

**ACADEMIC REGULATIONS, COURSE STRUCTURE
AND DETAILED SYLLABUS**

M.Tech (CONSTRUCTION MANAGEMENT)

**FOR
MASTER OF TECHNOLOGY TWO YEAR POST GRADUATE COURSE
(Applicable for the batches admitted from 2015-2016)**



**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

Venkatapur, Ghatkesar, Hyderabad – 500 088

R 15 - ACADEMIC REGULATIONS (CBCS) FOR M. Tech. (REGULAR) DEGREE PROGRAMMES

Applicable for the students of M. Tech. (Regular) programme from the Academic Year **2015-16** and onwards

The M. Tech. Degree of Jawaharlal Nehru Technological University Hyderabad shall be conferred on candidates who are admitted to the programme and who fulfill all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS

Admission to the above programme shall be made subject to eligibility, qualification and specialization as prescribed by the University from time to time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at the qualifying Entrance Test conducted by the University or on the basis of any other order of merit as approved by the University, subject to reservations as laid down by the Govt. from time to time.

2.0 AWARD OF M. Tech. DEGREE

- 2.1 A student shall be declared eligible for the award of the M. Tech. Degree, if he pursues a course of study in not less than two and not more than four academic years, failing which he shall forfeit his seat in M. Tech. programme.
- 2.2 The student shall register for all **88** credits and secure all the 88 credits.
- 2.3 The minimum instruction days in each semester are 90.

3.0 COURSES OF STUDY

The following specializations are offered at present for the M. Tech. programme of study.

1. CAD/CAM
2. Computer Networks and Information Security
3. Computer Science
4. Computer Science and Engineering
5. Construction Management
6. Electrical Power Systems
7. Electronics and Communication Engineering
8. Embedded Systems
9. Machine Design
10. Power Electronics and Electrical Drives
11. Software Engineering
12. Structural Engineering
13. VLSI System Design
14. Wireless and Mobile communication

4 Course Registration

- 4.1** A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him on the Post Graduate Programme (PGP), its Course Structure and Curriculum, Choice/Option for Subjects/ Courses, based on his competence, progress, pre-requisites and interest.
- 4.2** Academic Section of the College invites 'Registration Forms' from students within 15 days from the commencement of class work through 'ON-LINE SUBMISSIONS', ensuring 'DATE and TIME Stamping'. The ON-LINE Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.
- 4.3** A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from his Faculty Advisor, which should be submitted to the College Academic Section through the Head of Department (a copy of it being retained with Head of Department, Faculty Advisor and the Student).
- 4.4** If the Student submits ambiguous choices or multiple options or erroneous entries - during ON-LINE Registration for the Subject(s) / Course(s) under a given/ specified Course Group/ Category as listed in the Course Structure, only the first mentioned Subject/ Course in that Category will be taken into consideration.
- 4.5** Subject/ Course Options exercised through ON-LINE Registration are final and CANNOT be changed, nor can they be inter-changed; further, alternate choices will also not be considered. However, if the Subject/ Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the Student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing Subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

5 ATTENDANCE

The programmes are offered on a unit basis with each subject being considered a unit.

- 5.1** Attendance in all classes (Lectures/Laboratories etc.) is compulsory. The minimum required attendance in each theory / Laboratory etc. is 75% including the days of attendance in sports, games, NCC and NSS activities for appearing for the End Semester examination. A student shall not be permitted to appear for the Semester End Examinations (SEE) if attendance is less than 75%.
- 5.2** Condonation of shortage of attendance in each subject up to 10% (65% and above and below 75%) in each semester shall be granted by the College Academic Committee on genuine medical grounds and valid reasons on representation by the candidate with supporting evidence.

- 5.3 Shortage of Attendance below 65% in each subject shall not be condoned.
- 5.4 Students whose shortage of attendance is not condoned in any subject are not eligible to write their end semester examination of that subject and their registration shall stand cancelled.
- 5.5 A prescribed fees shall be payable towards condonation of shortage of attendance.
- 5.6 A candidate shall get minimum required attendance at least in three (3) theory subjects in the present semester to get promoted to the next semester. In order to qualify for the award of the M.Tech Degree, The candidate shall complete all the academic requirements of the subjects, as per the course structure.
- 5.7 A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present Semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission in to the same class.

6 EVALUATION

The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

- 6.1 For the theory subjects 60 marks shall be awarded for the performance in the Semester End Examination and 40 marks shall be awarded for Continuous Internal Evaluation (CIE). The Continuous Internal Evaluation shall be made based on the average of the marks secured in the two Mid Term-Examinations conducted, one in the middle of the Semester and the other, immediately after the completion of Semester instructions. Each mid-term examination shall be conducted for a total duration of 120 minutes with Part A as compulsory question (10 marks) consisting of 5 sub-questions carrying 2 marks each, and Part B with 3 questions to be answered out of 5 questions, each question carrying 10 marks. The details of the Question Paper pattern for End Examination (Theory) are given below:
- The Semester End Examination will be conducted for 60 marks. It consists of two parts. i). Part-A for 20 marks, ii). Part-B for 40 marks.
 - Part-A is a compulsory question consisting of 5 questions, one from each unit and carries 4 marks each.
 - Part-B to be answered 5 questions carrying 8 marks each. There will be two questions from each unit and only one should be answered.
- 6.2 For practical subjects, 60 marks shall be awarded for performance in the Semester End

