferential order:

i) From outside ii) From DCRUST Murthal.

(c) Practical Training Examination:

Portfolio evaluation of Practical Training will be through viva voce and digital and print submission; it shall be conducted by a jury comprising of the Coordinator of the Programme and an External examiner.

(d) Dissertation Examination:

Portfolio evaluation of Dissertation will be through viva voce and digital and print submissions; it shall be conducted by a jury comprising of the external and internal examiners. If an external examiner is unable to come, alternate examiner (including those of the same University department) may be appointed by the Chairperson of the concerned department with the intimation to the Controller of Examinations in the following preferential order:

i) From outside ii) From DCRUST Murthal

(e) Thesis:

Portfolio evaluation of thesis will be through viva voce and digital and print submissions. It shall be conducted by a jury comprising of two external examiners, thesis guide and Chairperson. Two external examiners shall be selected by the Vice-Chancellor from a panel of examiners supplied by the Chairperson of the Department and duly approved by the Board of Post Graduate Studies and Research of the Department. Both the examiners shall be called by the Department to conduct the thesis viva voce and in case of her/his refusal, the Vice-Chancellor, on the recommendation of the Chairperson of the Department shall appoint, another set of external examiners from the panel.

2.7 Dissertation

(a) The dissertation shall be based on empirical study, field work, and textual analysis in the field of architecture (relevant specialization). It should demonstrate candidate's capacity for analysis and judgment as also her/his ability to carry out independent viewpoint in interpretation. A dissertation may be supplemented by published work, if any.

(b) The dissertation shall present an orderly & critical exposition of existing knowledge of the subject or shall embody results of original interpretation and analysis & demonstrate the capacity of the candidate to do independent research work. While writing the dissertation, the candidate shall lay out clearly the work done by her/him independently and the sources from which she/he has obtained other information.

(c) The dissertation shall be prepared as per guidelines given in the dissertation manual. Nevertheless, the typing shall be done on both sides of the paper, the font size should be 12 point Times New Roman in 1.5 (one and a half) space but the reference and bibliography should be typed in single space in Harvard style. The paper to be used should be A-4 size and orientation should be portrait.

2.8 Thesis

(a) A candidate shall prepare her/his thesis under the supervision of a faculty of the Department. The guide shall be appointed by the Chairperson of the department in consultation with the faculty members. M.Arch. coordinator and the Chairperson will not act as guide for any student. The topic of thesis wherever applicable, will be approved by a

committee (Thesis Monitoring Committee) headed by the Chairperson of the department consisting of a Professor (Associate Professor, if professor is not available in the department) and guide(s) of the candidate.

(b) Any joint guide (Intra-departmental, Inter-departmental, External Institution or Industry), may also be associated in supervision, if desirable, but the reasons for recommendation of joint guide will be recorded in the Thesis Allotment proceedings. The inter-departmental or external guide can be appointed only as a joint guide and her/his prior written consent shall be submitted by the candidate to the Department.

(c) M. Arch. coordinator will coordinate all the internal stages in consultation with the Chairperson of the Department.

(d) No part of the thesis or supplementary published work should have been submitted elsewhere for the award of any other degree.

(e) A candidate shall submit her/his thesis at the end of the IV semester in case of two-year degree programme. The result of Thesis shall be declared only after the candidate has passed all the courses. In case a candidate's Thesis is rejected or she or he is unable to complete it within the prescribed period for her/his category, she or he may be allowed extension by the Vice-Chancellor on the recommendation of the chairperson, up to the limits prescribed for completion of degree by a candidate. However, she or he has to register each semester depositing continuation fee as decided by the University.

(f) The candidate shall be required to submit three soft bound copies of thesis as and when specified in the Scheme of Studies to the department. The candidate is required to submit the corrected copy of the thesis in hard bound with in two weeks after the viva -voce.

(g) The thesis shall be prepared as per guidelines given in the thesis manual. Nevertheless, the typing shall be done on both sides of the paper, the font size should be 12 point Times New Roman in 1.5 (one and a half) space but the reference and bibliography should be typed in single space in Harvard style. The paper to be used should be A-4 size and orientation should be portrait.

(h) The student will present her/his thesis work before the jury and the jury will award the marks. A student scoring 'F' grade in the viva voce exam shall have to resubmit her/his thesis after making all corrections/improvements & this thesis shall be evaluated as above in subsequent semester.

2.9 Eligibility for appearing in end semester examination

(a) A candidate has attended regularly the prescribed courses of studies for the relevant semester examination in the department recognized by the University for the degree of Master of Architecture (relevant specialization).

(b) A candidate has passed with 40% marks in the sessional of the prescribed courses of studies for the relevant semester examination in the department recognized by the University for the degree of Master of Architecture (relevant specialization).

(c) A candidate has his/her name submitted to the Controller of Examinations by the Chairperson of the department.

(d) A candidate has a good moral character (certificate be issued by the chairperson of the department concern if required).

(e) A candidate has attended not less than 75% of the total classes held in each theory/studio/seminar/ dissertation/thesis etc. This requirement shall be fulfilled separately

for each subject of study. A deficiency up to 10% may be condoned by the Chairperson of the department. A further condonation of 5% in attendance may be allowed in severe/ compassionate circumstances by the Vice-Chancellor. However it may not be treated as a matter of right by the students. (In case a student fails to fulfill the necessary requirement of the attendance in any subject(s) in any semester, he/ she shall not be promoted to next semester and will have to repeat that academic semester in the next academic session along with regular students.)

(f) A candidate whose result declaration is delayed for no fault of her/his or has applied for revaluation may attend classes of the next higher semester provisionally at her/his own risk and responsibility subject to her/his passing the concerned semester examination. Such a candidate shall also be governed by the clause 2.10. In case the candidate fails to pass the concerned Semester Examination, her/his attendance and studies in the next higher semester in which she or he was allowed to attend classes provisionally, shall stand cancelled.

2.10 Reappear

(a) The examinations for reappear in any subject(s) in the subsequent semester.

(b) If a candidate, after attending the classes for the course of studies in the Department has either not appeared or having appeared in any semester examination has failed in one or more paper(s) for that examination, she or he can appear for such paper(s) at subsequent examinations without attending a fresh course of studies for that semester. Such a candidate may, in the meantime, persue her or his studies for the next semester(s) and appear in the examination(s) for the same along with the examination for the lower semester(s).

(c) A candidate shall be automatically eligible for promotion to the next semester provided he/she fulfils the other essential eligibility criterion for promotion as mentioned in the ordinance.

2.11 Fees

The amount of Exam/Reappear/ Re-evaluation/ Improvement fee to be paid by the candidates shall be as prescribed by the University from time to time. A candidate who has paid dues for the higher class and is dropped for want of fulfillment of any of the above conditions shall not be required to pay his dues again on re-admission after fulfillment of above conditions.

2.12 Re-evaluation

Re-evaluation is permitted only for end semester examination (Theory course) as per University rules. There will be no revaluation for portfolio examination.

A candidate, who is unable to pass the Master of Architecture (relevant specialization) courses within a maximum of four consecutive academic years from the date of his/her admission shall lose the right to pursue the degree programme. In exceptional cases, mercy chance can be given by the Vice-Chancellor to a candidate if he/she applies.

2.13 The minimum passing marks/grade for passing any semester Examination shall be:

(a) 40% in each end semester examination (theory paper) of the subject.

(b) 40% in the sessional and the theory in each subject.

(c) 40% each Portfolio/Viva-Voce Examination.

(d) SGPA of 4.0

(e) 40% in sessional for courses like independent study seminar (where no external exam is being conducted).

A candidate who fails to obtain the requisite marks/grade in any course shall be required to appear in the concerned course in the subsequent examination(s) as per the clause 2.10.

A candidate who fails to appear in Portfolio examination viva voce, the student shall be marked as absent and shall be required to appear in the concerned course in the subsequent examination(s) as per the clause 2.10.

2.14 The result of a student at the end of each semester Examination and after completion of course shall be declared on the basis of the SGPA & CGPA (cumulative grade point average) obtained by the student.

2.15 At the end of each semester examination, the Controller of Examination shall publish the result, provided that in a case where candidate who was permitted to take examination for higher semester but has not cleared the lower semester examination his result for the higher semester examination will be declared provisionally. Each successful candidate shall be issued a copy of the result card on having passed the semester examination.

2.16 If a candidate has completed his/her degree with a CGPA $\leq$ 6.5 and she/he wants to improve her/his grade, she/he may be allowed to improve by depositing the requisite fee as per the University Rules. She/he is allowed to appear in at the most half of the theory papers only of a semester along with the regular candidates of that semester and the sessional part will be retained. Such opportunity may be given only twice in succession, subject to the condition that she/he have to complete the degree within 4 consecutive years of her/his registration. If the improved CGPA is less than the original, then the original will be retained.

2.17 Notwithstanding the integrated nature of the course wherever it is spread over more than one academic year, the Ordinance in force at the time a student joins the course shall hold good only for the examination held during or at the end of the semester and nothing in this Ordinance shall be deemed to debar the University from amending the Ordinance and the amended Ordinance, if any, shall apply to all students whether old or new.

3. Scholarship

Scholarship may be awarded to students as per the terms and conditions stipulated by the funding agencies. However, it should be mentioned in the prospectus.

4. The Credit System

Each Academic Program has a certain number of credits which describe its weightage. A student's performance is measured by the number of credits that he/she has completed satisfactorily. A minimum grade point average is required to be maintained for satisfactory progress.

Each subject (component) has a certain number of credits which reflect its weightage and is normally decided on the basis of effective contacts hours. It is mentioned in the scheme of studies and examinations.

4.1 The semester examination for all the semesters shall ordinarily be held in the month of December/January and also in the month of May/June, on such dates as may be fixed by University authority. The concerned teacher/ M. Arch. coordinator should ensure that 100% syllabus is covered in each subject before the Semester Examination.

4.2 The marks/grade awarded to a student in any particular subject will be based on the performance of the student evaluated throughout the semester. The syllabus of the minor tests will be what is covered in that particular term. The Semester Examination will be based on the entire syllabus.

