ACADEMIC REGULATIONS (R-20)

COURSE STRUCTURE

AND

DETAILED SYLLABI

M.Tech Regular (Full Time) Two Year Post Graduate Degree Programme

(For the Batches Admitted From the Academic Year 2020-2021)

STRUCTURAL ENGINEERING

Department of Civil Engineering

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

Accredited by NBA, New Delhi, Accredited by NAAC, Bengaluru |Affiliated to JNTUA, Ananthapuramu, Recognized by UGC under 12(B) & 2(F) | Approved by AICTE, New Delhi)

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FOREWORD

The autonomy is conferred on Sri Venkateswara College of Engineering and technology by JNT University, Anantapur based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Sri Venkateswara College of Engineering and Technology is proud to win the confidence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTUA, Anantapur to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperaton of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

Principal

VISION

Carving the youth as dynamic, competent, valued and knowledgeable professionals who shall lead the Nation to a better future.

MISSION

- ✓ Providing Quality Education, student-centered teaching-learning processes and state-of-art infrastructure for professional aspirants hailing from both rural and urban areas.
- ✓ Imparting technical education that encourages independent thinking, develops strong domain of knowledge, hones contemporary skills and positive attitudes towards holistic growth of young minds.
- ✓ Evolving the Institution into a Center of Academic and Research Excellence.

QUALITY POLICY

Sri Venkateswara College of Engineering and Technology strides towards excellence by adopting a system of quality policies and processes with continued improvements to enhance students' skills and talent for their exemplary contribution to the society, the nation and the world.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(AFFILIATED TO JNTUA, ANANTAPUR)
ACADEMIC REGULATIONS – R20
MASTER OF TECHNOLOGY (M.TECH)
REGULAR (Full-Time) TWO YEAR POST GRADUATE DEGREE PROGRAMME
(For the batches admitted from the Academic Year 2020-2021)

The Jawaharlal Nehru Technological University Anantapur, Ananthapuramu shall confer M.Tech Post Graduate degree to candidates who are admitted to the Master of Technology Program and fulfill all the requirements for the award of the degree.

1.0 **Applicability:** All the rules specified herein, approved by the Academic Council, shall be in the force and applicable to the students admitted from the Academic Year 2020-2021 onwards. Any reference to "College" in these rules and regulations stands for SVCET.

2.0 **Extent:** All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation. As and when a doubt arises, the interpretation of the Chairman, Academic Council shall be final and ratified by the Academic Council in the forthcoming meeting. As per the requirements of statutory bodies, Principal, Sri Venkateswara College of Engineering College shall be the Chairman, Academic Council.

3.0 **Admission:** Admission into the first year of two year M.Tech degree programme is based on the eligibility conditions detailed below.

4.0 **Eligibility:**

Admission to the above programme shall be made subject to the eligibility, qualifications and specialization prescribed by the competent authority for each programme, from time to time. Admissions shall be made either on the basis of merit rank obtained by the qualified candidates at an Entrance Test conducted by the University or on the basis of GATE / PGECET score, subject to reservations and policies prescribed by the Government from time to time.

4.1 **Admission Procedure:**

As per the existing stipulations of AP State Council for Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year as follows:

a) Category –A seats are to be filled by Convenor through APPGECET / GATE score.

b) Category-B seats are to be filled by Management as per the norms stipulated by Government of A.P.

5.0 **Specializations:**

S. No.	Branch	Specialization
1	CE	Structural Engineering
2	EEE	PE&ED
3	ME	CAD/CAM
4	ECE	VLSI Design
5	CSE	Computer Science and Engineering
6	CSE	CSE(Data Science)

6.0 Course Work:

A Candidate after securing admission must pursue the M.Tech course of study for Four Semesters duration. Each semester shall have a minimum of 16 instructional weeks.

A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

7.0 Contact Periods:

Depending on the complexity and volume of the course, the numbers of contact periods per week are assigned.

7.1 **Credit Courses:** Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Course in an L: T: P: C (Lecture Hours: Tutorial Hours: Practical Hours: Credits) structure, based on the following pattern.

7.2 **Theory Courses:** One hour Lecture (L) per Week in a Semester = 01 Credit.

7.3 **Practical Courses:** One Practical hour (P) per Week in a Semester = 0.5 Credit.

7.4 **Audit Courses (AC) = NOCREDITS** are awarded

7.5 **Mini Project:** For Mini Project, where formal contact periods are not specified, credits are assigned based on the complexity of the work to be carried out.

7.6 **Dissertation Work:** For Dissertation Work, where formal contact periods are not specified, credits are assigned based on the complexity of the work to be carried out.

7.7 The Two year curriculum of Post Graduate Degree Program M. Tech shall have total of 68 credits.

8.0 Choice Based Credit System (CBCS):

8.1 Choice Based Credit System (CBCS) is introduced in line with UGC guidelines in order to promote:

- Student centered learning
- Students to learn courses of their choice

A Student has a choice of registering for courses comprising basic science, program core and professional elective.

9.0 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 practical's, on the basis of Internal Evaluation and End Semester Examination.

For the theory subjects, 60% of the marks will be for the External End Examination. While 40% of the marks will be for Internal Evaluation. Internal marks for midterm examinations shall be arrived at by considering the marks secured by the student in both the midterm examinations with 80% weightage to the better midterm exam and 20% to the other. First midterm examinations will be conducted in the middle of the Semester (first two units) and

second midterm examinations immediately after the completion of instruction (last three units) with four questions with internal choice, either or type, are to be answered in 2 hours, evaluated for 40 marks.

For semester end examination five questions shall be given for a maximum of 60 marks with one question from each unit with internal choice i.e. either or type. All questions carry equal marks.

For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day to day performance (25 marks) and practical test at the end of the semester (15 marks).

For Mini Project there will be an internal evaluation for 100 marks. A candidate has to secure a minimum of 50% to be declared successful. The assessment will be made by a board consisting of HOD, Mini Project supervisor and one senior faculty of the department.

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 End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

In case the candidate does not secure the minimum academic requirement in any of the subjects, he has to reappear for the Semester Examination either supplementary or regular in that subject, or repeat the subject when next offered or do any other specified subject as may be required.

In case of audit course, students will be able to register for courses outside the prescribed range of Credits for audit only, when interested to supplement their knowledge / skills; any student who wishes to pursue audit course can register for the same with the concerned teacher and attend to the classes regularly. No examination will be conducted; no grade will be given for the audit courses. However such of those students who have registered and got the requisite attendance of 75% in the audit course, it will be mentioned in their grade sheet.

10.0 Dissertation Work:

10.1 Registration of Dissertation work

A candidate shall register for the dissertation work at the beginning of the second year, only after satisfying the attendance requirement of all the courses up to II Semester. The duration of the dissertation work is for two semesters.

10.2 The candidate has to submit, in consultation with the supervisor, the title, objective and plan of action of dissertation work to the Department Evaluation Committee (DEC) for its approval. Only after obtaining the approval from DEC, the student can initiate the dissertation work.

11.0 Evaluation of Dissertation Work

11.1 The Department Evaluation Committee (DEC) consisting of HOD, Supervisor and one internal senior faculty member shall monitor the progress of the project work. The DEC is constituted by the Principal on the recommendation of the Head of the Department.

11.2 Dissertation work Phase – I is to be completed in the III Semester. The student has to identify the topic of the project work, collect relevant literature, preliminary data, implementation tools/methodologies etc., and perform a critical study and analysis of the problem identify and

submit a report.

(i) Internal Evaluation: The internal evaluation of dissertation work phase – I shall be made by the DEC on the basis of two project reviews on the topic of the project. Each review shall be conducted for a maximum of 40 marks. For a total of 40 marks, 80% of better one of the two and 20% of the other one are added and finalized.

(ii) Semester-End Evaluation: The Semester end dissertation work phase – I Viva-Voce examination shall be conducted for 60 marks, by the HOD, concerned supervisor and a senior faculty member recommended by the HOD and appointed by the Principal.

11.**3** The student shall continue to undertake the dissertation work phase – II during the IV Semester by conducting practical investigations, implementation, analysis of results, validation and report writing. The student shall submit a dissertation report at the end of the semester after approval of the DEC.

(i) Internal Evaluation: The internal evaluation of dissertation work phase – II shall be made by the DEC on the basis of two project reviews on the progress, presentation and quality of work. Each review shall be conducted for a maximum of 120 marks. For a total of 120 marks, 80% of better one of the two and 20% of the other one are added and finalized.