- Examinations and 40 marks shall be awarded for day-to-day performance as Internal Marks.
- 6.3 The practical end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed by the Principal from the panel of examiners recommended by Chairman, Board of Studies in respective Branches.
 - 6.4 There shall be two seminar presentations during I year I semester and II semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Departmental Academic Committee consisting of Head of the Department, Supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful. If he fails to fulfill minimum marks, he has to reappear during the supplementary examinations.
 - 6.5 There shall be a Comprehensive Viva-Voce in II year I Semester. The Comprehensive Viva-Voce is intended to assess the students' understanding of various subjects he has studied during the M. Tech. course of study. The Head of the Department shall be associated with the conduct of the Comprehensive Viva-Voce through a Committee. The Committee consisting of Head of the Department, one senior faculty member and an external examiner. The external examiner shall be appointed by the Principal from the panel of 3 examiners recommended by Chairman, Board of Studies in respective Branches. There are no internal marks for the Comprehensive Viva-Voce and evaluates for maximum of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful. If he fails to fulfill minimum marks, he has to reappear during the supplementary examinations.
 - 6.6 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the Semester End Examination and a minimum aggregate of 50% of the total marks in the Semester End Examination and Continuous Internal Evaluation taken together.
 - 6.7 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 6.6) he has to reappear for the Semester End Examination in that subject.
 - 6.8 A candidate shall be given one chance to re-register for the subjects if the internal marks secured by a candidate is less than 50% and failed in that subject for maximum of two subjects and should register within four weeks of commencement of the class work. In such a case, the candidate must re-register for the subjects and secure the required minimum attendance. The candidate's attendance in the re-registered subject(s) shall be calculated separately to decide upon his eligibility for writing the Semester End Examination in those subjects. In the event of the student taking another chance, his Continuous Internal Evaluation (internal) marks and Semester End Examination marks obtained in the previous attempt stands cancelled.
 - 6.9 In case the candidate secures less than the required attendance in any subject, he shall not be permitted to write the Semester End Examination in that subject. He shall re-register for the subject when next offered.

7 Examinations and Assessment - The Grading System

- 7.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practicals, or Seminar, or Project, etc., based on the % marks obtained in CIE + SEE (Continuous Internal Evaluation + Semester End Examination, both taken together) as specified in Item 6 above, and a corresponding Letter Grade shall be given.
- 7.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
80% and above ($\geq 80\%$, $\leq 100\%$)	O (Outstanding)	10
Below 80% but not less than 70% ($\geq 70\%$, $< 80\%$)	A ⁺ (Excellent)	9
Below 70% but not less than 60% ($\geq 60\%$, $< 70\%$)	A (Very Good)	8
Below 60% but not less than 55% ($\geq 55\%$, $< 60\%$)	B ⁺ (Good)	7
Below 55% but not less than 50% ($\geq 50\%$, $< 55\%$)	B (Above Average)	6
Below 50% ($< 50\%$)	F (Fail)	0
Absent	Ab	0

- 7.3 A student obtaining F Grade in any Subject shall be considered 'failed' and is required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when offered. In such cases, his Internal Marks (CIE Marks) in those Subjects will remain the same as those he obtained earlier.
- 7.4 A student not appeared for examination then 'Ab' Grade will be allocated in any Subject shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when offered.
- 7.5 A Letter Grade does not imply any specific Marks percentage and it will be the range of marks percentage.
- 7.6 In general, a student shall not be permitted to repeat any Subject/ Course (s) only

for the sake of ‘Grade Improvement’ or ‘SGPA/ CGPA Improvement’.

- 7.7 A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course. The corresponding ‘Credit Points’ (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/ Course.

Credit Points (CP) = Grade Point (GP) x Credits ... For a Course

- 7.8 The Student passes the Subject/ Course only when he **gets GP ≥ 6(B Grade or above)**.
- 7.9 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from ALL Subjects/ Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

$$\text{SGPA} = \left\{ \sum_{i=1}^N C_i G_i \right\} / \left\{ \sum_{i=1}^N C_i \right\} \text{For each Semester,}$$

where ‘i’ is the Subject indicator index (takes into account all Subjects in a Semester), ‘N’ is the no. of Subjects ‘REGISTERED’ for the Semester (as specifically required and listed under the Course Structure of the parent Department), C is the no. of Credits allotted to the ith Subject, and G represents the Grade Points (GP) corresponding to the Letter Grade awarded for that ith Subject.

- 7.10 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is rounded off to TWO Decimal Places. CGPA is thus computed from the I Year Second Semester onwards, at the end of each Semester, as per the formula

$$\text{CGPA} = \left\{ \sum_{j=1}^M C_j G_j \right\} / \left\{ \sum_{j=1}^M C_j \right\} \dots \text{for all S Semesters registered}$$

(ie., upto and inclusive of S Semesters, $S \geq 2$),

where ‘M’ is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has ‘REGISTERED’ from the 1st Semester onwards upto and inclusive of the Semester S (obviously $M > N$), ‘j’ is the Subject indicator index (takes into account all Subjects from 1 to S Semesters), C is the no. of Credits allotted to the jth Subject, and G represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth Subject. After registration and completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

- 7.11** For Calculations listed in Item 7.6 – 7.10, performance in failed Subjects/ Courses (securing F Grade) will also be taken into account, and the Credits of such Subjects/ Courses will also be included in the multiplications and summations.

8. EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

8.1 A Project Review Committee (PRC) shall be constituted with Head of the Department as Chairperson, Project Supervisor and one senior faculty member of the Departments offering the M. Tech. programme.

8.2 Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects, both theory and practical.

8.3 After satisfying 8.2, a candidate has to submit, in consultation with his Project Supervisor, the title, objective and plan of action of his project work to the PRC for approval. Only after obtaining the approval of the PRC the student can initiate the Project work.

8.4 If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the PRC. However, the PRC shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

8.5 A candidate shall submit his project status report in two stages at least with a gap of 3 months between them.

8.6 The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of all theory and practical courses with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Head of the Department and make an oral presentation before the PRC.