4.3 The marks/grades will be displayed on the notice board of the department by M. Arch. coordinator with the approval of the Chairperson before forwarding it to the Examination Branch.

4.4 The Chairperson of the department shall forward the awards/grades to the Examination Branch within a week after the semester ends and examination process starts. The evaluated answer sheets of minor tests are to be kept by the M. Arch. coordinator for at least one year. The Examination Branch will keep the evaluated answer sheets of the semester examination for at least one year.

5. Grading Systems

For the award of grades in a subject, all component-wise evaluation shall be done in marks. The marks would be converted to grades as per the guidelines given below:

5.1 Award of Grades Based on Absolute Marks

The University will follow system of grading for all (irrespective of no. of students) based on absolute marks (after applying moderation if any) as given below:

Range of Marks (%)	**Grade**
90 to 100	A+
80 to 89	A
70 to 79	B+
62 to 69	B
55 to 61	C+
46 to 54	C
40 to 45	D
Less than 40	F

Note:

(i) The awards/grades shall be submitted by the teacher concerned through M. Arch. coordinator to the Chairperson of the department. The awards/grades should be finalized within 7 days of the semester examination.

(ii) In case of any difficulty/issue related to courses/conduct/moderation of awards/grades/reconduct of paper, the matter will be referred to a departmental monitoring committee comprising of Chairperson, senior most teachers by rotation, M. Arch. coordinator and faculty nominee of the Dean. The committee will be headed by the chairperson. The committee, on receipt of complaint either from the student or from the teacher, shall meet at the earliest and will give its decision within one week. The decision of the committee shall be final subject to approval of the Vice Chancellor.

5.2 Grade Points

The grading point of academic performance will be as under:

Academic Performance	**Grades**	**Grade Points**
Outstanding	A+	10
Excellent	A	9
Very Good	B+	8
Good	B	7
Average	C+	6
Below Average	C	5

Marginal	D	4
Very Poor	F	0
Absent	G	-
Incomplete Dissertation	X	-

Note:

1. Pass Grade is Grade D and higher grades
2. Grade F is Fail grades

'F' Grade

The **F** grades denote poor performance, i.e. failing a subject (or subject component). A student has to repeat all those components of a subject(s), in which she/he obtains 'F' grades, until a passing grade is obtained, within the stipulated time of completion of that programme as mentioned in clause 1(a)

'G' Grade

If a student, who is otherwise eligible for appearing in the semester examination as per the ordinance, but can not appear in the semester examination then s/he will be awarded 'G' grade. The candidate will be allowed to take up the examination next time along with regular students and s/he will be awarded the grade as per grade system explained above.

Continuous Absence

If a student is continuously absent from the Department for more than four weeks without intimation to the Chairperson of Department, her/his name will be struck off from the roll of the department. The re-admission shall not be allowed to the candidate during the same academic session.

'X' Grade

This grade is awarded for incomplete Thesis work as per guidelines given below and will be converted to a regular grade on the completion of the Thesis work and its evaluation.

A student who is unable to complete her/his Thesis may be awarded an 'X' grade by the Chairman/Chairperson on the recommendation of his/her guide.

A student who has been awarded 'X' grade shall be required to formally register for the next semester and pay the requisite fee.

'X' grade will be awarded in exceptional circumstances beyond student's/supervisor's control. Normally, the following grounds may be considered for the award of 'X' grade:

(i) Technical reasons/grounds such as Guide/equipment not being available.

(ii) Any other reason to the satisfaction of guide.

5.3 Evaluation of Performance

The performance of a student will be evaluated in terms of Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters at any point of time.

The CGPA is calculated on the basis of all pass grades, except audit courses, obtained in all completed semesters.

$$\text{CGPA}=\frac{\sum_{\text{sem}}(\text{Course credits x Grade point})\text{for courses with pass grade except audit courses}}{\sum_{\text{sem}}(\text{Course credits})\text{of courses with pass grade except audit courses}}$$

An example of these calculations is given below:

I Semester

Course No. (1)	Course Credits (2)	Grade Awarded (3)	Earned Credits (4)	Grade Points (5)	Point Secured (6)
MALXXX	5	C+	5	6	30
CSLXXX	4	C	4	5	20
PHLXXX	4	A+	4	10	40
PHPXXX	1.5	B+	1.5	8	12
MELXXX	4	F	0	0	00
AMLXXX	4	B	4	7	28

Credits registered in the semester (total of column 2) = 22.5

Earned Credits in the semester

Total of column 4 (total of column 2 excluding F grade) = 18.5

Point secured in this semester in passed courses = 130

SGPA/CGPA = $\frac{\text{Points secured in passed courses}}{\text{Credits earned}} = \frac{130}{18.5} = 7.027$

II Semester

Course No. (1)	Course Credits (2)	Grade Awarded (3)	Earned Credits (4)	Grade Points (5)	Point Secured (6)
MALXXX	5	D	5	4	20
EELXXX	5	F	0	0	00
CYLXXX	4	B	4	7	28
CYPXXX	1.5	C+	1.5	6	09
MELXXX	4	A	4	9	36
HULXXX	2	AP	2	N.A.	00

Credits registered in the semester (total of column 2) = 21.5

Earned Credits in the semester

Total of column 4 (total of column 2 excluding F&AP grades) =14.5

Cumulative Earned Credits (earned credits in previous semesters and current semester) = 18.5+14.5=33.0

Points Secured in this semester in passed courses = 93

Cumulative points secured (total of point secured in previous semesters and current semester) = 130 + 93 = 223

CGPA = $\frac{Cumulative\ points\ secured\ in\ all\ passed\ courses}{Cumulative\ earned\ credits,excluding\ audit\ courses} = \frac{130+93}{18.5+14.5} = 6.757$

Each successful candidate shall be issued a copy of the result card on having passed the semester examination.

Conversion of CGPA into Marks

The CGPA if multiplied by 9.5 will give the equivalent marks in percentage.

Candidates who pass all the prescribed subjects for all the semesters, but obtained:-

(i) Less than CGPA of 5.26	Pass class
(ii) 5.26 ≤ CGPA<6.32	2nd Division
(iii) 6.32 ≤ CGPA<7.9	1st Division
(iv) CGPA of 7.9 or more	1st Division with Distinction provided that they have passed all the semester examinations in single sitting within the normal period of course and without reappear in any paper throughout the programme. Will be awarded aforesaid division.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
DEPARTMENT OF ARCHITECTURE
SCHEME OF STUDIES & EXAMINATION FOR
MASTER OF ARCHITECTURE (SUSTAINABLE ARCHITECTURE)
Full Time (Two Year)
(Credit based scheme w.e.f. 2013-14)

SEMESTER I

S.No.	Course No.	Course Title	Teaching Schedule		Marks of Class work	Exam Marks		Total marks	Credit	Duration of Exam
			L	P		Theory	Portfolio			
1	MARC-601	Architectural Design Studio-I	-	6	100	-	100	200	6	-
	MARC-603	Fundamentals of Sustainable Architecture	4	-	75	75	-	150	4	3
2	MARC-605	Contemporary Architectural Trends and Theories	4	-	75	75	-	150	4	3
3	MARC-607	Climate Responsive Architecture in Tropics	4	-	75	75	-	150	4	3
4	MARC-609	Research Methods in Architecture	4	-	75	75	-	150	4	3
5		Elective-I	4	-	75	75	-	150	4	3
Total			20	6	475	375	100	950	26	-

Elective I (One out of Three subjects shall be chosen)

MARC-611 Environmental Science and Planning

MARC-613 Architectural Conservation

MARC-615 Advanced Thermal Comfort Studies

MARC-617 Building Project Management

SEMESTER II

S.No.	Course No.	Course Title	Teaching Schedule		Marks of Class work	Exam Marks		Total marks	Credit	Duration of Exam
			L	P		Theory	Portfolio			
1	MARC-602	Architectural Design Studio-II	-	6	100	-	100	200	6	-
2	MARC-604	Energy Efficient and Green Building Design Principles	4	-	75	75	-	150	4	3
3	MARC-606	Environmental and building regulations	4	-	75	75	-	150	4	3
4	MARC-608	Sustainable and Innovative Materials	4	-	75	75	-	150	4	3
5	MARC-610	Building Performance: measurement and analytical methods	4	-	75	75	-	150	4	3
6		Elective II	4	-	75	75	-	150	4	3
7	MARC-620	Practical Training	2		60		40	100	2	
Total			20	6	535	375	140	1050	28	-

Elective II (One out of Three subjects shall be chosen)

MARC-612 Design simulation and analysis

MARC-614 Daylighting and energy efficient electrical lighting

MARC-616 Technologies for Energy Efficient Buildings

MARC-618 Disaster Resilient Design

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
DEPARTMENT OF ARCHITECTURE
SCHEME OF STUDIES & EXAMINATION FOR
MASTER OF ARCHITECTURE (SUSTAINABLE ARCHITECTURE)
Full Time (Two Year)
(Credit based scheme w.e.f. 2013-14)

SEMESTER III

S.No.	Course No.	Course Title	Teaching Schedule		Marks of Class work	Exam Marks		Total marks	Credit	Duration of Exam
			L	P		Theory	Portfolio			
1	MARC-701	Architectural Design Studio-III	-	6	100	-	100	200	6	-
2	MARC-703	Principles of sustainable urbanism	4	-	75	75	-	150	4	3
3	MARC-705	Alternative Energy Fundamentals	4	-	75	75	-	150	4	3
4		Elective –III	4	-	75	75	-	150	4	3
	MARC-715	Dissertation		4	75	-	75	150	4	
Total					400	225	175	800	22	-

Elective III (Select any one)

MARC-707 Responsibility and Community Action

MARC-709 Energy and Environmental Systems for Green Buildings

MARC-711 Sustainable Housing

MARC-713 Sustainable Landscape

SEMESTER IV

S.No.	Course No.	Course Title	Teaching Schedule		Marks of Class work	Exam Marks		Total marks	Credit	Duration of Exam
			L	P		Theory	Portfolio			
1	MARC-702	Architectural Thesis Project	-	20	250	-	250	500	20	-

MARC 601 ARCHITECTURAL DESIGN STUDIO–I

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
-	6	100	-	100	200	6	-

INTENT:

The design studio is focused on the study and analysis of climate and its impact on the built form. Passive design strategies will be explored in the contemporary architecture.