(ii) Semester-End Evaluation: A candidate shall be allowed to submit the dissertation on the recommendations of the DEC. Three copies of the Dissertation certified in the prescribed format by the concerned Supervisor and HOD shall be submitted to the department. The Department shall submit a panel of three experts for a maximum of 05 students to the principal for appointment of the external examiner. The Viva-voce examination shall be conducted by the board consisting of the Supervisor, Head of the Department and the external examiner nominated by the principal. The board shall jointly award the marks for 180.

11.4 A candidate shall be deemed to have secured the minimum academic requirement of project work if he secures a minimum of 40% marks in the viva-voce examination and a minimum aggregate of 50% of the total marks in the end viva-voce examination and the internal assessment marks taken together. If he fails to get the minimum academic requirement he has to appear for the viva-voce examination again to get the minimum marks. The viva voce examination may be conducted once in two months for all the candidates who have submitted thesis during that period.

12.0 Eligibility to appear for the Semester-End Examination (SEE)

12.1 A student shall be eligible to appear for semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

12.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below75%) in each semester may be granted by the College Academic Council.

12.3 Shortage of Attendance below 65% in aggregate shall **in no case be condoned**.

12.4 Student whose shortage of attendance is not condoned in any semester is not eligible to take their end examination of that class and their registration shall stand cancelled.

12.5 A student shall not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable. The student may seek readmission for the semester when offered next. He will not be allowed to register for the courses of the semester

while he is in detention. A student detained due to shortage of attendance, will have to repeat that semester when offered next.

12.6 A stipulated fee shall be payable to the College towards condonation of shortage of attendance.

12.7 The attendance in Student Development Activities shall be considered for finalization of aggregate attendance.

12.8 For the calculation of a student attendance in any semester, the total number of classes conducted shall be counted as scheduled in the class-work time table.

13.0 Conduct of Semester End Examination and Evaluation

13.1 Semester end examination shall be conducted by the Controller of Examination (COE) by inviting 50% Question Papers from the External and 50% Question papers from the Internal Subject Experts. Principal will decide the External and Internal subject experts.

13.2 The answer papers of semester end examination should be evaluated externally / internally.

13.3 Marks for components evaluated internally by the faculty shall be submitted to the Controller of Examinations one week before the commencement of the End examinations. The marks for the internal evaluation components shall be added to the external evaluation marks secured in the Semester-end examinations, to arrive at the total marks for any course in that semester.

13.4 Performance in all the subjects is tabulated program-wise and will be scrutinized by the office of the Controller of Examinations. Total marks obtained in each subject are converted into letter grades. Finally subject-wise marks and grades details, subject-wise and branch-wise pass percentages are calculated through software.

14.0 Results Committee

14.1 Results Committee comprising of Principal, Controller of Examinations, Additional Controller of Examinations (Confidential) and one Senior Professor nominated by the Principal and the University Nominee will oversee the details of marks, grades and pass percentages of all the subjects and branch-wise pass percentages.

14.2 Office of the Controller of Examinations will generate student-wise result sheets and the same will be published through college website.

14.3 Student-wise Grade Sheets are generated and issued to the students.

15.0 Personal Verification / Recounting / Revaluation / Final Valuation

15.1 **Personal Verification of Answer Scripts:**

Candidates appear in a particular semester end examinations may appeal for verification of their answer script(s) for arithmetic correction in totaling of marks and any omission / deletion in evaluation within 7 days from the date of declaration of results at the office of the Controller of Examinations on the prescribed proforma and by paying the prescribed fee per answer script.

It is clarified that personal verification of answer script shall not tantamount to revaluation of answer script. This is only a process of reverification by the candidate. Any mistake /

deficiency with regard to arithmetic correction in totaling of marks and any omission / deletion in evaluation if found, the institution will correct the same.

15.2 **Recounting / Revaluation:**

Students shall be permitted for request for recounting/revaluation of the Semester-End examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student will be issued a revised grade sheet. If there are no changes, the same will be intimated to the students.

15.3 **Final Valuation:**

Students shall be permitted for request for final valuation of the Semester–End Examination answer scripts within a stipulated period after the publication of the revaluation results by paying the necessary fee. The final valuation shall be carried out by an expert not less than Associate Professor as per the scheme of valuation supplied by the examination branch in the presence of the student, Controller of Examinations and Principal. However students are not permitted to discuss / argue with the examiner. If the increase in marks after final valuation is equal to or more than 15% of the previous valuation marks, the marks obtained after final valuation shall be treated as final. If the variation of marks after final valuation is less than 15% of the previous valuation marks, then the earlier valuation marks shall be treated as the final marks.

16.0 **Supplementary Examinations:** In addition to the regular semester-end examinations conducted, the College may also schedule and conduct supplementary examinations for all the courses of other semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

17.0 **Re-Registration for improvement of Internal Marks**

17.1 Following are the conditions for Re-Registration of Theory Courses for improvement of Internal Marks:

17.2 The student should have completed all the course work and obtained examinations results from I to III semesters.

17.3 If the student has failed in the examination due to internal evaluation marks secured being less than 50%, he shall be given one chance for a maximum of 3 theory courses for improvement of internal evaluation marks.

17.4 The candidate has to register for the chosen courses and fulfill the academic requirements (i.e. a student has to attend the classes regularly and appear for the mid-examinations and satisfy the attendance requirements to become eligible for appearing at the semester-end examinations).

17.5 For each course, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D./ Challan in favour of the Principal, Sri Venkateswara College of Engineering & Technology, payable at Chittoor along with the requisition through the concerned Head of the Department.

17.6 A student availing the benefit for Improvement of Internal evaluation marks, the internal evaluation marks as well as the semester-end examinations marks secured in the previous attempt(s) for the re-registered courses stands cancelled.

18.0 Academic Requirements for completion of Post Graduate Degree Program M.Tech:

The following academic requirements have to be satisfied in addition to the attendance requirements for completion of Post Graduate Degree Program M.Tech.

For students admitted into Post Graduate Degree Program M.Tech for the Academic Year 2020-21:

18.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory, laboratory course, and Internship and project work, if he secures not less than 40% of marks in the semester-end examination and a minimum of 50% of marks in the sum total of the internal evaluation and Semester-end examination taken together.

A student shall be deemed to have satisfied the minimum academic requirements of mini-project, if he secures not less than a minimum of 50% of marks.

18.2 A student shall register for all the **68** credits and earn all the **68** credits. Grade points obtained in all the 6**8** credits shall be considered for the calculation of the DIVISION based on CGPA.

18.3 A student who fails to earn **68** credits as indicated in the course structure within **four** academic years from the year of their admission shall forfeit his seat in M.Tech Program and his admission stands cancelled.

19.0 Grades, Semester Grade point Average, Cumulative Grade point Average:

19.1 **Grade System:** After all the components and sub-components of any subject (including laboratory subjects) are evaluated, the final total marks obtained will be converted to letter grades on a "10 point scale" described below.

% of Marks obtained	Grade	Grade Points (GP)
90 to 100	A+	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
50 to 59	D	6
Less than 50%in Sum of Internal & External (or) Less than 40% in External	F	0
Not Appeared	N	0

19.2 Computation of SGPA and CGPA

19.2.1 The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$\mathbf{SGPA = \Sigma (Ci \times Gi) / \Sigma Ci}$$

where, Ci is the number of credits of the i^{th} subject and Gi is the grade point scored by the student in the i^{th} course

19.2.2 The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \Sigma (Ci \times Si) / \Sigma Ci$$

where 'Si' is the SGPA of the ith semester and Ci is the total number of credits in that semester

19.2.3 Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

19.2.4 While computing the SGPA/CGPA, the subjects in which the student is awarded Zero grade points will also be included.

19.2.5 Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

19.2.6 Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters A+, A, B, C, D, F and N.

19.2.7 As per AICTE regulations, conversion of CGPA into equivalent percentage is as follows:

Equivalent Percentage to SGPA = (SGPA – 0.50) x 10

Equivalent Percentage to CGPA = (CGPA – 0.50) x 10

19.3 Grade Sheet: A grade sheet (Marks Memorandum) will be issued to each student Indicating his performance in all subjects registered in that semester indicating the GPA and CGPA. GPA and CGPA will be rounded off to the second place of decimal.

20.0 Consolidated Grade Sheet: After successful completion of the entire Program of study, a Consolidated Grade Sheet containing performance of all semesters will be issued as a final record. Duplicate Consolidated Grade Sheet will also be issued, if required, after payment of requisite fee.