8.7 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College/School/Institute.

8.8 For Project work **Review I** in II Year I Sem. there is an internal marks of 50, the evaluation should be done by the PRC for 25 marks and Supervisor will evaluate for 25 marks. The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey in the same domain. A candidate has to secure a minimum of 50% of marks to be declared successful for Project Work Review I. If he fails to fulfill minimum marks, he has to reappear as per the recommendations of PRC.

8.9 For Project work **Review II** in II Year II Sem. there is an internal marks of 50, the evaluation should be done by the PRC for 25 marks and Supervisor will evaluate for 25 marks. The PRC will examine the overall progress of the Project Work and decide the Project is eligible for final submission or not. A candidate has to secure a minimum of 50% of marks to be declared successful for Project Work Review II. If he fails to fulfill minimum marks, he has to reappear as per the recommendations of

PRC.

- 8.10 For Project Evaluation (Viva Voce) in II Year II Sem. there is an external marks of 150 and the same evaluated by the External examiner appointed by the Institution. The candidate has to secure minimum of 50% marks in Project Evaluation (Viva-Voce) examination.
- 8.11 If he fails to fulfill as specified in 8.10, he will reappear for the Viva-Voce examination only after three months. In the reappeared examination also, fails to fulfill, he will not be eligible for the award of the degree.
- 8.12 The thesis shall be adjudicated by one examiner selected by the Institution. For this, Chairmen, BOS of the respective departments shall submit a panel of 3 examiners, who are eminent in that field with the help of the concerned guide and senior faculty of the department.
- 8.13 If the report of the examiner is not favourable, the candidate shall revise and resubmit the Thesis. If the report of the examiner is un favourable again, the thesis shall be summarily rejected.
- 8.14 If the report of the examiner is favourable, Project Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the Thesis.
- 8.15 The Head of the Department shall coordinate and make arrangements for the conduct of Project Viva- Voce examination.

9. AWARD OF DEGREE AND CLASS

9.1 A Student who registers for all the specified Subjects/ Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes the examinations prescribed in the entire PG Programme (PGP), and secures the required number of **88** Credits (with CGPA ≥ 6.0), shall be declared to have 'QUALIFIED' for the award of the M.Tech. Degree in the chosen Branch of Engineering and Technology with specialization as he admitted.

9.2 **Award of Class**

After a student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of M. Tech. Degree, he shall be placed in one of the following three classes based on the CGPA:

Class Awarded	CGPA
First Class with Distinction	≥ 7.75
First Class	$6.75 \leq \text{CGPA} < 7.75$
Second Class	$6.00 \leq \text{CGPA} < 6.75$

9.3 A student with final CGPA (at the end of the PGP) < 6.00 will not be eligible for the Award of Degree.

10. WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the institution or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases.

11. TRANSITORY REGULATIONS

11.1 If any candidate is detained due to shortage of attendance in one or more subjects, they are eligible for re-registration to maximum of two earlier orequivalentsubjects at a time as and when offered.

11.2 The candidate who fails in any subject will be given two chances to pass the same subject; otherwise, he has to identify an equivalent subject as per R15 Academic Regulations.

12 GENERAL

12.1 **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.

12.2 **Credit Point:** It is the product of grade point and number of credits for a course.

12.3 Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”.

12.4 The academic regulation should be read as a whole for the purpose of any interpretation.

12.5 In the case of any doubt or ambiguity in the interpretation of the above rules, the Decision of the Academic Council is final.

12.6 The Academic Council may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Academic Council.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm, computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidates has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the candidate is to be cancelled and sent to the controller of examinations, AGI.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination(including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidates has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for

		two consecutive semesters from class work and all semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant-Superintendent/ any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any office relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subjects and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders. They will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidates has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester examinations. The continuation of the course by the candidate is subject to the academic regulation in connection with forfeiture of seat.
8.	Posses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidates has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with college indulges in any malpractice or improper	Student of the college's expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidates has already appeared including

	conduct mentioned in clause 6 to 8	<p>practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeiture the seat.</p> <p>Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.</p>
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidates has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of the semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Malpractices committee, AGI for further action to award suitable punishment.	

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

I YEAR I SEMESTER

COURSE STRUCTURE

Subject Code	Subject Name	L	P	CREDITS
	Construction Project planning and Administration	4	0	4
	Management of quality and safety in construction	4	0	4
	Construction Engineering practices	4	0	4
	Core Elective-I Human Resources Development for construction. Earthquake resistant design of structures Formwork and scaffolding design.	4	0	4
	Core Elective-II Infrastructure valuation. Remote sensing and GIS for Urban planning .Rehabilitation and retrofitting of structures.	4	0	4
	Open Elective-I Quantitative methods in Construction Optimization Techniques.	4		4
	Construction Engineering Lab	0	4	2
	Seminar	-	4	2
Total		24	8	28

I YEAR II SEMESTER

COURSE STRUCTURE

Subject Code	Subject Name	L	P	CREDITS
	Construction methods and Equipment	4	0	4
	Construction and Contract Management	4	0	4
	Civil Engineering materials and Recent Advances	4	0	4
	Core Elective-III Under water construction Critical chain management Advanced concrete Technology	4	0	4
	Core Elective-IV Strategic management in construction Building services Geo-Environmental Engineering	4	0	4
	Open Elective-II Construction Economics and Finance System Integration & Management	4		4
	Advanced Construction Engineering Lab	0	4	2
	Seminar	-	4	2
Total		24	8	28

II YEAR I SEMESTER

Subject Code	Subject Name	L	P	Credits
	Comprehensive Viva-Voce	-	-	4
	Project work Review I	-	24	12
	Total Credits	-	24	16

II YEAR II SEMESTER

Subject Code	Subject Name	L	P	Credits
	Project work Review II	-	8	4
	Project Evaluation (Viva-Voce)		16	12
	Total Credits	-	24	16

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

CONSTRUCTION PROJECT PLANNING AND ADMINISTRATION

UNIT-I

Construction administration, control of quality in construction, organizational structure, responsibility for co-ordination of the trade-Introduction to Project planning and Scheduling-Processes of project planning- Project scheduling- Progress control.