CONTENT:

The studio will focus on institutional built form such as University, college, school and specialised institutional campuses in tropical or subtropical conditions. There will be a project design related to the resources and limitations posed by local site conditions, indoor and outdoor climate; to analyse local site and climate and their consequences for built form, along with an in-depth study of building physics and human comfort requirements. Different building shapes, functional programmes, site types are addressed, with focus on indoor as well as outdoor areas. Importance of daylight, solar access, shading, ventilation, heating and cooling strategies, wind and precipitation in the given climatic zone.

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.
This exercise needs to be supported by frequent site visits & detailed case studies.
There should be regular presentations of various internal stages.

I	Sessional evaluation	Weightage
	Seminar	20 %
	Programme formulation	20%
	Concept	20 %
	Preliminary Design	40%
II	Portfolio evaluation	
	Detail Design	100%

MARC 603 FUNDAMENTALS OF SUSTAINABLE ARCHITECTURE

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

This course objective is to provide a holistic overview of various aspects related to making the built environment sustainable.

CONTENT:

UNIT I: Sustainability: notion and evolution

- Timeline of sustainable development
- Global perspective
- Sustainability in India
- Sustainable built environment trajectory: eco efficiency; restorative design approach; C2C approach; reconciliatory and regenerative approach

UNIT II: Sustainability: types and theoretical framework

- Environmental Sustainability
- Economic Sustainability
- Social / Cultural Sustainability
- Ecological Literacy

UNIT III: Sustainable built form: assessment

- Malcolm Well Check list
- CSAM
- Ove Arup Spear
- Life Cycle Analysis
- LEED
- GRIHA
- NBC

UNIT IV: Sustainable built form: exemplars

- Building types: commercial, industrial, housing, leisure, public health
- Urban scenario: cities, neighbourhoods, historic precincts

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1 Tillman Lyle, J (1996) Regenerative Design for Sustainable Development, John Wiley & Sons.
2 Van der Ryn, S (1995) Ecological Design, Island Press.
3 Owen Lewis, J (1999) A Green Vitruvius - Principles and Practice of Sustainable Architectural Design, James & James.
4 Orr, W. D. (1992) Ecological Literacy: Education and the Transition to a Postmodern World,State University of New York Press.
5 Lovelock, J (2000) GAIA: A New Look at Life on Earth, Oxford University Press.
6 Tanzer K & Longoria, R (eds) (2007) The Green Braid: towards an architecture of ecology, economy and equity, Routledge.
7 Guzowski, M (1999) Daylighting for Sustainable Design, McGraw-Hill Professional Engineering Series
8 Olgyay, V (1973) Design with Climate: Bioclimatic approach to architectural regionalism, Princeton University Press.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 605 CONTEMPORARY ARCHITECTURAL TRENDS AND THEORIES

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to critically examine from a sustainability view point contemporary architectural trends and theories from early 20th century onwards.

CONTENT:

UNIT I: Modernism: meeting post-war challenges

- Early Modernism
- Post War Internationalism
- Brutalism
- Neo Expressionism

UNIT II: Modernism: death of an era and a new beginning

- Late Modernism
- Early Modernism Revisited (Neo-Corbu Aesthetics)
- Post Modernism

UNIT III: Seeking fresh meanings in architecture: challenging conventions

- Slick-Tech Architecture
- Neo Rationalism
- Neo Modernism

UNIT IV: Architecture of 21st century: the global effect

- Critical Regionalism
- Sustainable Architecture and city
- Green Architecture
- Bionic Architecture

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Correa, C (1985) The New Landscape, Bombay.
2. Frampton, K (1985) Modern Architecture: A Critical History, New York.
3. Jencks, C (1986) Modern Movements in Architecture, New York.
4. Krier, Rob (1988) Urban Space, New York.
5. Lang, J, Desai, M, Desai, M (1997) Architecture and Independence-The Search for Identity- India 1880 to 1980, Delhi.
6. Rossi, A (1985) The Architecture of the City, New York.
7. Scully, V (1977) Modern Architecture, New York.
8. Venturi, R (1977) Complexity and Contradiction in Architecture, New York.
9. Bhatt, V & Scriver, P (1991) After the Masters (Contemporary Indian Architecture), University of Washington.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 607 CLIMATE RESPONSIVE ARCHITECTURE IN TROPICS

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to study passive design of built form in tropical and sub-tropical climatic contexts for thermal comfort.

CONTENT:

UNIT I: Climate responsive design fundamentals

- Design process: intent, criteria, methods and tools, validation and evaluation, lessons from the field, challenges
- Elements of climate, taxonomy of climate, analysis of climate, challenges of tropical and sub-tropical climates
- Climatic data and its use in design, Typical Meteorological Year (TMY), Test Reference Year(TRY)
- Micro (site) climate: topography, vegetation, built forms
- Traditional knowledge of climate and context, occupant well being and shaping demand of resources

UNIT II: Occupant comfort

- Physiological and environmental factors of occupant comfort
- Empirical and analytical comfort indices
- Constancy or static model of thermal comfort
- Adaptive model of thermal comfort and thermal neutrality
- Comfort zone from Olgyay to ASHRAE
- Control potential zone analysis, psychrometric chart

UNIT III: Thermal Design Principles

- Thermodynamics and thermal behavior of buildings
- Thermal quantities and thermal insulation
- Calculation of heat flow: steady state and period heat flow:
- Passive control strategies: building form, thermal mass, ventilation, solar heating, evaporative cooling

UNIT IV: Solar control

- The Sun and its position, solar versus clock time, true north and magnetic deviation, sunpath projections
- Taxonomy of solar control: window orientation and size, external shading devices, internal blinds, high performance glasses, landscaping and other methods
- Method of design of shading devices: graphical, analogue and computer aided design

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1 Aulicieums, A & Szokolay, SV (2007) Thermal comfort, PLEA Note 3, University of Queensland.
2. Brown, GZ (1985) Sun, Wind and Light: Architectural Design Strategies, John Wiley & Sons, NY.
3. BIS (1987) Functional requirements of buildings other than industrial buildings, Bureau of Indian Standards, SP-41.
4. Givoni, B (1976) Man, climate and Architecture, Applied Science publishers, London.
5. Givoni, B (1994) Passive and low energy cooling of buildings, Van Nostrand Reinhold Co.
6. Markus, TA & Morris, EN (1980) Building, Climate and Energy, Pitman Publishing Limited, London.
7. Olgyay, V (1963) Design with climate, bioclimatic approach to architectural regionalism, Princeton.
8. Santamouris, M (ed) (2007) Advances in Passive Cooling, Earthscan, London.
9. Szokolay, SV (2007) Solar geometry, PLEA Note 1, University of Queensland.
10. Szokolay, SV (2008) Introduction to architectural science: the basis of sustainable design. Architectural Press, Oxford.

INSTRUCTION TO PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 609 RESEARCH METHODS IN ARCHITECTURE

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to provide the essential tools to conduct research in architecture and to publish research findings.

CONTENT:

UNIT I: Fundamentals of Research

- Elements of good research, types of research, research methods: qualitative, quantitative and mixed measures
- Research design as a part of the designer's thinking: problem statement, literature review, critical thinking, types of hypothesis, types of sample, methods of data collection, data analysis, research proposal preparation
- Information searching techniques: field study to archives and libraries.
- Statistical theories: regression analysis, factor analysis and multivariate analysis

UNIT II: Research in Architectural Design Development

- Qualitative research: types of research survey, interviews in research, observation, physical traces
- Correlational research
- Experimental and quasi experimental research
- Simulation and modeling research
- Case studies and combined strategies

UNIT III: Visual Research Methods

- Environmental measurement: landscape evaluation paradigms, visual representation and cues, recognition of building types, photo interviewing, attributes of residential environment
- Imageability: environmental character, visual appraisal
- Environmental mapping: cognitive mapping, direct observation, documentary techniques, photographically studying behaviour

UNIT IV: Report Writing and Presentation

- Research paper/report preparation: components
- Methods to use information: issues of copy right, citation & referencing: Harvard and Chicago styles. End Note.
- Presentation techniques: oral presentation, layout, printing process, internet, overhead, power point

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Dwivedi, RS (2001) Research Methods in behavioral science, Mcmillan, New Delhi.
2. Graziano, A (1989) Research methods process of inquiry, Harper Collins Publishing, New York.
3. Groat, L & Wang, D (2002) Architectural research methods, John Wiley publication, New York.
4. Harrigan, JE (1987) Human factors research methods, Elsevier, Amsterdam.
5. Kothari, CR (1990) Research Methodology: methods & techniques, 2nd edn, Wishwa Prakashan, New Delhi.
6. Sanhoff, H (1991) Visual research methods in design, Van Nostrand Reinhold, New York.
7. Zeisel, J (1995) Inquiry by Design: tools for environment-behaviour research, Cambridge University Press.
8. Creswell, JW (2002) Research design: qualitative, quantitative, & mixed methods approaches. Thousand Oaks, Sage.
9. Denscombe, M (2003) The good research guide: for small-scale research projects. Oxford University Press, London.
10. George, A & Bennett, A (2005) Case studies and theory development in the social sciences. Cambridge MA:MIT Press.
11. Yin, RK (2003) Case Study Research: Design and Methods, 3rd edn, Thousand Oaks: Sage Publications.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 611 ENVIORNMENTAL SCIENCE AND PLANNING

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

To create awareness of issues related to environmental problems, ecological security, human well being and future sustainability.