21.0 Award of Degree: The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendation of The Principal of SVCET (Autonomous). Student admitted in M.Tech 2Yrs programme shall register for all 68 credits and earn all the 68 credits. Marks obtained in all the 68 credits shall be considered for the award of the class based on CGPA.

21.1 Eligibility: A student shall be eligible for the award of M.Tech Degree if he fulfills all the following conditions:

- Registered and successfully completed all the components prescribed in the program of study for which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained CGPA greater than or equal to 6.0 (Minimum requirement for declaring as passed.)

21.2 **Award of Class:** Declaration of Class is based on CGPA.

Cumulative Grade Point Average	Class
≥7.75	First Class with Distinction
≥6.75 and<7.75	First Class
≥6.0 and <6.75	Second Class

22.0 With Holding of Results:

If the candidate has not paid dues to the University / College or if any case of in-discipline is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

23.0 Graduation Day:

The institute shall have its own annual Graduation Day for the award of Provisional Certificates to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute. The college shall institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

24.0 Discipline:

Every student is required to observe discipline and decorum both inside and outside the institute and not to indulge in any activity which will tend to bring down the honor of the institute. If a student indulges in malpractice in any of the theory / practical examination, continuous assessment examinations he shall be liable for punitive action as prescribed by the Institute from time to time.

25.0 Grievance Redressal Committee:

The institute shall form a Grievance Redressal Committee for each course in each department with the Course Teacher and the HOD as the members. This Committee shall solve all grievances related to the course under consideration.

26.0 Transitory Regulations:

Students who got detained for want of attendance (**or**) who have not fulfilled academic requirements (**or**) who have failed after having undergone the Program in earlier regulations (**or**) who have discontinued and wish to continue the Program are eligible for admission into the unfinished semester from the date of commencement of class work with the same (**or**) equivalent courses as and when courses are offered and they will be in the academic regulations into which they are presently readmitted. A student has to satisfy all the eligibility requirements within the maximum stipulated period of **four years** for the award of M.C.A Degree.

27.0 Medium of Instruction:

The Medium of Instruction is **English** for all courses, laboratories, Internal and External examinations, Seminar Presentation and Project Reports.

28.0 Mode of Learning:

Preferably 50% course work for the theory courses in every semester shall be conducted in the blended mode of learning. If the blended learning is carried out in online mode, then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

29.0 General Instructions:

i. The academic regulations should be read as a whole for purpose of any interpretation.

ii. Disciplinary action for Malpractice/improper conduct in examinations is appended.
iii. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.
v. The Principal may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Principal.

vi. The above rules and regulations are to be approved / ratified by the College Academic Council as

and when any modification is to be done.

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FAILURE TO READ AND UNDERSTAND THE REGULATIONS IS NOT AN EXCUSE

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(AFFILIATED TO JNTUA, ANANTHAPURAMU)

RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN EXAMINATIONS

Sl.No.	Nature of Malpractices / Improper conduct If the candidate	Punishment
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 candidate 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.
3.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate 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.
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 candidate 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 University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	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 the performance in that subject and all other subjects the candidate 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 University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
6.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate 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 of seat.
7.	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 practicals 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 University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.
8.	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 of his 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 or 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 subject 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.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate 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. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	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.
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 that 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 Examination committee for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

Identification of Courses

M. Tech

Each course shall be uniquely identified by an alphanumeric code of width 7 characters as given below.

No. of Digits	Description
First two digits	Year of regulations Ex:20
Next one letter	Type of program: A: B. Tech B: M. Tech C: M.B.A D: M.C.A
Next two letters	Code of program: ST: Structural Engineering, P.E: Power Electronics & Electric Drives, CM: CAD/CAM, VL: VLSI, CS: Computer Science and Engineering, DS: Data Science
Last two digits	Indicate serial numbers: ≥ 01

Ex:
20BST01
20BPE01
20BCM01
20BVL01
20BCS01
20BDS01

VISION AND MISSION OF THE DEPARTMENT

DEPARTMENT VISION:

- To be a centre of excellence in Civil Engineering education by making every effort continuously for improvement in education and undertaking research as well as to contribute to the technology for the infrastructure development leading to sustainable development of the society.

DEPARTMENT MISSION:

- To provide quality education for successful career and higher studies in Civil Engineering that emphasizes academic and technical excellence in profession and research, effective communication, team work and leadership to meet the challenges of the society.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To expose the graduate students to advanced Structural Analysis, Structural Dynamics, Allied Theory in Elasticity and Plasticity, FEM etc.,

PEO2: to impact training to graduate students in behavior and design of Advanced RC structures, behavior and design of advanced steel structures, latest procedure in earthquake resistance design practice and earthquake resistant design philosophies.

PEO3: To expose the graduate students to latest design codes, current national and international scenario on Structural Engineering and to motive them in interdisciplinary involvement in problems related to Structural Engineering. To orient the graduate students to high value research related to structural engineering so that they get impetus to pursue research and lifelong learning.

PROGRAM OUTCOMES (PO'S):

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1: To expose the graduate students to advanced courses in analysis and design of RC, PSC and steel structures as per the latest design codes, current national and international scenario on Structural Engineering.

PSO 2: To motive the graduate students to address the societal needs by interdisciplinary approach through advanced courses such as Finite element analysis, plates and shell structures, Structural dynamics and allied courses.

PSO 3: To enrich the graduate students to get hands on training on latest equipment/software to be industry ready/purse advanced research

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

R.V.S. NAGAR, CHITTOOR - 517127, A.P.

DEPARTMENT OF CIVIL ENGINEERING

COURSE STRUCTURE AND SCHEME OF EXAMINATION FOR M.TECH - STRUCTURAL ENGINEERING

M.TECH, I SEMESTER

S.NO	SUBJECT CODE	SUBJECT	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
			L	T	P		CIE	SEE	TOTAL
1	20BST01	Theory and Analysis of Plates	3	0	0	3	40	60	100
2	20BST02	Theory of Elasticity and Plasticity	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE – I									
3	20BST03	Advanced Structural Analysis	3	0	0	3	40	60	100
	20BST04	Advanced Concrete Technology							
	20BST05	Advanced Foundation Engineering							
PROFESSIONAL ELECTIVE – II									
4	20BST06	Advanced Steel Structures	3	0	0	3	40	60	100
	20BST07	Repair and Rehabilitation of RCC Structures							
	20BST08	Special Concrete							
5	20BMB21	Research Methodology	2	0	0	2	40	60	100
6	20BST09	Advanced Concrete Technology Laboratory - I	0	0	4	2	40	60	100
7	20BST10	Advanced Structural Engineering Laboratory-I	0	0	4	2	40	60	100
8	20BST11	Audit Course – I: Constitution of India	2	0	0	-	-	-	-
TOTAL			**16**	**0**	**8**	**18**	**280**	**420**	**700**

M.TECH, II SEMESTER

S.NO	SUBJECT CODE	SUBJECT	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
			L	T	P		CIE	SEE	TOTAL
1	20BST12	Finite Element Methods in Structural Engineering	3	0	0	3	40	60	100
2	20BST13	Stability of Structures	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE – III									
3	20BST14	Advanced Structural Design	3	0	0	3	40	60	100
	20BST15	Structural Dynamics							
	20BST16	Artificial Intelligence							
PROFESSIONAL ELECTIVE – IV									
4	20BST17	Prestressed Concrete	3	0	0	3	40	60	100
	20BST18	Earthquake Resistant Structures							
	20BST19	Analysis of shells and Folded Plates							
5	20BST20	Mini Project	0	0	4	2	100	00	100
6	20BST21	Advanced Concrete Technology Laboratory - II	0	0	4	2	40	60	100
7	20BST22	Advanced Structural Engineering Laboratory-II	0	0	4	2	40	60	100
8	20BST23	Audit Course – II: Personality Development through :Life Enlightenment Skills	2	0	0	-	-	-	-
TOTAL			**14**	**0**	**12**	**18**	**340**	**360**	**700**

M.TECH, III SEMESTER

S.NO	SUBJECT CODE	SUBJECT	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
			L	T	P		CIE	SEE	TOTAL
PROFESSIONAL ELECTIVE – V									
1	20BST24	Design of Tall Buildings	3	0	0	3	40	60	100
	20BST25	Design of Offshore Structures							
	20BST26	Disaster Resistant Structures							
PROFESSIONAL ELECTIVE – VI									
2	20BST27	Precast and Prefabricated Structures	3	0	0	3	40	60	100
	20BST28	Structural Health Monitoring And Retrofitting of Structures							
	20BST29	Industrial Structures							
3	20BST30	Dissertation Phase - I	-	-	20	10	40	60	100
TOTAL			**6**	**0**	**20**	**16**	**120**	**180**	**300**

M.TECH, IV-SEMESTERS

S.NO	SUBJECT CODE	SUBJECT	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
			L	T	P		CIE	SEE	TOTAL
1	20BST31	Dissertation Phase - II	-	-	32	16	120	180	300
TOTAL						**16**	**120**	**180**	**300**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – I-Semester

L	T	P	C
3	0	0	3

(20BST01) THEORY AND ANALYSIS OF PLATES

Objectives:

1. To understand the basic equations, bending effects of plates.
2. To understand the symmetrical loading and various loading conditions of circular and annular plates.
3. To understand the simultaneous bending and stretching of plates and to develop governing equation.
4. To study the concepts of orthotropic plates, numerical, approximate methods, large deflection theory of plates.