UNIT-II

Project planning and scheduling techniques- Network scheduling techniques. Project planning using computer based models- Principles of project management.

UNIT-III

Certainty, risk and uncertainty, risk management, identification and nature of construction risks, contractual allocation of risk, types of risks, minimizing risks and mitigating losses, use of expected values, utility in investment decisions, decision trees, sensitivity analysis.

UNIT-IV

Resource management and inventory-Implementation of project planning management.

UNIT-V

Analysis and design of planning and control system- Disputes and claims management-Use of computer based project management tools.

Text books:

1. Callahan,M.T., Quackenbush,D.G.,and rowing,J.E., Construction project scheduling,McGraw- Hill ,New York,1992.
2. Cleland,D.I.and Ireland, L.R., project management:Strategic design and implementation,4th Edition, McGraw-Hill, New York,2002.
3. Fisk,D.R.2000 Construction Project Administration, Prentice hall International, London.
4. K Wakye,A.A 1997, Construction Project Administration: Adisson Wesley Longman, London.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

MANAGEMENT OF QUALITY AND SAFETY IN CONSTRUCTION

UNIT-I

Quality policy in construction industry-Consumer satisfaction- Ergonomics-Time of completion- Statistical tolerance.

UNIT-II

Taguchi's concept of quality-contract and construction programming-inspection procedures.

UNIT-III

Quality assurance/Quality control programme and cost implication.

UNIT-IV

Different aspects of quality-appraisals-failure mode analysis-stability methods and tools-Influence of drawings-detailing.

UNIT-V

Specifications-standardization-Bid preparation-construction activity-Environmental safety-social and environmental factors.

Text Books:

1. Clarkson H.Oglesby,productivity improvement in construction, Mcgraw Hill,2000.
2. James,J.O Brain, construction inspection handbook-quality assurance and quality control,Van Nostrand, newyork,1989.
3. Juran frank, J.M.and gryana,F.M.quality planning and analysis ,tata McGraw Hill,1982.
4. Kwaku A., Tenah and jose M.Guevera, fundamental of cinstruction management and organization PHI 1995.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

CONSTRUCTION ENGINEERING PRACTICES

UNIT-I

Reinforced and prestressed concrete construction-Prefabricated structures.

UNIT-II

Production of ready mixed concrete-productivity analysis-Economics of formwork-
Design of farmwork and their reusability.

UNIT-III

Modular construction practices-fibonacci series, its handling and other reliable
proportioning concepts.

UNIT-IV

Modular coordination-standardization-system building-advantages.

UNIT-V

Lamination and advantages of modular construction-concepts implementation procedures.

Text Books:

1. Allen E, Iano,J,funadamentals of building construction material and method,
john wiely and sons,2011.
2. Cameron K.andres.ronald C.Smith,principals and practices of commercial
construction,8th edition, prentice hall,2009.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

**HUMAN RESOURCES DEVELOPMENT FOR CONSTRUCTION
(Core Elective-I)**

UNIT-I

Challenges of managing people in construction, organization.

UNIT-II

Management theory- Human resources management theory- strategic human resources management approaches.

UNIT-III

Operational approaches of Human resources management- employee relations.

UNIT-IV

Employee empowerment-salient features-diversity and worklife balance.

UNIT-V

Employee welfare-strategic Human resource development- employment legislation-legal aspects.

Text Books:

1. Langfor D.A. Human Resource management in construction, Longman, 1995.
2. Martin Loosemore, Andrew Dainty, Helen Lingard, Human Resource Management in construction projects: strategic and operational approaches, Taylor and Francis, 2010.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES (Core Elective-I)

UNIT - I

Engineering Seismology: Earthquake phenomenon cause of earthquakes-Faults- Plate tectonics- Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales- Energy released-Earthquake measuring instruments-Seismoscope, Seismograph, accelerograph- Characteristics of strong ground motions- Seismic zones of India.

Introduction-Functional planning-Continuous load path-Overall form-simplicity and symmetry- elongated shapes-stiffness and strength - Seismic design requirements-regular and irregular configurations-basic assumptions.

UNIT - II

Conceptual Design - Horizontal and Vertical Load Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures. Twisting of Buildings – Flexible Building and Rigid Building Systems. Strength and Stiffness – Ductility – Definition – Ductility Relationships – Choice of construction Materials – Unconfined Concrete & Confined Concrete – Masonry, Steel Structures. Design Earthquake Loads – Basic Load Combinations – Permissible Stresses. Seismic Methods of Analysis – Static Method – Equivalent Lateral Force Method. Dynamic Analysis – Response Spectrum Method – Modal Analysis Torsion.

UNIT - III

Introduction to Earthquake Resistant Design – Seismic Design Requirements and Methods.

RC Buildings – IS Code based Method.- Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem - Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear – Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes – Behaviour of Unreinforced and Reinforced Masonry Walls – Behaviour of Walls Box Action and Bands – Behaviour of infill Walls - Non Structural Elements – Failure Mechanism of Nonstructural Elements – Effects of Nonstructural Elements on Structural System – Analysis – Prevention of Damage to Nonstructural Elements – Isolation of Non-Structures.