CONTENT:

UNIT I: Environment and Ecosystem

- Major ecosystems of the world: forest, grassland, desert, wetland, freshwater and marine ecosystems.
- Biodiversity
- Concept of carrying capacity
- Ecological footprints
- Population growth, urbanization, growth of vehicles and its impact on air quality, changes in forest
- Climate change and green house gas emission
- Carbon balance of trees and ecosystem

UNIT II: Environmental Management

- Resource management: land, water, air, minerals, flaura, fauna, rain water harvesting
- Strategies for different geographical regions: hills, coast line, wet lands, deserts etc.
- Ecologically venerable areas/zones: river flood plains, mining towns, forest

UNIT III: Environmental Pollution and Control

- Air, water, noise and soil pollution and associated control
- Waste management: solid waste disposal methods – open dumps, ocean dumping, Land fills, Incineration; Recycling and reuse. Hazardous waste disposal and management.
- Waste water treatment: primary treatment, secondary treatment and advance treatment.
- Electronic waste: sources and types, constituents of E-wastes, recycling of e-waste and its environmental consequences, Management of e-wastes, Basel convention, Nuclear wastes and their management.

UNIT IV: Policy and Future framework of Environmental Sustainability

- Implementation: International, national and local initiatives to implement greenhouse gas emissions reduction
- Convincing decision makers: government, regional agencies, local government and business.
- Urban- rural equality issues
- Concepts such as permaculture, biophilia, localism, life-cycle analysis, natural capitalism, cradle-to-cradle (C2C) production, systems thinking and ecological design, biomimicry

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Botkin, D & Keller, E (1995) Environmental Science: Earth as a living planet, John Willey and Sons, New York.
2. Carter, L (1996) Environmental Impact Assessment, McGraw Hill, New Delhi.
3. El-Halwagi, MM (1997) Pollution Prevention through Process Integration, Academic Press, Washington.
4. Jimmie, PS and Ramakrishnan (2000) Mountain Biodiversity, Land Use Dynamics and Traditional Ecological Knowledge, Oxford and IBH, New Delhi.
5. Odum EP & Barrett GW (2005) Fundamentals of Ecology, Thomson Asia Pvt. Ltd., Singapore.
6. Rana SVS (2005) Essentials of Ecology and Environmental Science, Prentice Hall of India, New Delhi.
7. Singh OP (2006) Environment and natural resources, Regency Publications, New Delhi.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 613 ARCHITECTURAL CONSERVATION

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to critically examine the built environment of the past as a cultural resource to be safeguarded for posterity. It examines global practices in architectural conservation and management of built heritage against which the development of conservation in India is then scrutinised.

CONTENT:

UNIT I: Principles of Conservation of the Built Environment

- Historical background
- Methods & approaches
- International conservation conventions

UNIT II: Conservation Theory & Policy Framework

- Cultural World Heritage: notion & criteria
- Conservation in India: agencies & statutory framework
- World Heritage Sites in India

UNIT III: Conservation Practice

- Inventorising built heritage
- Documenting built heritage
- Material conservation
- Structural conservation

UNIT IV: Conservation Management

- Historic site management
- Disaster management
- Adaptive reuse

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Cohen, N (1999) Urban Conservation, MIT Press.
2. Feilden, BM (1982) Conservation of Historic Buildings. Oxford.
3. Jokilehto, J (2002) A History of Architectural Conservation. ICCROM.
4. Rabun, JS *et al* (2008) Building Evaluation for Adaptive Reuse & Preservation. New Jersey.
5. Royal Commission on the Historical Monuments of England (RCHME) (1996) Recording Historic Buildings: A Descriptive Specification. 3rd Edition, Swindon.
6. US/ICOMOS International Symposium (4th :2001 :Philadelphia, Pa.) (2003) Managing change: sustainable approaches to the conservation of the built environment. Los Angeles.
7. Watt, D (1999) Building Pathology: principles & practice. Blackwell.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 615 ADVANCED THERMAL COMFORT STUDIES

Teaching schedule		Marks of sessional work	Marks of examination		Total marks	Credits	Duration of examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The objective of the course is to develop an advanced understanding of the theory of human thermal comfort.

CONTENT:

UNIT I: Fundamentals of thermal comfort

- Principles of heat transfer between the human body and the environment
- Metabolic heat production, heat loss by conduction, convection, radiation and evaporation, vasomotor adjustment
- Conflicting theories of thermal comfort which result from the rational/climate chamber approach and the field study approach to thermal comfort evaluation.

UNIT II: Static Model of thermal comfort

- The role of the "six variables" in human heat balance
- The physiology and psychophysics of thermal comfort and heat balance.
- Thermal balance as a method of defining thermal comfort.
- The Fanger model and the Gagge two-node models. Multi-node thermal models of the human body.

UNIT III: Adaptive model of thermal comfort

- The field study as an approach to defining the conditions for thermal comfort.
- The theory and practice of user surveys in comfort work and in building appraisal.
- The analysis of comfort data from field studies: use of correlation, regression and probit analysis, and weaknesses of these techniques and some of the methods which can be used to overcome them.
- Meta-analyses and the development of an adaptive model: The development of specific applications of the adaptive method - adaptive algorithm, comfort appraisal of free-running buildings etc.

UNIT IV: Post occupancy evaluation and thermal comfort standards

- Occupant interactions with building controls – windows, fans, blinds etc.
- Organise and execute a comfort survey or post-occupancy building evaluation and analyse its results.
- Collection and analysis of energy use data from building records and on-site measurement and visualisation techniques.
- Collection of energy and comfort data and analysis using simulation and monitoring
- Knowledge of the setting and use of thermal comfort standards for buildings.

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Fanger, PO (1970) Thermal Comfort. Danish Technical Press, Copenhagen.
2. Finney, DJ (1964) Probit Analysis. Cambridge University Press, Cambridge.
3. Heschong, L (1979) Thermal delight in Architecture. MIT Press, Cambridge; London.
4. McIntyre, DA (1980) Indoor Climate. Applied Science Publishers.
5. Nicol, JF and Roaf, S (2007) Progress in passive cooling: adaptive thermal comfort and passive architecture.
6. Nicol, JF (2011) Thermal Comfort a handbook for field studies toward an adaptive model. Earthscan, London.
7. Parsons, K (2003) Human thermal environments. Blackwell.
8. Shove, E., Chappells, H. and Lutzenhiser, L. (eds) (2009) Comfort in a lower carbon society. Routledge, London.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 617 BUILDING PROJECT MANAGEMENT

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

This course objective is to provide an advanced understanding of building project management.

CONTENT:

UNIT I: Fundamentals of Project Management

- History of project management
- Building construction industry in India
- Taxonomy of building projects, building project life cycle
- Project management cycle

UNIT II: Pre-construction Stage

- Pre-project phase: project formulation, costing, appraisal, financing
- Planning and design phase: project plan development, master plan, programming, work break down structure, scheduling, project organization-scope of work definition, planning & control
- Contract selection phase: Indian Contracts Act-elements of contracts-types of contracts-Features-suitability-design of contract documents -international contract document-standard contract document-law of torts
- Tenders: prequalification-bidding-accepting-evaluation of tender from technical, contractual and commercial points of view-contract formation, World Bank procedures and guidelines

UNIT III: Construction Stage

- Project mobilisation phase: legal and contractual issues, programming, planning and scheduling, project management software, budgeting and cost system, organising the worksite, buying out the job, project staffing,
- Project operation phase: monitoring and control, quality management, safety management, environmental management, resource management, materials management, equipment management, communication
- Project closeout and termination phase: completing the work, closing out the project

UNIT IV: Legal Framework

- International standards
- National standards
- International Labour Organisation (ILO)
- interpretation-potential contractual problems, arbitration

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Bennett, LF (2003) The Management of construction a project life cycle approach. Butterworth Heinemann,Amsterdam.
2. Chitkara, KK (1999) Construction project management: planning, scheduling and controlling. Tata McGraw Hill, Delhi.
3. Gould, F & Nancy, EJ (2000) Construction Project Management. Prentice Hall, New Jersey.
4. Halpin, DW & Senior, BA (2010) Construction Management, Page 2 VP & Executive Publisher.
5. Harris, F & McCaffer, R (2006) Modern Construction Management, Blackwell Publishing.
6. Joy PK (2008) Handbook of Construction Management, Macmillan Indian Ltd.
7. NICMAR (1990) Construction Machines & Equipment, National Institute of Construction Management and Research.
8. Weist, JD (1977) A Management Guide to PERT/CPM: With GERT/PDM/DCPM and Other Networks, Prentice Hall.

INSTRUCTION TO PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30).
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 602 ARCHITECTURAL DESIGN STUDIO – II

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
-	6	100	-	100	200	6	-

INTENT:

The design studio is focused on the study and analysis of energy efficient principles, environmental regulations and use of innovative materials with performance appraisal.

CONTENT:

The studio will be based on energy intensive non-residential buildings Industrial buildings, Commercial buildings, Transport terminals.

There will be a project design with focus on integrated energy design and interdisciplinary cooperation between building professionals. Emphasis shall be building systems and services and their integration in architecture to provide good interior climate in a resource efficient manner. Indisciplinary procedure necessary to ensure a successful functioning of these systems in architecture.

Assessment will be based on breadth and depth of sustainability targets set in terms of LEED/GRIHA/BEE ratings and the degree to which these are met. Learning outcomes include the questioning of the traditional design process, the management of conflicts and tradeoffs, and the potential synergy between passive design principles, electro-mechanical systems and Green technologies.

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

This exercise needs to be supported by frequent site visits & detailed case studies.

There should be regular presentations of various internal stages.

I	Sessional evaluation	Weightage
	Seminar	20 %
	Programme formulation	20%
	Concept	20 %
	Preliminary Design	40%
II	Portfolio evaluation	
	Detail Design	100%

MARC 604 ENERGY EFFICIENT AND GREEN BUILDING DESIGN PRINCIPLES

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The objective of course is to learn principles and design strategies for energy efficient and green buildings especially at schematic design stage. The emphasis would be learning through exemplars.