UNIT-I

DIFFERENTIAL EQUATION OF THIN PLATES :

Theory of bending of thin plates with lateral loads- Governing differential equation and various boundary conditions - in Cartesian and Polar coordination.

UNIT-II

RECTANGULAR PLATES: Classical solution for rectangular plates with different types of loads and boundary conditions - Navier's and Levy's solution methods.

UNIT-III

CIRCULAR PLATES: Symmetrically loaded, circular plates under various loading conditions, annular plates.

UNIT-IV

ORTHOTROPIC PLATES: Derivation of the governing equation, applications to grillage problems as equivalent orthotropic plates.

NUMERICAL AND APPROXIMATE METHODS: Energy solutions by variational methods, finite difference and finite element methods of analysis for plate problems.

UNIT-V

LARGE DEFLECTION THEORY OF PLATES: Study of few simple cases.

Expected Outcomes:

After completion of the course the student will be able to

1. Understand behaviour of plates for UDL, hydrostatic, concentrated load cases.
2. Perform cylindrical bending of long rectangular plates, pure bending of rectangular and circular plates, and deflection theories.
3. Understand bending theory for structural behaviour of plates.
4. Implement numerical and approximate methods for plate problems.

Text books:

1. Timoshenko, S., and Krieger, S.W., *Theory Of Plates and Shells*, Mc Graw Hill Book company.
2. N.K.Bairagi, *Plate Analysis*, Khanna Publishers, Delhi, 1986.

Reference books:

1. Szilard, R., *Theory and Analysis of Plates*, Prentice Hall Inc

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. **(STRUCTURAL ENGINEERING)**

M.Tech – I-Semester

L	T	P	C
3	0	0	3

(20BST02) THEORY OF ELASTICITY AND PLASTICITY

Objectives:

1. To make the students understand the concepts of elasticity and equip them with the knowledge to independently handle the problems of elasticity.
2. To enhance the competency level and develop the self confidence through quality assignments in theory of Elasticity.
3. To inculcate the habit of researching and practicing in the field of elasticity.
4. To understand the concepts of plasticity, yield criteria, plastic flow etc.,

UNIT-I

INTRODUCTION: Elasticity –Notation for forces and stresses-Components of stresses – components of strain –Hooke's law.

PLANE STRESS AND PLANE STRAIN ANALYSIS: Plane stress-plane strain-Differential equations of equilibrium- Boundary conditions- Compatibility equations-stress function-Boundary conditions.

UNIT-II

TWO DIMENSIONAL PROBLEMS IN RECTANGULAR COORDINATES: Solution by polynomials-Saint Venant's principle-Determination of displacements-bending of simple beams-application of Fourier series for two dimensional problems - gravity loading.

TWO DIMENSIONAL PROBLEMS IN POLAR COORDINATES : General Equation in polar co-ordinates - stress distribution symmetrical about an axis –Pure bending of curved bars- strain components in polar coordinates-Displacements for symmetrical stress distributions-simple symmetric and asymmetric problems-General solution of two dimensional problem in polar coordinates-Application of the general solution of two dimensional problem in polar coordinates-Application of the general solution in polar coordinates.

UNIT-III

ANALYSIS OF STRESS AND STRAIN IN THREE DIMENSIONS: Principle stress - ellipsoid and stress-director surface-Determination of principle stresses- Maximum shear stresses-Homogeneous deformation-principle axis of strain rotation.

GENERAL THEOREMS: Balance laws - Differential equations of equilibrium- conditions of compatibility - Determination of displacement-Equations of equilibrium in terms of displacements-principle of superposition-Uniqueness of solution –the Reciprocal theorem.

UNIT-IV

TORSION OF PRISMATIC BARS: General solution of problems by displacement (St. Venant's warping function) & force (Prandtl's stress function) approaches - Membrane analogy - Torsion of circular and non-circular (elliptic and rectangular) sections - Torsion of thin rectangular section and hollow thin walled section - Single and multi-celled sections.

UNIT-V

THEORY OF PLASTICITY: Stress-strain curve - Theories of strength and failure –Yield Criteria - Yield Surface – Plastic Flow – Plastic Work – Plastic Potential – Strain hardening

Expected Outcomes: After the completion of the course the students will be able to

1. able to solve the problems of 3-D elasticity with confidence.
2. can independently work with the problems of 2-D elasticity in Cartesian/Polar Coordinates.
3. familiarized with the use of airy's stress function in 2-D problems of elasticity in Cartesian/Polar Coordinates.
4. equipped with the knowledge of various theories of torsion of prismatic bars of various cross sections and can solve the problems of torsion.

Text Books:

1. Timoshenko, S., Theory of Elasticity and Plasticity, MC Graw Hill Book company.
2. Sadhu Singh, Theory of Elasticity and Plasticity, Khanna Publishers.

Reference Books:

1. Papov, Advanced Strength of materials, MC Graw Hill Book Company.
2. Chen, W.F. and Han, D.J, Plasticity for structural Engineers, Springer-Verlag, New York.
3. Lubliner, J., Plasticity Theory, Mac Millan Publishing Co., New York.
4. Y.C.Fung., Foundations of Solid Mechanics, Prentice Hall India

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – I-Semester

L	T	P	C
3	0	0	3

(20BST03) ADVANCED STRUCTURAL ANALYSIS

(PROFESSIONAL ELECTIVE-I)

Objectives:

1. To understand the static and kinematic indeterminacy of the structures
2. To understand the concepts of matrix methods of analysis of structures
3. To understand the analysis of continuous beams.
4. To understand the analysis of rigid and pin jointed frames

UNIT-I

INTRODUCTION TO MATRIX METHODS OF ANALYSIS: Determination of static and kinematic indeterminacies of two-dimensional and three-dimensional portal frames, pin jointed trusses and hybrid frames-coordinate systems –structural idealization-Flexibility and stiffness matrices-Force displacement relationships for axial force, couple, torsional moments – stiffness method of analysis and flexibility method of analysis.

UNIT-II

ANALYSIS OF CONTINUOUS BEAMS: Stiffness method and flexibility method of analysis – continuous beams of two and three spans with different end conditions-internal hinges.

UNIT-III

ANALYSIS OF TWO DIMENSIONAL PORTAL FRAMES: Stiffness and flexibility method of analysis of 2D portal frames with different end conditions-plotting of bending moment diagrams

UNIT-IV

ANALYSIS OF TWO-DIMENSIONAL PIN-JOINTED TRUSSES: Stiffness and flexibility methods-computation of joint displacement and member forces.

UNIT-V

TRANSFORMATION OF COORDINATES: Local and Global co-ordinate systems-transformation of matrices from local to global coordinates of element stiffness matrix-direct stiffness method of analysis-assembly of global stiffness matrix from element stiffness matrices – static condensation-sub-structuring.

Expected Outcomes:

After completion of the course the students will be able to

1. Distinguish determinate and indeterminate structures.
2. Identify the method of analysis for indeterminate structures.
3. Apply matrix methods of analysis for continuous beams.
4. Apply matrix methods of analysis for rigid and pin jointed frames.