UNIT - IV

Design of Shear walls: Classification according to Behavior, Loads in Shear walls, Design of Rectangular and Flanged Shear walls, Derivation of Formula for Moment of Resistance of Rectangular Shear walls – Coupled Shear Walls.

UNIT - V

Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behavior of beams, columns and joints in RC buildings during earthquakes- Vulnerability of open ground storey and short columns during earthquake- Seismic Evaluation and Retrofitting.

Capacity Based Design: Introduction to Capacity Design, Capacity Design for Beams and Columns- Case studies.

References

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

3. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons
4. Masonry and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros
5. Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial college Press.
6. Earthquake Tips – Learning Earthquake Design and Construction
C.V.R.Murty

Reference Codes:

1. IS: 1893 (Part-1) -2002. “Criteria for Earthquake Resistant – Design of structures.” B.I.S., New Delhi.
2. IS:4326-1993, “ Earthquake Resistant Design and Construction of Building”, Code of Practice B.I.S., New Delhi.
3. IS:13920-1993, “ Ductile detailing of concrete structures subjected to seismic force” – Guidelines, B.I.S., New Delhi.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

**FORMWORK AND SCAFFOLDING DESIGN
(Core Elective-I)**

UNIT-I

Formwork and false work - Temporary work systems, construction planning and site constraints.

UNIT-II

Materials and construction of the common formwork and false work systems; Special, and proprietary forms.

UNIT-III

Concrete pressure on forms. Design of timber and steel forms; Loading and moment of formwork.

UNIT-IV

Types of beams, decking and column formwork; Design of decking; False work design; Effects of wind load.

UNIT-V

Foundation and soil on false work design; The use and applications of special forms; Sequence of construction; Safety use of formwork and false work.

Text Books:

1. Austin, C.K., Formwork for Concrete, Cleaver, Hume Press Ltd., London, 1996.
2. Michael P. Hurst, Construction Press, London and New York, 2003

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

**HUMAN RESOURCES DEVELOPMENT FOR CONSTRUCTION
(Core Elective- II)**

UNIT-I

Challenges of managing people in construction, organization.

UNIT-II

Management theory- Human resources management theory- strategic human resources management approaches.

UNIT-III

Operational approaches of Human resources management- employee relations.

UNIT-IV

Employee empowerment-salient features-diversity and worklife balance.

UNIT-V

Employee welfare-strategic Human resource development- employment legislation-legal aspects.

Text Books:

1. Langfor D.A. Human Resource management in construction, Longman,1995.
2. Martin Loosemore, Andrew Dainty,Helen Lingard, Human Resource Management in construction projects: strategic and operational approaches, Taylor and Francis, 2010.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

**INFRASTRUCTURE VALUATION
(Open Elective-I)**

UNIT-I

Function analysis; FAST diagramming; brain storming; criteria scoring matrices.

UNIT-II

An introduction to value theory; an introduction to value management.

UNIT-III

Value Engineering-Definition and concepts of the creative and structured phases of value engineering.

UNIT-IV

The workshop approach to achieve value- procedures- merits and demerits-detailed analysis.

UNIT-V

Teambuilding theory; target setting; time management.

Text Books:

1. Lawrence D. Miles, Techniques of Value Analysis and Engineering, McGraw-Hill Book Company, 2009.
2. M.R.S. Murthy, Cost Analysis for Management Decisions, Tata McGraw-Hill Publishing Company Ltd., 1988.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

**REMOTE SENSING AND GIS FOR URBAN PLANNING AND MANAGEMENT
(Open Elective-I)**

UNIT-I

Remote sensing for detection of urban features-Scale and resolution-Scope and limitations- interpretation from Aerial and satellite images-digital image processing techniques-image fusion.

UNIT-II

Classification and settlement-settlement structure-segmentation of built-up areas-classification algorithms-land use/land cover mapping-change detection-high resolution remote sensing.

UNIT-III

Urban morphology-housing typology-population estimation from remote sensing-infrastructure demand analysis-urban renewal land suitability analysis-plan formulation-regional, master and detailed development-Use of remote sensing and GIS in plan preparation-urban information system- web GIS.

UNIT-IV

Mapping transportation network-classification-optimum route/shortest route-alignment planning-traffic and parking studies-accident analysis

UNIT-V

Urban growth modeling-Expert systems in planning-3D city models-ALTM-Land use transportation interaction models-intelligent transportation systems.

Text Books:

1. Juliana Maantay, John Ziegler, John Pickles, GIS for the Urban environment, Esri press 2006.
2. Allan Brimicombe, GIS Environmental modeling and Engineering, CRC; 1 edition 2003.
3. Paul Longley, Michael Batty, spatial Analysis: Modeling in a GIS Environment Wiley, 1997.
4. Michael F. Goodchild, Louis T. Steyaert, Bardely O. Parks, Carol Johnston, David Maidment, Michael crane, Sandi Glendinning, GIS and Environmental modeling: Progress and Research issues (Handover) by, Publisher; Wiley; 1 edition, 1996.
5. Roland Fletcher, The limits of settlement Growth: A Theoretical Outline (New.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

**REHABILITATION AND RETROFITTING OF STRUCTURES
(Core Elective- II)**

UNIT – I

Introduction – Deterioration of Structures – Distress in Structures – Causes and prevention. Mechanism of Damage – Types of Damage.

UNIT – II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT – III

Inspection and Testing – Symptoms and Diagnosis of Distress - Damage assessment – NDT.

UNIT – IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT – V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

Text Books:

1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Defects and Deterioration in Buildings, E F & N Spon, London
3. Non-Destructive Evaluation of Concrete Structures by Bungey - Surrey University Press
4. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
5. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W. H. Ranso, (1981)
6. Building Failures : Diagnosis and Avoidance, EF & N Spon, London, B. A. Richardson, (1991).