CONTENT:

UNIT I: Energy efficient and green buildings

- Energy and Environment: World/Asia energy outlook
- Building types and energy consumption
- Importance of energy efficient buildings, green, and sustainable buildings, Green rating around the world.
- The principles of integrated design, systems approach

UNIT II: Design principles and strategies: site, building, fenestration

- Site selection and analysis: topography, vegetation, built form, water, access to natural light, local wind patterns and micro climate
- Site planning: layout, shape, spacing, orientation, mutual relationship, solar studies, pollution prevention and ecology, heat island effect
- Building envelope/shell optimization: wall, roof and fenestration components (windows, day lighting, solar control, ventilation, etc.), air and moisture control
- Environmentally responsive building elements: Advanced Integrated Façade (AIF), Thermal Mass Activation (TMA), Earth Coupling (EC), Phase Change Materials (PCM), Dynamic Insulation (DI).

UNIT III: Design principles and strategies: Services and energy production

- Heating Ventilating Air Conditioning (HVAC) optimization
- Electrical lighting and controls, integration with daylighting
- Sound: the sonic environment, noise control
- Energy production and cogeneration: plug loads, air-to-air heat exchangers, energy recovery systems, photovoltaic, wind turbines, micro hydro turbines, fuel cells, combined heat and power systems

UNIT IV: Design principles and strategies: health, materials, water and waste

- Indoor environmental quality (IAQ): pollutant sources and impacts, predicting IAQ, zoning for IAQ, passive and active approaches for IAQ, materials and health
- Materials and resources: renewable materials, reuse materials, resource efficient products
- Water efficiency: conservation, water catchment systems, pervious surfaces, bioswales, Retention ponds
- Waste management: recycling systems, composting toilets, water reuse/recycling, living machines

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Anink D, Boonstra C. & Mak J. (1996) Handbook of Sustainable Building: an environmental preference method for selection of materials for use in construction and refurbishment, London: James and James.
2. Kwok, AG & Grondzik, WT (2007) The green studio handbook: environmental strategies for schematic design, Architectural Press, Oxford.
3. Majumdar, M (ed.) (2001) Energy Efficient Buildings in India, Tata Energy Research Institute and Ministry of Non-conventional Energy Sources, Government of India.
4. Nayak, JK & Prajapati, JA (2006) Handbook on Energy Conscious Buildings, Prepared under the interactive R&D Project No. 3/4(03)99-SEC, Ministry of New and Renewable Energy, Government of India.
5. Owen Lewis, J (1999) A Green Vitruvius - Principles and Practice of Sustainable Architectural Design, James & James.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 606 ENVIRONMENTAL AND BUILDING REGULATIONS

Teaching schedule		Marks of sessional work	Marks of examination		Total marks	Credits	Duration of examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to explore government programmes, legislation, industry regulations and codes, green certifications and LEED in global and national context.

CONTENT:

UNIT I: Overview

- Environmental threats and issues
- Timeline of sustainable development
- Global trends and overview of environmental and building regulations
- International regulatory bodies

UNIT II: Environmental Impact Assessment and Environmental Policies And Ethics

- Introduction to environmental impact assessment (EIA)
- Impact assessment methodologies
- Environmental policies and ethics

UNIT III: Building Energy Regulations and Codes

- Integrated Energy Policy of Planning Commission
- Bureau of Indian Standard codes, National Building Code
- Energy Conservation Building Code (ECBC)
- Other regulations

UNIT IV: Green Building Ratings

- Need and objective of methodical rating systems
- Basis elements of rating systems
- Leadership in Energy and Environmental Design (LEED)
- Green Integrated Habitat Assessment (GRIHA)

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. GOI (2006). Integrated Energy Policy. Expert Committee Report, Planning Commission, Government of India. http://planningcommission.nic.in/reports/genrep/rep_intengy.pdf.
2. MoEF (2006). Environmental Clearances, Ministry of Environment and Forest, Government of India, New Delhi, http://moef.nic.in/modules/project-clearances/environment-clearances/.
3. BIS (1987). Handbook of Functional Requirements of Buildings (other than industrial building) SP 41(S & T), Bureau of Indian Standards, New Delhi
4. BIS (2005). National Building Code of India SP:7, Bureau of Indian Standards, New Delhi.
5. BEE (2007). Energy Conservation Building Code, Bureau of Energy Efficiency, Ministry of Power, Government of India.
6. MNRE (2010). Green Rating for Integrated Habitat Assessment, Ministry of New and Renewable Energy, Government of India, New Delhi. http://www.grihaindia.org/index.php.
7. IGBC (2007). LEED – India, Green Building Rating System, (LEED-India NC), version 1.0, Indian Green Building Council, Hyderabad. http://www.igbc.in/site/mmbase/attachments/48344/LEED.Abrid_Ver.pdf
8. Lawrence DP (2003) Environmental Impact Assessment: Practical Solutions to Recurrent Problems, John Wiley & Sons, New Delhi.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 608 SUSTAINABLE AND INNOVATIVE MATERIALS

Teaching Schedule		Marks of sessional work	Marks of examination		Total marks	Credits	Duration of examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to present a value system for selecting environmentally preferable products and an overview of green and sustainable building materials.

CONTENT:

UNIT I: Concepts of Sustainable Building Materials

- Definition of sustainable building materials through a lens of social, environmental and economic impacts
- Physical properties and embodied energy of building materials
- Life-cycle-analysis (LCA), cost, sourcing, energy efficiency, off-gassing, green specifications, value engineering and third party certification based materials selection tools for better decision making in relation to their energy and environmental impacts and benefits.
- Impacts of selecting durable and environmentally responsible building materials: recycle, reuse, waste prevention, biodegradability,

UNIT II: Traditional Building Materials

- Wood based materials different species of wood, bamboo, reed, coconut, thatch, sea weeds
- Earth based materials adobe, burnt bricks
- Stone based materials different types of stone
- Lime based materials different types of lime

UNIT III: Contemporary Building Materials

- Cement, concrete and ferrocement
- Steel, stainless steel, aluminium, and other metals, aluminium composite panel
- Glass and its different types, curtain wall
- Plastics, Polymers and composite
- Pre fabricated and pre-engineered building components
- New materials: fabric and digital technologies, nanotechnology, regenerative plastics

UNIT IV: Alternative Building Materials

- Overview and definition of alternative or appropriate building materials
- Alternative materials developed and promoted by government organisations CSIR labs: CBRI and SERC, ASTRA (IISc), BMTPC, HUDCO and its building centres
- Alternative materials developed and promoted by non government organisations DA, Auroville, TERI

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Anink, D, Boonstra, C & Mak, J (1996) Handbook of sustainable building: an environmental preference method for selection of materials for use in construction and refurbishment. James and James (Science Publishers) Limited.
2. CBRI (1990) Building materials & components technology for developing countries, Central Building Research Institute.
3. Jagdish KS & Nangunda KS (2002) Proceedings of the national workshop on alternative building methods.
4. Krewinkel, HW (1998) Glass Buildings: Material, Structure and Detail. Princeton Architectural Press.
5. Schwartz, MM (2006) New materials, processes and methods technology. Taylor & Francis/CRC Press.
6. Watson Donald (2000) Time saver standards for building materials and systems. McGraw Hill, NY.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 610 BUILDING PERFORMANCE: MEASUREMENTS AND ANALYTICAL METHODS

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to familiarise with the tools with which the experimental and practical aspects of measuring building performance can be understood and the criteria by which building performance may be judgedTo understand. The course further aims to develop an understanding of statistical methods by which information may be collated and analysed.

CONTENT:

UNIT I Building Performance Criteria

- Thermal, visual and acoustic comfort
- Benchmarking
- Energy and Carbon targets in India applied to a range of building types including housing, offices and schools

UNIT II Energy Analysis techniques

- Energy audit: definition, need and significance, methods
- Preliminary energy audit, detailed energy audit
- Energy survey, material and energy balance, energy performance assessment of lighting
- Monitoring and target setting
- Energy audit reports

UNIT III: Post Occupancy Evaluation

- Using occupant surveys for the assessment of buildings
- Statistical methods appropriate to the presentation and analysis of field data from social and physical surveys

UNIT IV Energy Efficiency Measures

- Identification of energy conservation opportunities
- Appraisal of the various opportunities and options for energy efficiency measures
- Designing and constructing simple experiments to monitor buildings using data loggers

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Baird; Gray; Isaacs; Kernohan; and McIndoe (1996) Building Evaluation Techniques, by, McGraw-Hill Companies, Inc., USA.
2. BEE (n.d) Energy Audit Book, Bureau of Energy Efficiency, Petrocelly & Thumann (2000) Facilities Evaluation Handbook: Safety, Fire Protection and Environmental Compliance, by, Fairmont Press, USA.
3. FFC (2001) Learning from our Buildings: a State-of-the-Practice Summary of Post-Occupancy Evaluation, by Federal Facilities Council, National Academy of Engineering, USA.
4. Preiser and Vischer (eds) (2005) Assessing Building Performance, Elsevier Butterworth Heinmann, Oxford.
5. Roaf S. (2004) Closing the Loop-benchmarks for Sustainable buildings, London: RIBA.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 612 DESIGN SIMULATION AND ANALYSIS

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to develop an understanding of the computer simulation techniques for estimating daylighting, air flow and energy consumption in buildings.