Text Books:

1. Pundit & Gupta, *Structural Analysis,* Tata McGraw Hill Publications
2. C.S.Reddy, *Structural Analysis,* Tata McGraw Hill Publications

Reference Books:

1. Cotes, R.C., Couties, M.G., and Kong, F.K., Structural Analysis, Chapman & Hall India, Madras
2. John L.Meek., Matrix Structural Analysis, MC Graw Hill Book Company.
3. R.C.Hibbeler, Structural Analysis, Pearson Education
4. C.K.Wang, Indeterminate Structural Analysis, McGraw Hill Publishers

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – I-Semester

L	T	P	C
3	0	0	3

(20BST04) ADVANCED CONCRETE TECHNOLOGY (PROFESSIONAL ELECTIVE-I)

Objectives:

1. To know the types of cement, mineral and chemical admixtures, aggregates
2. To understand the properties of concrete.
3. To understand the methodology of mix design.
4. To understand the properties of various special concretes

UNIT-I

CONCRETE MAKING MATERIALS: Cement - Bogue's compounds – Hydration Process– Types of cement – Aggregates – Gradation Charts – Combined aggregate-Alkali Silica Reaction - Admixtures – Chemical and Mineral admixtures, Nano materials and applications. Fresh concrete: Workability – factors affecting workability – measurement of workability by different tests – Effect of time and temperature on workability – segregation and bleeding – mixing and vibration of concrete – quality of mixing water.

UNIT-II

HARDENED CONCRETE: Water/cement ratio-Abram's law – Gel space ratio – effective water in mix – Nature of strength of concrete – strength in tension and compression- Griffith's hypothesis – factors affecting strength – auto-geneous healing –Relation between compression and tensile strength – curing and maturity of concrete Influence of temperature on strength – Steam curing – testing of Hardened concrete – compression tests – tension tests – factors affecting strength – flexure tests – splitting tests – Non destructive testing methods.

UNIT-III

HIGH STRENGTH CONCRETE: Micro structure – Manufacturing and Properties- Design 0s HSC Using Erintroy Shaklok Method- Ultra High Strength Concrete. High Performance Concrete - Requirements and properties of High Performance Concrete- Design Considerations. Elasticity, shrinkage and creep: Modulus of elasticity – dynamic modulus of elasticity – poison's ratio – Early volume changes – swelling – Draying shrinkage - Mechanism of shrinkage – factors affecting shrinkage – Differential shrinkage – moisture movement carbonation shrinkage-creep of concrete – factors influencing creep – relation between creep and time – Nature of creep – Effect of creep.

UNIT-IV

MIX DESIGN: Proportioning of concrete mixes by various methods – fineness modulus, trial and error, mix density, Road Note. No. 4, ACI and ISI code methods – factors in the choice of mix proportions– quality control of concrete – Statistical methods – High strength concrete mix design– Durability of concrete

UNIT-V

SPECIAL CONCRETES: Light weight concretes –light weight aggregate concrete- Mix design- Cellular concrete - No fines concrete – High density concrete – Fiber reinforced concrete – Different types of fibers - factories affecting properties of FRC – Applications polymer Concrete – types of polymer concrete properties of polymer concrete applications

Expected Outcomes:

After the completion of the course the students will be able to

1. Determine the properties of concrete ingredients i.e. cement. Sand. Coarse aggregate
2. Use different types of cement as per their properties for different field applications.
3. Design economic mix proportion.
4. Use different types of admixtures to improve the properties of concrete for different field applications.

Text books:

1. A. M. Neville, 'Properties of concrete ', Pitman Publishing Limited, London.
2. M.S.Shetty, *Concrete Technology*, S.Chand & Co.

Reference Books :

1. F.M.Lea, 'Chemistry of cement and concrete' 3rd ed., 1970 Edward Arnold.
2. PD Kulkarni, R.K.Ghosh, Y.R. Phull, *Text book of Concrete Technology*,Newage international
3. Rajat Siddique, *Special Structural concretes* , Galgotia Publications
4. ML Gambhir, *Concrete Technology*, 3rd edition, TATA Mc Graw Hill Publishing Company.

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – I-Semester

L	T	P	C
3	3	0	3

(20BST05) ADVANCED FOUNDATION ENGINEERING (PROFESSIONAL ELECTIVE-I)

Objectives:

1. To introduce students to the state of the art of analysis & design in foundation Engineering.
2. To study in depth knowledge of the theory of soils and foundations.
3. To have the students understand and be able to apply the techniques of analysis & design.
4. Be able to apply advanced theoretical, numerical, emperical & design techniques to foundation Engineering problems.

1. SHALLOW FOUNDATIONS-I: General Requirements Of Foundations. Types Of Shallow Foundations And The Factors Governing The Selection Of Type Of Shallow Foundation. Bearing Capacity Of Shallow Foundations By Terzaghi's Theory And Meyerhof's Theory (Derivation Of Expressions And Solution To Problems Based On These Theories). Local Shear And General Shear Failure And Their Identification

2. SHALLOW FOUNDATIONS-II: Bearing Capacity Of Isolated Footing Subjected To Eccentric And Inclined Loads. Bearing Capacity Of Isolated Footing Resting On Stratified Soils- Button's Theory And Siva Reddy Analysis. Analysis And Structural Design Of R.C.C Isolated, Combined And Strap Footings.

3. DEEP FOUNDATIONS-I: Pile Foundations-Types Of Pile Foundations. Estimation Of Bearing Capacity Of Pile Foundation By Dynamic And Static Formulae. Bearing Capacity And Settlement Analysis Of Pile Groups. Negative Skin Friction, Pile Load Tests.Sheet Pile Walls.Cantilever Sheet Piles And Anchored Bulkheads, Earth Pressure Diagram,Determination Of Depth Of Embedment In Sands And Clays-Timbering Of Trenches-Earth Pressure Diagrams-Forces In Struts.

4. DEEP FOUNDATIONS-II: Well Foundations-Elements Of Well Foundation. Forces Acting On A Well Foundation. Depth And Bearing Capacity Of Well Foundation. Design Of Individual Components Of Well Foundation (Only Forces Acting And Principles Of Design). Problems Associated With Well Sinking.

5. FOUNDATIONS IN PROBLEMATIC SOILS: Foundations In Black Cotton Soils-Basic Foundation Problems Associated With Black Cotton Soils. Lime Column Techniques-Principles And Execution. Under Reamed Piles-Principle Of Functioning Of Under Reamed Pile-Analysis And Structural Design Of Under Reamed Pile. Use Of Cohesive Non Swelling (CNS) Layer Below Shallow Foundations.

Expected Outcomes:

1. Comprehensive theory based understanding of underpinning fundamentals
2. Knowledge of Engineering design practice.
3. Indepth understanding of specialist bodies of knowledge
4. Understanding of scope, principles, norms of sustainable engineering practice.

TEXT BOOKS:

1. Analysis And Design Of Foundations And Retaining Structures-Shamsher Prakash,Gopal Ranjan And Swami Saran.

Reference Books:

1. Analysis And Design Of Foundations-J.E.Bowles
2. Foundation Design And Construction-Tomlinson
3. Foundation Design-Teng.
4. Geotechnical Engg – C.Venkatramaiah

SRI VENKATESWARA COLLEGE OF ENGINEERING &TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – I-Semester

L	T	P	C
3	0	0	3

(20BST06) ADVANCED STEEL STRUCTURES (PROFESSIONAL ELECTIVE-II)

Objectives:

1. To learn the preliminary design of industrial requirements.
2. To learn the procedures of cantilever, portal frame methods of analyses.
3. To understand about types gantry girders and its design methodologies.
4. To understand theorems of plastic analysis and principles of optimization in structural design.

UNIT-I

DESIGN OF SELF SUPPORTING STACKS/CHIMNEYS: Considerations for preliminary design (industrial requirements – thermal requirement – mechanical force requirement – wind load and dead load estimation) – Detailed estimation of wind; dead-and other accidental – loads; Analysis; Detailed design including provision of stakes /spoilers – Design of super structure only.

UNIT-II

ANALYSIS OF MULTI-STOREY FRAMES USING APPROXIMATE METHODS: Cantilever method - Portal method - Analysis of multi-storey frames using substitute frame method.

UNIT-III

INDUSTRIAL BUILDINGS: Industrial buildings-braced and unbraced - Gable frames with gantry-Rigid industrial frames-Fire resistant design-Fatigue resistant design.

UNIT-IV

TOWERS: Basic structural configurations - free standing and guyed towers -Loads on towers - wind loads - foundation design - design criteria for different configurations and transmission line towers.

UNIT-V

PRINCIPLES OF OPTIMIZATION IN STRUCTURAL DESIGN: Application to simple – rectangular portal frame – minimum weight design.

Expected Outcomes: After completion of the course the student will be able to

1. Design self-supporting stacks and chimneys for industrial buildings.
2. Analyse multi-storey frames using approximate methods and able to design gantry girder to resist all types of loads.
3. Analyse portal frames by using plastic design methodologies.
4. Apply principles of optimization in structural design.