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

**QUANTITATIVE METHODS IN CONSTRUCTION MANAGEMENT
(Open Elective –I)**

UNIT-I

Introduction and concepts of probability and statistics-Probability theory-Statistical tools.

UNIT-II

Linear programming Transportation and assignment problems.

UNIT-III

Dynamic programming, Queuing theory, Decision theory, Games theory.

UNIT-IV

Simulations applied to construction, Study of various effects.

UNIT-V

Modifications and improvement on CPM/PERT techniques.

Text Books:

1. Freund,J.E.and Miller,I.R., Probability and statistics for engineers,5th edition,prentice hall of india, New delhi,1994.
2. Goel B.S and mittal.S.K., Operation Research,pragati Prakashan,Meerut,2000.
3. Gupta,S.C.and Kapur,V.K., Fundamentals of mathematical statistics,sultan chand and sons new delhi,1999.
4. Taha,H.A., Operations research: An introduction,8th edition,prentice hall india,new delhi,2010.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
4	0	4

**OPTIMIZATION TECHNIQUES
(Open Elective– I)**

UNIT-I

Introduction to Optimization: Introduction - Historical developments - Engineering applications of Optimization - Statement of an Optimization problem - Classification of Optimization problems - Optimization Techniques. Optimization by calculus: Introduction - Unconstrained functions of a single variable - Problems involving simple constraints - Unconstrained functions of several variables – treatment of equality constraints - Extension to multiple equality constraints – Optimization with inequality constraints - The generalized Newton-Raphson method.

UNIT- II

Linear Programming: Introduction - Applications of linear programming - standard form of a linear programming problem - Geometry of linear programming problems - Definitions and theorems - Solution of a system of Linear simultaneous equations - Pivotal reduction of a general system of equations - Motivation of the Simplex Method - Simplex Algorithm - Two phases of the simplex method.

UNIT- III

Non-Linear Programming: Introduction - Unimodal Function - Unrestricted search - Exhaustive search- Dichotomous search - Interval Halving method - Fibonacci method - Golden section method - Comparison of elimination methods - Unconstrained optimization techniques - Direct search methods- Random search method - grid search method - Univariate method - Powell's method - Simplex method - Indirect search methods - Gradient of a function - Steepest descent method – Conjugate gradient - Newton's method.

UNIT-IV

Dynamic Programming: Introduction - Multistage decision processes - concept of sub-optimization and the principle of optimality - computational procedure in dynamic programming - example illustrating the Calculus method of solution - example illustrating the Tabular of solution - conversion of a final value problem into an initial value problem - continuous dynamic programming - Additional applications.

UNIT- V

Network Analysis: Introduction - Elementary graph theory - Network variables and problem types - Minimum-cost route - Network capacity problems - Modification of the directional sense of the network.,Application of Optimization Techniques

Text Books:

1. Optimization: Theory and Applications by S.S.Rao. New Age International (p) Ltd.
2. Numerical Optimization Techniques for Engineering Design with applications by G.N.Vanderplaats 2007.
1. Elements of Structural Optimization by R.T.Haftka and Z.Gurdal Kluwer academic publishers
4. Optimum Structural Design by U.Kirsch. Tata Mc Graw Hill
5. Optimum Design of Structures by K.I.Majid.
6. Introduction to Optimum Design by J.S.Arora. Academic press, 2012 ISBN : 978-0-12-381375-6

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – I Sem.

L	P	C
0	4	2

CONSTRUCTION ENGINEERING LAB

1. Evaluation of properties of cement
2. Evaluation of properties of fine aggregates
3. Evaluation of properties of coarse aggregates
4. Variation of workability with time for different grades of concrete experimental observations
5. Experimental observation on influence of size shape and grade of coarse on strength characteristics of concrete
6. Experimental observation on influence of grading of fine aggregate on strength characteristics of concrete
7. Experimental observation on influence of hand mixing and machine mixing on strength characteristics of concrete
8. Experimental observation on influence of aggregate cement ratio on strength characteristics of concrete
9. Experimental observation on influence of coarse aggregate –fine aggregate ratio on strength characteristics of concrete
10. Experimental observation on influence of Admixtures on strength characteristics of concrete

Note: Minimum of 08 experiments are to be conducted from the above list.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

CONSTRUCTION METHODS AND EQUIPMENT

UNIT-I

Selection of equipment-factors effecting-relative advantages and disadvantages-technical and economic aspects.

UNIT-II

Construction engineering fundamentals-analysis of production outputs and costs

UNIT-III

Characteristics and performance of equipment for earth moving.

UNIT-IV

Erection and material transport equipments- their performance advantages-pile driving-dewatering.

UNIT-V

Study of performance of equipment used for concrete construction including batching and mixing units-equipment used for tunneling.

Text Books:

1. Peurifoy,R.L., Ledbetter.W.B and schexnayder,C,construction planning and equipment methods, 5th Edition, McGraw Hill, Singapore,1995.
2. Sharma S.C.. Construction equipment and management, khanna publishers,newdelhi, 2011.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

CONSTRUCTION AND CONTRACT MANAGEMENTMANAGEMENT

UNIT-I

Introduction and concepts of Construction law-public law-government departments and local authorities.

UNIT-II

Private law-contracts-torts-property law and building law-concepts-salient features-sections.

UNIT-III

Construction contracts-contracts specifications-types of contract documents used for construction.

UNIT-IV

Contract procurement- selection of contractor-contract procedure-salient features.

UNIT-V

Arbitration and litigation procedure-preparation, settlement, evidence, price adjustment-need for the formulae-civil engineering and building formulae- practical implications.