CONTENT:

UNIT I: Building Information Modelling (BIM)

- BIM as tool for design, managing and documenting projects
- Configurations, methodologies and standards, Capabilities and limitations of BIM
- Application of BIM from conceptualization stage to design, visualization and simulation
- Application of BIM in integrating and coordinating the digital models for architecture, structure, MEP (Mechanical, Electrical, Plumbing and other databases to create a complete virtual building model
- Application of BIM for scheduling, calculating areas, curtain wall costing, thermal analysis

UNIT II: Environmental Design Modelling

- Estimate the availability and nature of sun, light, wind and other environmental elements at a site, climate analysis
- Investigate the fabric performance of a design of a building, evaluate daylight, heating and cooling strategies appropriate to a specific site and brief
- Evaluate how building services loads are influenced by the use, form, fabric and setting of a building

UNIT III: Building Performance Modelling

- Dynamic thermal modelling: theoretical and mathematical backgrounds, modelling approaches of thermal behaviour of a design and produce meaningful results in support of a design recommendation
- Simplified programmes: ENERGY 10, ENER Win, solar 5, Energy Scheming, Ecotect; detailed programmes: DOE2 BLAST, ESP-r, TRNSYS, Energy Plus
- Computational Fluid Dynamics: Theoretical and mathematical backgrounds, modelling approaches of air flow behaviour of a design and produce meaningful results in support of a design recommendation

UNIT IV: Analogue modelling

- Scale model laboratory experiments
- Lighting studies: artificial sky
- Wind studies: wind simulator
- Sun studies: Heliodome
- Other studies: facade testing, thermal comfort test

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Clarke J. (2001) Energy Simulation in Building Design, 2nd Edition. Oxford: Butterworth-Heinemann.
2. Clarke JA., Yaneske PP. and Pinney AA. (1990) The Harmonisation of Thermal Properties of Building Materials BRE Publication & BEPAC Research Report.
3. CIBSE (2006) Guide A: Environmental Design, London: Chartered Institution of Building Services Engineers.
4. Larson GW. and Shakespeare R. (1998) Rendering with Radiance, Morgan Kaufmann Publishers inc.
5. NCEC DG XII Daylighting in Architecture, A European Reference handbook, (1993) James and James. ISBN 1-873936-21-4.

INSTRUCTIONS TO QUESTION PAPER SETTER

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 614 DAYLIGHTING AND ENERGY EFFICIENT ELECTRICAL LIGHTING

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course aim to develop advanced understanding of daylighting and electrical lighting for energy efficiency.

CONTENT:

UNIT I: Lighting

- Physics of lighting, direct, diffused and reflected, transmittance and reflectance, inverse square law
- Photometric quantities: Intensity, flux, illuminance, Luminance
- Quality of light: direct and reflected glare, visual efficiency: visual acuity, contrast sensitivity, visual performance
- Colour fundamentals: colour temperature, object colour, reactions to colour, chromaticity, colour rendering index
- Light sources: basic characteristics, selecting an appropriate light source, comparison of natural and artificial light

UNIT II: Daylighting

- Daylight sources: characteristics, standard overcast sky (Design sky), clear sky, partly cloudy sky
- Daylighting design: opportunities, human factors, site strategies, aperture strategies (sidelighting and toplighting), specialized daylighting strategies-galleries, atria, light-pipe and shafts
- Daylight factor: components, calculation as Bureau of Indian Standard methods
- Control devices: conventional divisions, optical division, prismatic division, awnings, curtains, overhangs, light shelves, sills, fins, jalis, louvers and shutters, photochromatic and film controls, prismatic glass, special highperformance glasses inbuilt louvers

UNIT III: Electrical Lighting

- Electric light sources: incandescent lamps, gaseous discharge lamps, fluorescent lamps, high intensity discharge lamps, other electric lamps-induction lamps, Light-Emitting Diodes, sulfur lamps and fiber optics
- Electrical lighting design: lighting fixture distribution, mounting height, fixtures appraisals, coefficient of utilization, control, modular lighting design, general/ambient lighting, local/focus lighting, task lighting, layout
- Prediction: average illuminance, horizontal illuminance by Lumen (Flux) method, illuminance at a point
- Lighting control: switching, dimming, occupancy

UNIT IV: Lighting Applications

- Issues, challenges and opportunities in integration of electrical and natural light for built environment
- Lighting art galleries, museum, residential, educational, commercial, industrial, buildings
- Special lighting applications: emergency lighting, floodlighting, street lighting, fiber optic lighting, hollow light guides, prismatic light guides, remote source lighting

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Baker N & Steemers K (2001) Daylight Design of buildings: A Handbook for Architects James & James Ltd.
2. Ander, GD (2003) Daylighting Performance and Design (second edition), John Wiley & Sons Inc., New Jersey.
3. Guzowski, M (2000) Daylighting for Sustainable Design, McGraw-Hill, New York.
4. Boubekri M. (2008) Daylighting Architecture Health Building Design Strategies, Oxford: Architectural Press.
5. Cuttle C. (2008) Lighting by design, 2nd Edition Architectural Press.
6. IESNA Lighting Handbook, 9th Edition, Illuminating Engineering Society of North America, 2000
7. Tregenza P & Wilson M (2011) Daylighting Architecture and Lighting Design, Routledge.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 616 TECHNOLOGIES FOR ENERGY EFFICIENT BUILDINGS

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to develop advance understanding of energy efficient passive and active technologies for buildings.

CONTENT:

UNIT I: Passive and Low Energy Technologies

- Heating Systems: principles and types: direct gain, Indirect gain (Trombe walls, thermal storage walls), isolated Gain (sunspaces, greenhouses, convective loops)
- Cooling Systems (water as sink): direct evaporative cooling, indirect evaporative cooling, downdraft chimneys
- Cooling Systems (ground as sink): principles of earth cooling, soil temperatures and its variation, climatic applicability, direct coupling of building with soil, indirect coupling (earth air tunnels and pipes)
- Cooling systems (sky as sink): night-sky radiation, climatic applicability, skytherm and night radiant systems

UNIT II: Heating Ventilation Air Conditioning (HVAC) Technologies

- System design: building thermal load (external, internal, infiltration and ventilation), design conditions (indoor and outdoor), load calculation methods, zoning/space design, building form and orientation, cost benefit analysis
- All-air systems- efficient air distribution and air diffusion, Variable Air Volume (VAV) fan system, temperature and humidity control, free cooling and economizer cycle, minimum outdoor air control, desiccant based AC system
- All-water systems: chilled water, condensing water, hot water systems, efficient water distribution/piping system, efficient variable flow pumping systems and equipment, water balancing and temperature controls
- Refrigeration plant: heat rejection method, part-load performance, plant operation, multiple and variable-speed compressor chillers, heat recovery chiller, gas-fired absorption chiller, cogeneration system, chiller sequencing.
- Other technologies: filters-dry filters, wet filters, air washers, electrostatic, fire fighting and alarm
- Mechanical ventilation systems: extract systems, supply systems, balanced systems

UNIT III: Electrical and Plumbing Systems

- General principles: minimize losses in power distribution, reduce losses and wastage in use of electricity, reduce losses due to power factor and quality, appropriate metering and monitoring facilities; maximum demand controller, soft starter, variable speed drive, electronic ballast, lighting control
- Cold water supply and drainage: supply points and equipment capacity, reduce pumping energy, use water (energy) saving equipment, water recycling and rainwater utilization
- Hot water supply: flow rate and temperature, solar hot water and proper design

UNIT IV: Lifts and Escalators

- Traction lifts, gearless lifts and hydraulic lifts, rated load and contract speed, energy management-eco efficient car lights, standby, metering
- Traffic analysis and zoning, operation and braking controls, harmonic distortion and power factor of motor drives
- Intelligent lift traffic control, variable volume and frequency (VVF) system, regenerative drive, green hoisting

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Bureau of Indian Standards (2005) National Building Code of India, Part 8: Building Services, New Delhi.
2. Crosbie, MJ (1998) The Passive Solar Design and Construction Handbook, John Wiley & Sons Inc., New York.
3. Givoni, B (1994) Passive and Low Energy Cooling of Buildings, John Wiley & Sons Inc., New York.
4. Grondzik, WT, Kwok, AG, Stein, B, Reynolds, JS (2009) Mechanical and Electrical Equipment for Buildings, Wiley.

INSTRUCTIONS TO QUESTION PAPER SETTER

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 618 DISASTER RESILIENT DESIGN

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective on disaster management and sustainable development including frameworks and skills for addressing contemporary hazards, disasters and complex emergencies, in both post-development and majority world contexts.

CONTENT:

UNIT I: Environmental Hazards & Disasters

- Meaning of Environmental hazards
- Environmental Disasters and Environmental stress
- Natural disasters: earthquake, cyclones-high winds, storm surge, floods, landslides tsunami
- Man made disasters: fire, nuclear exploisoin

UNIT II: Disaster Management, Mitigation, and Preparedness

- Pre- disaster stage (preparedness) GIS, remote sensing
- Mitigation Stage
- Post disaster state (Rehabilitation and recovery)

UNIT III: Institutional Framework for Disaster Management

- Environmental policies & programmes
- Institutions & National Centres for Natural Disaster reduction
- Environmental Legislations in India, Awareness, Conservation Movement, Education & training
- Community awareness, education and participation

UNIT IV: Disaster Resilient Design

- Historical experience, local practices, traditional regional responses
- Site planning: land topography, open space and built form
- Building forms-horizontal and vertical eccentricities, mass and stiffness distribution, building envelope and finishes, non structural elements like services, fixtures, mountings
- Structural interventions: foundation- base isolation, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, underground & overhead tanks, staircases.
- Laboratory simulations of models
- Codes and regulations

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Arnold, C & Reitherman, R(1982) Building Configuration and Seismic Design, John Wiley and Sons.
2. Carter, WN (1990) Disaster Management a disaster manager's handbook, Asian Development Bank, Manila.
3. Farrington, K (1999) Natural Disasters – The terrifying forces of nature, Grammery Books, London.
4. Hewitt (1983) Interpretation of Calamity, Allen & Unwin Inc., London.
5. Lagorio, HJ (1990) Earthquakes: architect's guide to non structural & seismic hazards, John Wiley & Sons.
6. Sharma, VK (1995) Disaster management, Indian Institute of Public Administration, United Press, New Delhi
7. Singh, RB (2000), Disaster Management, Rawat Publication, Jaipur.
8. United Nations (1986) Disaster Prevention & Mitigation, United Nations Disaster Relief Organization.
9. Zebrowski, E (1993) Perils of a Restless Planet, Cambridge University Press, Cambridge.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 620 PRACTICAL TRAINING

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
2	-	60		40	100	2	-

INTENT: The course intents to give insight into Sustainable Architectural practice

CONTENT:

Practical training for 6 weeks is to be carried out during the summer vacation after the second semester. Trainee may undertake the training with LEED AP and (or) BEE empanelled and (or) GRIHA architectural consultants (registered with the Council of Architecture) having minimum 5 years of experience and the students should obtain prior approval from the department. The students are expected to learn nuances of working on LEED, GRIHA or ECBC compliant buildings. The students will work minimum 35 hours per week and submit weekly performance reports. During practical training students are required to study various aspects, as discussed during the preceding semester course and submit a report on the following aspects:

A General Information Name of Student Registration no. of student Placement of training Duration of training
B Nature of organizational enterprise (explain type of design and construction activities the organization is involved in)
C Organization structure and position of trainee
D Types of consultancy (Residential, Institutional, Commercial etc) enclose typical documents
E Chronological list of responsibilities assigned to the Trainee
F List of the Works done during training (enclose typical work outputs)
G Experiences and inferences drawn during training
a Sustainable site planning
b Water management
c Energy and atmosphere
d Sustainable Building Materials & Resources
e Waster management
f Energy optimization
g Health & Wellbeing (Indoor air quality)
h Building operation & Maintenance
i Innovation in Design
j ECBCE compliance
k NBC compliance
l Any other strategy in design
Special features of the project work (enclose documents to explain and highlight peculiarities)
Any other information

NOTE:

Detailed training manual to be made and circulated to the students at the commencement of the semester. Trainee must attach the certified copies of the work carried out by him/ her as an annexure in the report.