Text books:

1. Vazarani and Ratwani, Design of Steel Structures, Khanna Publishers
2. Punmia, B.C., Analysis of Steel Structure,

Reference books:

1. B.G.Neal, Plastic analysis of structures, John Wiley & Sons, Inc.
2. Baker, Steel Skeleton V.I and II, the Cambridge University Press
3. Timoshenko, Strength of materials (Vol-II), CBS Publications
4. Pinfold, Analysis of Steel Structure
5. Analysis of Steel Structure by Relevant IS codes

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – I-Semester

L	T	P	C
3	0	0	3

(20BST07) REPAIR AND REHABILITATION OF RCC STRUCTURES (PROFESSIONAL ELECTIVE-II)

Objectives:

1. To learn the influence of climate, temperature, chemicals on serviceability and durability of structures.
2. To acquaint with maintenance and repair strategies of structures
3. To know about the different repair techniques and materials for repair works.
4. To understand about concept of rehabilitation by referring to different case studies

UNIT-I

GENERAL: Quality assurance for concrete construction, as built concrete properties, strength, permeability, and volume changes, thermal properties, and cracking.

INFLUENCE ON SERVICEABILITY AND DURABILITY: Effects due to climate, temperature, chemicals, wear and erosion, design and construction errors, corrosion mechanism, Effects of cover thickness and cracking methods of corrosion protection, inhibitors, resistant steels, coatings and cathodic protection.

UNIT-II

MAINTENANCE AND REPAIR STRATEGIES: Inspection, Structural Appraisal, Economic appraisal, components of equality assurance, and conceptual bases for quality assurance schemes.

REPAIR OF STEEL STRUCTURES: Bridge, building, towers etc, monuments and historical structures, Prevention of water leakage in structures, and under-water repairs

UNIT-III

MATERIALS FOR REPAIR : Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, and Fibre reinforced concrete.

UNIT-IV

TECHNIQUES FOR REPAIR : Rust eliminators and polymers coating for rebar’s during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning.

UNIT-V

CASE STUDIES: Repairs to overcome low member strength, Deflection, cracking, chemical disruption, weathering, wear, fire, leakage, and marine exposure.

Expected Outcomes:

After completion of the course the student will be able to

1. possess thorough knowledge of Quality assurance for concrete structures.
2. inspect the structures for serviceability and durability.
3. assess the durability and serviceability problems of structures and their maintenance works.
4. use different construction materials to improve durability of the structure.

Text books:

1. Dension Campbell, Allen and Harold Roper, *Concrete Structures, Materials, Maintenance and Repair*, Longman Scientific and Technical, U.K. 1991.
2. MS. Shetty, *Concrete Technology – Theory and practice*, S.Chand and company, New Delhi, 1992.

Reference books:

1. RT.Allen and S.C. Edwards, *Repair of concrete Structures*, Blakie and sons, UK, 1987.
2. Broomfield John.P , *Corrosion of steel*, Spom Press,New York,1996.
3. Santhakumar, A.R.*Training Course notes on damage assessment and Repair in low cost housing*, RHDC-NBO Anna University, Madras, July, 1992.
4. Raikar, R.N.*Learning from Failures – Deficiencies in Design, Construction and Service*, R&D centre (SDCPL), Raikar Bhavan, Bombay, 1987.
5. N.Palaniappan, *Estate Management*, Anna Institute of Management, Madras Sep. 1992.
6. F.K.Garas, J.L.Clarke, GST Armer, *Structural Assessment*, Butterworths, UK Aporil 1987.
7. A.R. Santhakumar, *Concrete chemicals – Theory and applications*, Indian society for construction Engineering and Technology, Madras. 1993 (In press)

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. **(STRUCTURAL ENGINEERING)**

M.Tech – I-Semester

L	T	P	C
3	0	0	3

(20BST08) SPECIAL CONCRETE (PROFESSIONAL ELECTIVE-II)

Objectives:

1. The objective of this course is to make students to learn principles of
2. Concrete mix design, To differentiate between different types of concrete.
3. To characterize the high Performance concrete.

UNIT-I

Components of modern concrete and developments in the process and constituent materials: Role of constituents, Development in cements and cement replacement materials, pozzolona, fly ash, silica fume, rice husk ash, recycled aggregates, chemical admixtures. Mix proportioning of Concrete: Principles and methods.

UNIT-II

Light Weight concrete: Introduction, classification, properties, strength and durability, mix proportioning and problems. High density concrete: Radiation shielding ability of concrete, materials for high density concrete, mix proportioning, properties in fresh and hardened state, placement methods.

UNIT-III

Ferro cement: Ferrocement materials, mechanical properties, cracking of ferrocement, strength and behaviour in tension, compression and flexure, Design of ferrocement in tension, ferrocement constructions, durability, and applications.

UNIT-IV

Fibre reinforced concrete: Fibre materials, mix proportioning, distribution and orientation, interfacial bond, properties in fresh state, strength and behavior in tension, compression and flexure of steel fibre reinforced concrete, mechanical properties, crack arrest and toughening mechanism, applications.

UNIT-V

High Performance concrete: constituents, mix proportioning, properties in fresh and hardened states, applications and limitations. Ready Mixed Concrete-QCI-RMCPC scheme requirements, Self Compacting Concrete, Reactive powder concrete, and bacterial concrete.

Expected Outcomes:

After the completion of the course the students will be able to

1. Achieve Knowledge of design and development of problem solving skills.
2. Understand the principles of Concrete mix design
3. Design and develop analytical skills.
4. Summarize the Light Weight concrete, Fibre reinforced concrete and High Performance concrete
5. Understand the concepts of high Performance concrete

Text Books:

1. Neville A.M, "Properties of Concrete" Pearson Education Asia, 2000
2. P. Kumar Mehta, Paul J.N. Monterio, CONCRETE:Microstructure, Properties and Materials", Tata McGraw Hill
3. A.R.Santhakumar, (2007) "Concrete Technology"-Oxford University Press, New Delhi, 2007

Reference Books :

1. Gambhir "Concrete Technology" TMH.
2. Short A and Kinniburgh.W, "Light Weight Concrete"- Asia Publishing House, 1963
3. Aitcin P.C. "High Performance Concrete"-E and FN, Spon London 1998
4. Rixom.R. and Mailvaganam.N. "Chemical admixtures in concrete"- E and FN, Spon London 1999
5. Rudnai.G., "Light Weight concrete"- Akademiaikiado, Budapest, 1963 9. http://qcin.org/CAS/RMCPC/

SRI VENKATESWARA COLLEGE OF ENGINEERING &TECHNOLOGY (AUTONOMOUS)

I M.Tech I Semester

(20BMB21) RESEARCH METHODOLOGY

L	T	P	C
2	0	0	2

OBJECTIVES:

1. To introduce the students to concepts, objectives, and process of research.
2. To enable the students to formulate research problems and develop a coherent research design.
3. To introduce the students to instruments of data collection, tools for data analysis, and help them draw meaningful interpretations.
4. To enable the students to prepare research reports.

Unit-I: Research: Meaning, Objective, Motivation in Research, Types of Research, Research Approaches, Research Process; Validity and Reliability in Research; Research Design: Features of Good Design, Types of Research Design, and Basic Principles of Experimental Design.

Unit-II: Sampling Design: Meaning ,Steps in Sampling Design, Characteristics of a Good Sample Design, Random Samples and Random Sampling Design; Measurement and Scaling Techniques: Errors in Measurement, Tests of Sound Measurement, Scaling and Scale Construction techniques, Forecasting Techniques, Time Series Analysis, Interpolation and Extrapolation.

Unit-III: Methods of Data Collection: Primary Data, Questionnaire and Interviews, Collection of Secondary Data, Cases and Schedules. Professional Attitude and Goals, Concept of Research Excellence, Ethics in Science and Engineering, Frauds in Science and Research.

Unit-VI: Correlation and Regression Analysis, Method of Least Squares, Regression Vs. Correlation, Correlation Vs. Determination, Types of Correlation and Their Specific Applications; Statistical Interference: Tests of Hypothesis, Parametric Vs. Non-Parametric Tests, Procedure for Testing Hypothesis, Use Statistical Techniques for Testing Hypothesis, Sampling Distribution, Sampling T Chi-Square Test, Analysis of Variance and Covariance, Multivariable Analysis

Unit V: Interpretation of Data and Report Writing, Layout of a Research Paper, Techniques of Interpretation, Making Scientific Presentation at Conferences and Popular Lectures to Semi Technical Audience, Participating in Public Debates on Scientific Issues.