Text books:

1. Gajaria G.T., laws relating to building and engineering contracts in india, M.M Tripathi private Ltd., Bombay, 1982.
2. Jimmie Hinze, construction contracts, 2nd edition., McGraw hill,2001.
3. Joseph T.Bockrath, contracts and the legal environment for engineers and architects,6 th edition, McGraw hill,2000.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

CIVIL ENGINEERING MATERIALS AND RECENT ADVANCES

UNIT-I

Light weight aggregate concrete - fiber reinforced concrete - High strength concrete.

UNIT-II

Changes in concrete with time, Corrosion of rebars in concrete- control measures.

UNIT-III

Different Industrial waste materials – their usage in concrete –study of properties.

UNIT-IV

Effects of temperature on Concrete- high temperature - Ferro-cement – advantages and properties and strength.

UNIT-V

Polymers - Fibre reinforced plastic in sandwich panels - Adhesives and sealants. Structural elastomeric bearings, Moisture barriers.

Text books:

1. Adam M. Neville, Properties of Concrete, 5th Edition, Longman Sc and Tech Publishers, 2011.
2. Kumar Mehta. P. and Paulo J.M. Monteiro, Concrete Microstructure, Properties and Materials, McGraw Hill, 2006.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

**UNDER WATER CONSTRUCTION
(Core Elective-III)**

UNIT-I

Under Water construction - Site preparation, temporary roads, site drainage.

UNIT-II

Deep trench and deep basement excavations. Bulk excavation. Stability of slopes to open excavations.

UNIT-III

Support of excavation by timbering and sheet piling. Retaining walls and sheet pile design - requirements for shoring and underpinning.

UNIT-IV

Methods of shoring of Underpinning - Tunneling in touch, medium-tough and soft rocks.

UNIT-V

Tunneling by borls shield tunneling - Culverts and conduits - Design of piles, pile load tests. Foundation design for dynamic conditions.

Text Books:

1. Ben C. Gerwick Jr., Construction of Marine and Offshore Structures, 3rd Edition, CRC Press, 2007.
2. Patrick Powers. J, Construction Dewatering: New Methods and Applications, John Wiley & Sons, 1992.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

**CRITICAL CHAIN MANAGEMENT
(Core Elective-III)**

UNIT-I

Overview of Theory of Constraints (TOC), Concept of critical chain in projects.

UNIT-II

Developing single-project critical chain plan- Advantages and disadvantages-procedures.

UNIT-III

Developing multi-project critical chain plan. Measurement and control.

UNIT-IV

Study of Project risk management.

UNIT-V

TOC's thinking process applied to project management.

Text Books:

1. Dettmer HW, The Logical Thinking Process: A Systems Approach to Complex Problem Solving, ASQ Quality Press, 2007.
2. Leach LP, Critical Chain Project Management, Artech House, 2004.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

**ADVANCED CONCRETE TECHNOLOGY
(Core Elective –III)**

UNIT – I

Concrete Making Materials : Cement – Bogus Compounds – Hydration Process – Types of Cement – Aggregates – Gradation Charts – Combined Aggregate – Alkali Silica Reaction – Admixtures – Chemical and Mineral Admixtures.

UNIT – II

Fresh And Hardened Concrete: Fresh Concrete – workability tests on Concrete – Setting Times of Fresh Concrete – Segregation and bleeding.

Hardened Concrete : Abrams Law, Gel space ratios, Maturity concept – Stress strain Behaviour – Creep and Shrinkage – Durability Tests on Concrete – Non Destructive Testing of Concrete.

UNIT – III

High Strength Concrete – Microstructure – Manufacturing and Properties – Design of HSC Using Erintroy Shaklok method – Ultra High Strength Concrete.

High Performance Concrete – Requirements and Properties of High Performance Concrete – Design Considerations

UNIT – IV

Special Concretes : Self Compacting concrete, Polymer Concrete, Fibre Reinforced Concrete – Reactive Powder Concrete – Requirements and Guidelines – Advantages and Applications.

Concrete Mix Design: Quality Control – Quality Assurance – Quality Audit - Mix Design Method – BIS Method – DOE Method – Light Weight Concrete, Self Compacting Concrete.

UNIT – V

Form work – materials – structural requests – form work systems – connections – specifications – design of form work – shores – removal for forms - shores – reshoring – failure of form work.

Text Books:

1. Special Structural concretes by Rafat Siddique, Galgotia Publications 2000.
2. Design of Concrete Mixes by N.Krishna Raju, CBS Publications, 2000.
3. Concrete: Micro Structure by P.K.Mehta, ICI, Chennai.
4. Properties of Concrete by A.M.Neville, ELBS publications Oct 1996.
5. Concrete Technology by A.R. Santhakumar, Oxford University Press 2006Oct
6. Concrete Technology by M.S.Shetty, S.Chand & Co 2009.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

**STRATEGIC MANAGEMENT IN CONSTRUCTION
(Core Elective- IV)**

Unit-I

Introduction to Strategic Management Concepts-necessity and significance of strategic management.

Unit-II

Different approaches of Strategy Formation and Implementation-procedures- problems encountered.

Unit-III

External and Internal Environment Analysis.

Unit-IV

Financial Strategies-budget allocation for different tasks -Decision and Analytical Tools.

Unit-V

Corporate Strategic Events, Leadership and Decision-making, Corporate Social Responsibility.

Text Books:

1. David Langford, Steven Male, Strategic Management in Construction, 2nd Edition, John Wiley and Sons, 2008.
2. Richard Fellows, Construction Management in Practice, 2nd Edition, Blackwell Science, 2001.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

BUILDING SERVICES (Core Elective- IV)

UNIT-I

Orientation and Planning - Grouping and circulation - lighting and ventilation .

UNIT-II

Termite proofing of buildings- Lightning protection of buildings - Fire protection of buildings .