	Evaluation	Weightage
I	Sessional evaluation	
	Training report	60%
II	Portfolio evaluation	
	Viva voce	40%

MARC 701 ARCHITECTURAL DESIGN STUDIO – III

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
-	6	100	-	100	200	6	-

INTENT:

Study and analysis of a settlement (Urban, Semi urban, Rural) in respect to sustainable design principles, strategies and planning.

CONTENT:

The studio will be based on traditional/ historic city quarter, rural habitat, contemporary city space, neighborhood study and housing estates in urban and semi-urban, urban development and township contexts and will examine challenges at a settlement scale: clusters of buildings and public spaces.

There will be a project design that integrates strategies for site planning, urban/rural design, user behaviour and response, community action and other strategies to achieve high quality sustainable living environment.

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.
This exercise needs to be supported by frequent site visits & detailed case studies.
There should be regular presentations of various internal stages.

I	Sessional evaluation	Weightage
	Seminar	20 %
	Programme formulation	20%
	Concept	20 %
	Preliminary Design	40%
II	Portfolio evaluation	
	Detail Design	100%

MARC 703 PRINCIPLES OF SUSTAINABLE URBANISM

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to build awarness about issues, challenges and opportunities of sustainablity in urban context both traditional and contemporary

CONTENT:

UNIT I: Traditional Urbanism

- Basic elements of the city; concepts of space, time, scale of cities
- Historical cities in India and across the world
- Effects of Socio cultural, economic and environmental influence on urban form
- Resource management in traditional cities

UNIT II: Industrial Revolution and urbanization

- Impact of Industrial revolution on urbanization and city form and function, development of Industrial cities
- City planning theories of late 19th and early 20th centuries: Patrick Geddes, Ebenezer Howard, Le Corbusier, Doxiadis, Soria Mata, Ludwig Hilberseimer
- City planning theories of post war: Arthur Perry, Lewis Mumford, Kevin Lynch, Jane Jacobs, Clarence Stein, Frank Lyod Wright, Rob Krier, Aldo Rossi, Robert Venturi
- Contemporary cities in India

UNIT III: Urban Regeneration

- Heritage based sustainable development: definition of heritage and cultural landscapes
- Urban regeneration as viable tool of sustainable development
- Revitalization of neighbourhoods, precints, townships
- Slum upgradation
- Regulatory role of government: State Town and Country Planning Acts, National Housing Policy, UDPFI guidelines, Urban Arts Commission, Urban Renewal Mission and other relevant regulations

UNIT IV: Concepts of contemporary Sustainable Urbanism

- Sustainable urban and regional development related to Ecocities, nature in the city
- Transit oriented development, sustainable transport planning
- Mix used development, walk to work culture
- Social inclusion, equitable access to resources
- Futuristic concepts and technology.

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Alexander, C (1977) Pattern Language, Oxford University Press.
2. Cullen, G (1968), Townscape, Architectural Press, London.
3. Farooq, A (1997) Contemporary architecture and city form, Marg Publishers.
4. Farr, D (2007) Sustainable Urbanism: Urban Design with Nature, John Wiley & Sons Inc.
5. Gallion, A (2003), The Urban Pattern, CBS Publishers & Distributors, India.
6. Keeble, L (1968) Town and Country Planning, Ms Havding Gough Ltd. UK.
7. Lynch, K (2000) Image of the city. MIT Press, London.
8. Watson, D; et al (2003) Time Saver Standards for Urban Design, McGraw Hill, New York.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 705 ALTERNATIVE ENERGY FUNDAMENTALS

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The objective of course is to explore the latest in renewable and new energy technologies associated with building design.

CONTENT:

UNIT I: Introduction to Energy and Related Issues

- Historical use of energy by humans
- Global energy cycles and trends
- Energy consumption pattern: industry, transport, agriculture, buildings (commercial and domestic)
- Sources of Energy: primary and secondary, non-renewable and renewable, conventional and non-conventional

UNIT II: Sources of New and Renewable Energy

- Biomass: chemical energy, woody and agriculture crops, Energy from various types of wastes, biomass conversion: methanation, gasification, charcoal, incineration
- Solar: thermal energy, flat plate or focusing or tracking collectors, air or liquid, heat exchanger, pumps, piping, valves, system controller, storage, maintenance, instrumentation, sizing, mounting and angling of collectors, closed and open loop systems, drain down and drain back systems, forced circulation and thermo-syphon
- Wind Power: kinetic energy, wind mill, wind turbine, resource availability, meteorology, terrain, turbulence
- Geothermal: thermal energy, the hot rocks beneath the surface of the earth, hot springs
- Other sources: ocean, wave and tidal, Hydrogen and fuel cells, biotechnological and algal storage

UNIT III: Application of Renewable Energy in Buildings

- Solar Energy: domestic hot water, space heating, swimming pool, commercial or industrial water heating, solar absorption air-conditioning
- Solar photovoltaics: single crystal, polycrystalline and thin film technology, shading, tracking devices, power conditioning, power storage, grid interactive and stand alone, domestic lighting, street lighting, water pumping, solar cell self repairs like a plant, photovoltaic integrated facades
- Wind turbine, wind tower, wind scoops
- Other applications: geothermal - heating/power generation in cold regions, biomass- cooking, mechanical applications/pumping, power generation, transportation

UNIT IV: Other Energy Issues

- Overview of regional renewable energy resource assessments; the economic viability of each technology
- Energy policy and guidance in India
- Barriers to the implementation of renewable energy

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Boyle, G (2004) Renewable Energy: Power for a Sustainable Future (second edition), Oxford University Press, Oxford.
2. Gevorkian, P (2008) Solar Power in Building Design: the Engineer's Complete Design Resource, McGraw-Hill Companies Inc., USA.
3. Hodge, BK (2010) Alternative Energy Systems and Applications, John Wiley & Sons Inc., USA.
4. Kishore, VVN (2008) Renewable Energy Engineering and Technology, TERI Press, New Delhi.
5. Solanki, CS (2009) Renewable Energy Technologies: A Practical Guide for Beginners, PHI Learning Pvt. Ltd., New Delhi.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 707 RESPONSIBILTY AND COMMUNITY ACTION

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to examine the history and development of sustainability as a social goal, and explore its implications for the design of contemporary and future built environments.

CONTENT:

UNIT I: Man and Environment

- Relation of human with Environment & climate
- Concept of social structure: family, community
- Traditional patterns and trends of change in Indian society

UNIT II: Community and its Parameters

- Collective action, co-learning (sharing, facilitation), cooperation (local people work, outsiders direct), consulting (opinions, analyses, programme), Compliance (Assign tasks, give incentives),Co-Option (representation)
- Community Mobilisation: a catalyst, Involvement of all stakeholders, Identification of marginalised groups like Economically deprived group, Women, Tribal/indigenous people, Disabled people, Minority Groups
- Various platforms of community based participation

UNIT III: People, Society and Sustainability

- Psychological (e.g. people's understanding of environmental issues, awareness, concern, motivation, attitudes and behaviour)
- Social (e.g. the role of communities, NGOs, businesses, local authorities and so on)
- Societal (e.g. issues of culture including the role of the mass media).

UNIT IV: Human Responses for Sustainability

- Consequences of environmental degradation for people and society: health, forced relocation
- Attitudes and behaviour of people to mitigate environmental degradation
- The initiatives by government and non government agencies to pursuade people to change attitudes and behaviour to mitigate environmental degradation

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

READING LIST: (to be amplified by the subject teacher)

1. Bachrach, Peter, & Aryeh B (1992) Power and Empowerment: A Radical Theory of Participatory Democracy. Philadelphia, PA: Temple University Press, 1992.
2. Bowles, S & Herbert G (2002) Social Capital and Community Governance. The Economic Journal 112
3. Dryzek, JS (2001) Legitimacy and Economy in Deliberative Democracy. *Political Theory* 29, no. 5 651-669.
4. Sanoff, H (Ed) (1978) Designing with Community Participation Dowden, Hutchison & Ross, Stroudsberg.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 709 ENERGY AND ENVIORNMENTAL SYSTEMS FOR GREEN BUILDINGS

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

The course objective is to provide advanced knowledge of various systems and subsystems of intelligent buildings and building management system (BMS).