OUTCOMES*:*

After completion of the course, the students will be able to:

1. Explain the concepts, objectives, and process of research (Understanding).

2. Formulate the research problem and develop a sufficiently coherent research design (Creating).

3. Identify the measuring and scaling procedure used in research (Applying).

4. Use statistical tools for descriptive and inferential analysis (Applying).

5. Outline the key elements of report writing (Remembering).

TEXT BOOKS:

1. Garg, C. K. (2019). Research Methodology: Methods And Techniques (4 ed.). New Delhi: New Age International Publisher.
2. Bhattacharyya, D. K. (2006). Research Methodology (2 ed.). New Delhi: Excel Books.
3. O.R.Krishnaswamy and D.Obul Reddy,(2009),Research Methodology and Statistical Analysis, Himalaya Publication,(2nd Edition)

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. **(STRUCTURAL ENGINEERING)**

M.Tech – I-Semester

L	T	P	C
0	0	4	2

(20BST09) ADVANCED CONCRETE TECHNOLOGY LABORATORY - I

Objectives:

1. To learn the principles of workability in cement concrete.
2. To learn the preliminary tests on aggregates like flakiness test, elongation test, specific gravity, bulk density fineness modulus.
3. To know the compression test, Young's modulus test procedures
4. To learn the mix design procedure

List of Experiments:

1. Workability
   - (a)Slump Test
   - (b)Compaction Factor Test
   - (c)Vee-Bee Test
2. Flakiness Test
3. Elongation Test
4. Specific Gravity of
   - (a) Cement
   - (b) Coarse Aggregate
   - (c) Fine Aggregate
5. Bulk density of
   - (a) Fine Aggregate
   - (b) Coarse Aggregate
6. Fineness Modulus of
   - (a) Fine Aggregate
   - (b) Coarse Aggregate
7. Compressive strength of Cement
8. Mix Design of Concrete and Casting of Specimen.
9. Young's Modulus of Concrete
10. Fineness by Blain's apparatus for cement, fly ash, Silica.
11. Use of Non destructive testing (NDT) equipments – Rebound hammer,Ultra sonic pulse velocity meter

Expected Outcomes:

After completion of the course the student will be able to

1. Assess the workability of cement concrete and its suitability, quality of concrete
2. Assess the quality of fine and coarse aggregates after testing the aggregates according to IS specifications.
3. Test the quality of cement concrete by conducting compressive strength on concrete cubes.
4. Design different grades of mix design and also asses the fineness of cement, flash, silica by using Blaine's apparatus.

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – I-Semester

L	T	P	C
0	0	4	2

(20BST10) ADVANCED STRUCTURAL ENGINEERING LABORATORY –I

Objectives:

1. To learn the software applications in structural engineering.
2. To learn the CAD commands, dimensioning.
3. To draw the plan, elevation and section drawings of structural objects and to learn the DBMS concepts.
4. To understand the C programming language.

List of Experiments:

1. Computer Aided Drafting **-** Basic 2D objects – line, polyline, circle, ellipse – Dimensioning
2. Preparation of plan, elevation and section drawings of simple structural objects

3. Introduction to 3D **-** DBMS concepts **-** Civil Eng. Databases – Data entry & Reports.**-** Spreadsheet concepts – Worksheet calculations in Civil Engineering **-** Regression & Matrix Inversion.

4. Development of C programs to solve problems using numerical techniques
    1. Roots of an equation using Newton – Raphson method.
    2. Solution of linear simultaneous equations using Gauss elimination.
    3. Matrix inversion using GJ method
    4. Linear regression line of given points.
    5. Curve fitting using Polynomial Regression.
    6. Eigen value extraction power method

Expected Outcomes: After completion of the course the student will be able to

1. draw dimensioning for a given object and able to draw plan, elevation and section of the objects.
2. assess the 3D, DBMS concepts related to civil engineering data base.
3. analyse regression and matrix inversions.
4. develop C programs and to solve problems using numerical techniques.

References

1. Rajaraman, V., Computer Oriented Numerical Methods, Prentice – Hall of India, 2004.

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. **(STRUCTURAL ENGINEERING)**

M.Tech – I-Semester

L	T	P	C
2	0	0	0

AUDIT COURSE -I
CONSTITUTION OF INDIA

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals" constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Syllabus

Units	Content	Hours
1	• **History of Making of the Indian Constitution:** History Drafting Committee, (Composition & Working)	4
2	• **Philosophy of the Indian Constitution:** Preamble Salient Features	4
3	• **Contours of Constitutional Rights & Duties:** • Fundamental Rights • Right to Equality • Right to Freedom • Right against Exploitation • Right to Freedom of Religion • Cultural and Educational Rights • Right to Constitutional Remedies • Directive Principles of State Policy • Fundamental Duties.	4

4	• **Organs of Governance:** • Parliament • Composition • Qualifications and Disqualifications • Powers and Functions • Executive • President • Governor • Council of Ministers • Judiciary, Appointment and Transfer of Judges, Qualifications • Powers and Functions	4
5	• **Local Administration:** • District‟s Administration head: Role and Importance, • Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation. • Pachayati raj: Introduction, PRI: ZilaPachayat. • Elected officials and their roles, CEO ZilaPachayat: Position and role. • Block level: Organizational Hierarchy (Different departments), • Village level: Role of Elected and Appointed officials, • Importance of grass root democracy	O 4
6	• **Election Commission:** • Election Commission: Role and Functioning. • Chief Election Commissioner and Election Commissioners. • State Election Commission: Role and Functioning. • Institute and Bodies for the welfare of SC/ST/OBC and women.	4

Suggested reading

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to evolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – II-Semester

L	T	P	C
3	0	0	3

(20BST12) FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING

Objectives:

1 To provide an overview and basic fundamentals of Finite Element Analysis.
2 To introduce basic aspects of finite element theory, including domain discretization, interpolation, application of boundary conditions, assembly of global arrays, and solution of the resulting algebraic systems.
3 To explain the underlying concepts behind variational methods and weighted residual methods in FEM.
4 Formulate simple structural problems in to finite elements.

UNIT-I

INTRODUCTION:

Concept of Finite Element Method - Merits and demerits, applications, relevant software's. Steps involved in FEM as applicable to structural mechanics problems. Descritization interpolation model, Convergence and compatibility criteria.

UNIT-II

ONE DIMENSIONAL ANALYSIS: Stiffness Matrix for Beam and Bar elements shape functions for ID elements –static condensation of global stiffness matrix-solution –Initial strain and temperature effects.

UNIT-III

TWO DIMENSIONAL ANALYSIS: Different types of elements for plane stress and plane strain analysis –Displacement models –generalized coordinates-shape functions-convergent and compatibility requirements –Geometric Invariance –Natural coordinate system-area and volume coordinates-Generation of element stiffness and nodal load matrices –static condensation.

UNIT-IV

ISOPARAMETRIC FORMULATION: Concept, Different isoparametric elements for 2d analysis-Formulation of 4-noded and 8-noded isoparametric quadrilateral elements –Lagrangian elements serendipity elements.

AXI SYMMETRIC ANALYSIS: Bodies of revolution-axi symmetric modelling –strain displacement relationship-formulation of axi symmetric elements.

UNIT-V

THREE DIMENSIONAL FEM: Different 3-D elements, 3D strain –displacement relationship-formulation of hexahedral and isoparametric solid element.

Expected Outcomes:

After the completion of the course the students will be able to

1 Analyse and build FEA models for various Engineering problems.
2 Able to identify information requirements and sources for analysis , design and evaluation
3 Use professional-level finite element software to solve engineering problems.
4 Interpret results obtained from FEA software solutions, not only in terms of conclusions but also awareness of limitations.

Text books:

1. Finite element analysis _Theory & programming by G.S.Krishna murthy
2. Introduction to finite element method –Triupathi Chandra patla &Belugunudu

Reference books:

1. O.C.Zienkiewicz, *Finite element method*
2. Introduction to finite element method –J.N.Reddy
3. Cook R.D., Concepts and Applications of Finite Element Analysis, John Wiley and Sons Inc., New York, 1989.
4. Bathe K.J.., finite Element Procedures in Engineering Analysis, Prentice Hall,1990.
5. Gallagher R.H., & Wilson Finite Element Analysis Fundamentals, Prentice Hall Inc.,1975.
6. Hinton and Owen, Finite Element Programming, Academic Press, London, 1977.