UNIT-III

Vertical transportation – Prefabrication systems in residential buildings: Planning and modules and sizes of components in prefabrication.

UNIT-IV

Shell structures - Domes - Folded plate structures - Skeletal and space frame structures- Grain storage structures

UNIT-V

Earthquake resistant structures - Air-conditioning and heating - Acoustics and Sound insulation – Plumbing services

Text Books:

1. Arora and Bindra, Building Construction, Dhanpat Rai, 2012.
2. Hand Book of Housing Statistics, NBO, 2003.
3. National Building Code of India, Bureau of Indian Standards, 2005.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

**GEO-ENVIRONMENTAL ENGINEERING
(Core Elective- IV)**

UNIT-I

Sources and Site Characterization: Scope of Geoenvironmental Engineering, Various Sources of Contaminations, Need for contaminated site characterization; and Characterisation methods.

UNIT-II

Solid and Hazardous Waste Management: Classification of waste, Characterisation solid wastes, Environmental Concerns with waste, waste management strategies.

UNIT-III

contaminant Transport: Transport process, Mass-transfer process, Modeling, NAPL.

UNIT-IV

Remediation Techniques: Objectives of site remediation, various active and passive methods, Bioremediation, Phytoremediation, Remediation of NAPL sites.

UNIT-V

Landfills: Types of landfills, Site Selection, Waste Containment Liners, Leachate collection system, Cover system, Gas collection system.

Text Books:

1. Phillip B. Bedient, Refai, H. S. & Newell C. J. - Ground Water Contamination - Prentice Hall Publications, 4th Edition, 2008
2. Sharma, H. D. and Reddy, K. R. - Geoenvironmental Engineering, John Wiley & Sons (2004)

References:

1. Rowe, R. K. - Geotechnical & Geoenvironmental Engineering Handbook, Kluwer Academic, 2001
2. Reddi, L. N. and Inyang, H. I. - Geoenvironmental Engineering Principles and Applications, Marcel. Dekker, Inc., New York (2000).
3. LaGrega, M. D., Buckingham, P. L. and Evans, J. C. - Hazardous Waste Management, New York: McGraw-Hill, 2001

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

**CONSTRUCTION ECONOMICS AND FINANCE
(Open Elective –II)**

UNIT-I

Construction accounting-income statement-depreciation and amortization.

UNIT-II

Engineering economics-benefit-cost analysis-replacement analysis-break even analysis-assessment of time for arriving break even.

UNIT-III

Risks and uncertainties and management decision in capital budgeting-Uncertainties due to improper planning.

UNIT-IV

Taxation and inflation-work pricing-contract bidding and award-revision-escalation.

UNIT-V

Turnkey activities-project appraisal and yield-Working capital management-international finance- budgeting and budgetary-performance-appraisal.

Text Books:

1. Danny myers,construction economics: A new approach,Taylor and francis publisher,2004.
2. Ofori,G, the construction industry aspects of its economics and management, Singapore university press,1990.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
4	0	4

**SYSTEM INTEGRATION CONSTRUCTION
(Open Elective-II)**

UNIT I STRUCTURAL INTEGRATION Structural System, Systems for enclosing Buildings, Functional aesthetic system, Materials Selection and Specification.

UNIT II ENVIRONMENTAL FACTORS Qualities of enclosure necessary to maintain a specified level of interior environmental quality – weather resistance – Thermal infiltration – Acoustic Control – Transmission reduction – Air quality – illumination – Relevant systems integration with structural systems.

UNIT III SERVICES Plumbing – Electricity – Vertical circulation and their interaction – HVAC.

UNIT IV MAINTENANCE Component longevity in terms of operation performance and resistance to deleterious forces - Planning systems for least maintenance materials and construction – access for maintenance – Feasibility for replacement of damaged components – equal life elemental design – maintenance free exposed and finished surfaces.

UNIT V SAFETY Ability of systems to protect fire – Preventive systems – fire escape system design – Planning for pollution free construction environmental – Hazard free Construction execution.

REFERENCES:

1. A.J.Elder and Martiz Vinden Barg, Handbook of Building Enclosure, McGraw-Hill Book Company, 1983.
2. David V.Chadderton, Building Services Engineering, Taylor and Francis, 2007.
3. Jane Taylor and Gordin Cooke, The Fire Precautions Act in Practices, 1987.
4. Peter R. Smith and Warren G. Julian, Building Services, Applied Science Publishers Ltd., London, 1993.
5. William T. Mayer, Energy Economics and Building Design , McGraw-Hill Book Company,

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

M. Tech – I Year – II Sem.

L	P	C
0	4	2

ADVANCED CONSTRUCTION ENGINEERING LAB

1. Concrete mix design by BIS method-proportioning, batching, mixing, modelling of specimens for compression, modulus of elasticity and modulus of rupture-testing of specimens as per relevant codes of practice (Comparative study).
2. Concrete mix design by , ACI method proportioning, batching, mixing, modelling of specimens for compression, modulus of elasticity and modulus of rupture-testing of specimens as per relevant codes of practice
3. Concrete mix design by BS method proportioning, batching, mixing, modelling of specimens for compression, modulus of elasticity and modulus of rupture-testing of specimens as per relevant codes of practice
4. Development of correlation between Non-Destructive and Destructive tests using Rebound Hammer.
5. Experimental observations on Influence of Aggregate cement ratio on NDT reading
6. Experimental observations on Influence of Water cement ratio on NDT reading
7. Experimental observations on Influence of Excess/Deficient cement on NDT reading
8. Experimental observations on Influence of Excess/Deficient water on NDT reading
9. Experimental observations on Influence of Aggregate type on NDT reading

Note: Minimum of 08 experiments are to be conducted from the above list.