UNIT I: Concepts, development and trends in Intelligent Buildings (IB)

- Evolution of IB: automated buildings (1981-85), responsive buildings (1986-91), effective buildings (1992-)
- Integrated Pyramid: single function/dedicated, multifunctional, integrated, computer integrated systems
- Major IB features: automatic reactions, effective communication & IT management, responsive to changes
- Key issues of IB: (site, shell, skin, building services and technology - HVAC zoning and control)
- Goals of IB: building management, space management and business management
- Major systems: Building Automation Systems (BAS), Office automation System (OAS), Communication automation System (CAS) and Computer Aided Facility Management System (CAFMS)
- Common objectives of intelligent-green buildings: responsive (to user needs/to climate), efficient (building design & systems), effective (operation & management), better integration (with IT & within systems)

UNIT II: Building Automation System (BAS), Controls and Protocols

- Stand-alone, distributed architecture and open architecture
- Hardware: Network Control Units (NCUs), Network Expansion Units (NEUs), Application Specific Controller (ASCs) Operator WorkStations (OWSs), N1 Local Area Network (LAN), N2 bus
- Software – Direct Digital Control (DDC), Artificial Intelligence (AI)- neural network, fuzzy logic, genetic algorithm
- Intelligent field devices (sensors, actuators and controllers-SAC)
- Interconnection devices (ICD) linking different networks and network segments
- Configuration and Management Devices (CMD) to configure and maintain a BAS
- Principles and technologies of local area networks (LAN): network protocol, ISO reference model
- Communication protocols: BACnet and its features, LonWorks and its features,
- Internet technologies and their applications in BASs: protocols, LAN vs WAN
- Process control, Proportional-integral-derivative (PID) controller and adaptive control, Direct Digital Control (DDC)

UNIT III: Building Energy Management Systems (BEMS)

- Intelligent Heating, Ventilating and AirConditioning (HVAC): Air Handling Unit controller, Constant Air Volume controller, Variable Air Volume controller, Unitary Equipment controller, Chiller controller, DDC control loops
- Intelligent Chiller systems: performance and optimal control, safety interlocks, sequence control of multiple chillers
- Intelligent Lighting control systems (natural and artificial): basic components, stand alone control and system based standard lighting control protocols, multilevel lighting and modulated lighting
- Intelligent Indoor climate control systems: outdoor air ventilation control and optimization
- Intelligent façade: solar control, noise, air, moisture, photovoltaic

UNIT IV: Security and safety control systems

- Building safety and protection of building occupants
- The closed circuit television (CCTV) surveillance system including structured cabling, dealing with the components, functions, and control strategies of these systems
- Intelligent Access Controller (IAC): building circulation and networking
- Intelligent Intrusion Detection system, burglar alarm systems
- Intelligent Fire Controller (IFC): alarm system

READING LIST: (to be amplified by the subject teacher)

1. Banham, R (1969) Architecture of the Well Tempered Environment, Architectural Press.
2. Boutet, TS (1987) Controlling air movement, McGraw Hill Book Co.
3. Brookes, A & Grech, C (1992) The Building Envelope, Butterworth Architecture.
4. Clements-Croome, D (2004) Intelligent Buildings: Design, Management & Operation, Thomas Telford.
5. Wang, S (2010) Intelligent buildings and building automation. Spon Press.

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 711 SUSTAINABLE HOUSING

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

To appreciate the issues related to Sustainable housing and understanding of Sustainable Housing designs & Construction Technology, Policies and Infrastructure in Sustainable Housing Projects.

UNIT I:

Sustainable Housing: Definitions, Fundamentals, Social, Economic and Environmental Sustainability issues in Housing, Sustainable housing scenario at National and States level. Housing Typology, land value, Types of ownerships in housing and sustainability.

UNIT II:

Sustainable Architectural Designs of Housing: Sustainability issues in Housing designs, Energy efficiency at various levels -City Level, Layouts, Neighborhood Level, Cluster, Buildings level Financing of Sustainable Housing Projects, Sustainable Materials, Construction Technology & Practices in Housing Projects

UNIT III:

National Housing Policies, State Housing Policies and Five year plans in reference to promotion of Sustainable Housing, Housing policies and Sustainability: International Scenario, Indian Acts, legislations, Building byelaws, Zoning Regulations, NBC, Planning Codes contextual to Sustainable Development & Construction in Housing Projects

UNIT IV:

Sustainable Infrastructure in Housing: Sustainable Water Supply, Sewerage System, Solid Waste Disposal, Electricity, Communication, Security, Roads, Landscape in Housing Projects, Sustainable Water Management, Use of Solar and other renewable sources of energy in housing projects, Intelligent Building Concepts and Automation in Housing Projects

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 713 SUSTAINABLE LANDSCAPE

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
4	-	75	75	-	150	4	3

INTENT:

To appreciate the issues related to Sustainable Landscaping

UNIT I:

Ecology & Sustainable Landscape: Definitions, Fundamentals, Food Chain, Food web Cycles in Nature, Tropic levels, Global Climatic Zones and their characteristics, Issues related to Soil Contamination, Water Contamination, Invasive Species, Pesticide Toxicity, Green House Gas Emission, Environment Impact Assessment, Laws /Legislation for Environment Protection

UNIT II:

Sustainable concepts and practices in Historical Gardens: British, French, Japanese, Italian and Chinese Gardens.

Sustainable solutions and practices in landscape: Irrigation Techniques, Waste Management, Water Management

Use of Solar and other sources of energy in landscape designs energy

UNIT III:

Landscape Elements and Sustainability issues: Use of Vegetation, Water, Earth and Stones in Landscape designs, Concept of Native Plants, Xeriscaping, Low Cost Maintenance of landscapes, Organic Gardening, Bio-Filtering, Bio-Swales, Rain Gardens, Green Roof & Walls, Wild Life Habitat, Energy Efficient Landscaping Designs, Sustainable Gardening and Sustainable Planting,

UNIT IV:

Sustainable Landscape Designs in Residential, Institutional, Commercial, &Industrial complexes, Sustainable landscape designs at Town Levels, town, neighbourhood Roads, Parks, Forests, consideration of Geology in Town Landscapes

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Minor Test – I	20%
	Minor Test – II	20%
	Assignment / Mini Project / Term paper	30%
	Quiz/Tutorial/Class Test	30%
II	Theory examination	100%

INSTRUCTIONS TO QUESTION PAPER SETTER:

1. Exam shall be of 3 hours duration and of maximum marks: 75. (minimum passing marks:30)
2. Total EIGHT questions are to be set (two questions from each unit), and candidate have to attempt any five questions selecting one from each unit, each question of 15 marks each.
3. The question paper should at least have one question with 3 subparts and three questions with 2 subparts.

MARC 715 DISSERTATION

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
	4	75		75	150	4	-

INTENT:

The course aims to acquire experience of collating amd critically appraising information into topics of possible research in built environment with appropriate developed literature searches.

CONTENT:

The dissertation shall entail the following:

- Identification of an appropriate and focused research topic reflecting social and technological needs of the day
- Formulate synopsis including objectives, scope of work, methodology of work, case studies to be undertaken, site selection culminating in broad functional requirements.
- An investigation of the topic using an analysis of existing literature, case studies and other data sources
- To develop understanding of the research topic.
- Drawing informed and scientific conclusions from the research

(a) The dissertation shall be based on empirical study, field work, and textual analysis in the field of sustainable architecture. It should demonstrate candidate's capacity for analysis and judgment as also her/his ability to carry out independent viewpoint in interpretation. A dissertation may be supplemented by published work, if any.

(b) The dissertation shall present an orderly & critical exposition of existing knowledge of the subject or shall embody results of original interpretation and analysis & demonstrate the capacity of the candidate to do independent research work. While writing the dissertation, the candidate shall lay out clearly the work done by her/him independently and the sources from which she/he has obtained other information.

(c) The dissertation shall be prepared as per guidelines given in the dissertation manual. Nevertheless, the typing shall be done on both sides of the paper, the font size should be 12 point Times New Roman in 1.5 (one and a half) space but the reference and bibliography should be typed in single space in Harvard style. The paper to be used should be A-4 size and orientation should be portrait.

The dissertation shall be well structured document of not more than 15000 words with clear objectives and well-argued and appropriate conclusions indicating an appropriate level of expertise. The submission format for all stages shall be print and digital. Seminars in related areas to the dissertation topic (activities and functions to be handled, building typologies, technology applied) are required to be presented at all stages during the entire semester.

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional evaluation	Weightage
	Synopsis	10%
	Mid term submission	50%
	Prefinal submission	40 %
II	Portfolio evaluation	100%

READING LIST: (to be amplified by the subject teacher)

1. McMillan, K & Weyers, J (2007) How to write dissertations and project reports. Pearson Prentice Hall.
2. Watson, G (1987) Writing a thesis: a guide to long essays and dissertations, London: Longman. Specialist bibliography according to the project.

MARC 702 ARCHITECTURAL THESIS PROJECT

Teaching Schedule		Marks of Sessional work	Marks of Examination		Total marks	Credits	Duration of Examination (h)
L	P		Theory	Portfolio			
	20	250	-	250	500	20	-

INTENT:

The course objective is to provide an opportunity to undertake supervised research leading to design intervention.

CONTENT:

The project will be independent and allow exploration of issues within the scope of the subject area and to achieve a recognisable level of expertise in the subject. The thesis will demonstrate an understanding of the relationship between architecture, energy and sustainability through an appropriate use of scientific and social science research techniques applied to an area of research in the environment of buildings.

The project shall entail the following

- Formulate of a focused thesis topic.
- Conduct an investigation of the thesis topic using an analysis of existing literature.
- Develop understanding of the thesis topic
- Draw informed and scientific conclusions from the research

Based on the conclusion design interventions shall be made to achieve thesis objectives. The thesis report shall be well structured document of not more than 25000 words with clear objectives and well-argued and appropriate conclusions and design intervention indicating an appropriate level of expertise. The thesis report shall include all drawings to appropriate scale.

NOTE:

Detailed teaching programme to be made and circulated to the students at the commencement of the semester.

I	Sessional	Weightage
1.	Synopsis	10%
2.	Programme formulation	30%
3.	Concept	20%
4.	Preliminary Design	40%
II	Portfolio	100%

READING LIST: (to be amplified by the respective guide)

1. Evans, D & Gruba, P (2002) How to write a better thesis. 2nd Edition, Melbourne University Press.
2. Murray, R (2006) How to write a thesis. 2nd Edition, Maidenhead: Open University Press.
3. Turabian, K (2007) A manual for writers of research papers, theses, and dissertations, 7th Edition, Chicago: University of Chicago Press.
4. As appropriate for each individual thesis.