SRI VENKATESWARA COLLEGE OF ENGINEERING &TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – II-Semester

L	T	P	C
3	0	0	3

(20BST13) STABILITY OF STRUCTURES

Objectives:

1. To acquaint with basic principles relating to stability of structures
2. To help the students to learn about mathematical treatment of stability Problems.
3. To train students in dealing with buckling, and torsion developed for different structures under different support and loading conditions.
4. To acquaint students with the Elastic and in-elastic Buckling behaviour of structures.

UNIT-I

FORMULATIONS RELATED TO BEAM COLUMNS: Concept of Stability, Differential equation for beam columns –Beam column with concentrated loads –continuous lateral load – couples -beam column with built in ends –continuous beams with axial load –application of Trigonometric series – Determination of allowable stresses.

UNIT-II

ELASTIC BUCKLING OF BARS: Elastic buckling of straight columns – Method of Neutral Equilibrium-Effect of shear stress on buckling-Eccentrically and laterally loaded columns –energy methods –Buckling of a bar on elastic foundation, Buckling of a bar with intermediate compressive forces and distributed axial loads – Buckling of bars with change in cross section –Effect of shear force on critical load –Built up columns

UNIT-III

INELASTIC BUCKLING: Buckling of straight bars-Double modulus theory –Tangent modulus theory

MATHEMATICAL TREATMENT OF STABILITY PROBLEMS: Linear and non Linear Eigen Value problems-Buckling problem orthogonality relation –Ritz method-Timoshenko method, Galerkin method

UNIT-IV

TORSIONAL BUCKLING: Pure torsion of thin walled bar of open cross section-Non –Uniform torsion of thin walled bars of open cross section-Torsion buckling –Buckling under Torsion and Flexure.

LATERAL BUCKLING OF SIMPLY SUPPORTED BEAMS: Beams of rectangular cross section subjected for pure bending

UNIT-V

BUCKLING OF SIMPLY SUPPORTED RECTANGULAR PLATES: Derivation of equation of plate subjected to constant compression in two directions and one direction.

Expected Outcomes:

After the completion of the course the students will be able to

1. Able to distinguish different types of beam columns and developing differential equations under different loading conditions.
2. Demonstrate skills in treating both elastic and in-elastic buckling of structures.
3. Develop skills relating to torsion and lateral buckling of structures.
4. Identify the difference of Elastic and in-elastic Buckling Behaviour of Structures

Text books:

1. Bleach, Stability Of Metallic Structure , Mc Graw hill
2. Chen & Atsuta, Theory of Beam Columns Vol I, Mc.Graw Hill

Reference books:

1. Timoshenko, S., and Gere., Theory of Elastic Stability, Mc Graw Hill Book company, 1973.
2. Chajes, A., Principles of Structural Stability Theory, Prentice Hall,1974
3. Ashwini Kumar, Stability Theory of Structures, TATA Mc Graw Hill publishing company Ltd, New Delhi, 1985.
4. Gambhir, M.L, Stability Analysis and Design of Structures, Springer-verlag Berlin Heidal Berg Publishers, 2004.

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. **(STRUCTURAL ENGINEERING)**

M.Tech – II-Semester

L	T	P	C
3	0	0	3

(20BST14) ADVANCED STRUCTURAL DESIGN
(PROFESSIONAL ELECTIVE –III)

Objectives:
1. To understand the short term and long term deflections of beams and slabs.
2. To understand the mechanism of flexural cracking and its estimation
3. To understand the design of deep beams, plain concrete walls and shear walls.
4. To understand the design of beam column joints.

UNIT-I

DEFLECTION OF REINFORCED CONCRETE BEAMS AND SLABS: Introduction -Short-term Deflection of beams and Slabs -Deflection due to -Imposed loads - Short- term deflection of beams due to applied loads- Calculation of deflection by IS 456 - Calculation of deflection by BS 8110 - Deflection calculation by Eurocode - ACI Simplified Method - Deflection of continues beams by IS 456 - Deflection of Cantilevers - Deflection of Slabs

ESTIMATION OF CRACKWIDTH IN REINFORCED CONCRETE MEMBERS: Introduction - Factors affecting Crack width in beams - Mechanism of Flexural cracking Calculation of crack widths - Simple Empirical method - Estimation of Crack width in -beams by IS 456 of BS 8110 - Shrinkage and Thermal Cracking

UNIT-II

DESIGN OF REINFORCED CONCRETE DEEP BEAMS: Introduction - Minimum Thickness - Steps of Designing deep beams - Design by IS 456 - Design according to British Practice - ACI Procedure for design of deep beams - Checking for local failures - Detailing of deep beams

UNIT-III

DESIGN OF PLAIN CONCRETE WALLS: Introduction - Braced and Unbraced walls - Slenderness of walls- Eccentricities of vertical loads at Right angles to wall - Empirical design method for plane concrete walls carrying axial load - Design of walls for Inplane Horizontal forces - Rules for detailing of steel in concrete walls

DESIGN OF SHEAR WALLS: Introduction - Classification of shear walls - Classification according to behaviour - Loads in shear walls - Design of Rectangular and flanged shear walls - Derivation of formula for moment of Resistance of Rectangular shear walls

UNIT-IV

DESIGN OF CAST IN-SITU BEAM-COLUMN JOINTS: Introduction – Types of cast in-situ joints – Joints in multi-storeyed Buildings – Forces acting on Joints – Strength Requirement of Columns – Forces directly acting on joints – Design of joints for strength – Anchorage – Confinement of core of joint – Shear strength of joint – Corner (Knee) joint – Detailing for Anchorage in exterior beam-column joint – Procedure for design of joint.

UNIT-V

DESIGN OF REINFORCED CONCRETE MEMBERS FOR FIRE RESISTANCE: Introduction - ISO 834 standard heating conditions- Grading or classifications - Effect of High temperature on steel and concrete - Effect of high temperatures on different types of structural members - Fire resistance by structural detailing from Tabulated data - Analytical determination of the ultimate bending moment capacity of reinforced concrete beams under fire - Other considerations

Expected Outcomes:

After the completion of the course the students will be able to

1. Design the R.C. beams and slabs to satisfy the limit state of serviceability by determining the short term and long term deflection.
2. Estimate the crack width in beams for the given load.
3. Design deep beams, plain and shear walls
4. Design beam-column join for the given loading system.

Text books:

1. P.C.Verghese, *Advanced Reinforced Concrete Design*, PHI Learning, New Delhi
2. P.Purushothaman, *Reinforced concrete Structural Elements: Behaviour, analysis and Design*, TATA Mc Graw Hill.

Reference Books:

1. C.E. Reynolds and J.C. Steedman, *Reinforced Concrete- Desigers Hand book,* a view point publication.
2. P.Dayaratnam , *Limit State Design of Reinforced Concrete Structures*, Oxford & IBH Publishers, 2004 edition.
3. N.Krishna Raju,*Advanced Reinforced Concrete Design*, CBS Publishers & Distributors.
4. Devadas Menon, Reinforced *cement concrete Structures, Tata McGraw Hill Education*

SRI VENKATESWARA COLLEGE OF ENGINEERING &TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – II-Semester

L	T	P	C
3	0	0	3

(20BST15) STRUCTURAL DYNAMICS
(PROFESSIONAL ELECTIVE –III)

Objectives:

1. To acquaint with basic principles relating to Dynamics of structures under both damped and undamped condition.
2. To understand Impact of degree of freedom on vibration of structures
3. To make students learn about mathematical treatment of dynamics of structural Problems both single degree and multi degree of freedom.
4. To train students in dealing with vibration and earth quake analysis.

UNIT-I

Equation of Motions, Problem Statement, Solution Methods of Single Degree of Freedom Systems (SDOF)

Basic concepts of structural dynamics: single degree of freedom system, force displacement relationship, damping force, equation of motion, mass-spring-damper system, methods of Solution of differential equation.

Free Vibration (SDOF): Undamped free vibration, viscously damped free vibration, energy in free vibration.

UNIT-II

MULTI DEGREE OF FREEDOM SYSTEM: selection of the degree of freedom –Evaluation of structural property matrices-Formulation of the MDOF equations of motion –Undamped free vibrations Solution of Eigen value problem for natural frequencies and mode shapes- Orthogonality conditions - Approximate methods of extraction of Eigen values.

UNIT-III

DYNAMIC RESPONSE OF MDOF SYSTEMS: Normal co-ordinates - Mode superposition technique - Numerical integration procedures

UNIT-IV

INTRODUCTION TO EARTHQUAKE ANALYSIS: Introduction –Excitation by rigid base translation – Lumped mass approach -SDOF and MDOF system- I.S code methods of analysis.

UNIT-V

CONTINUOUS SYSTEM: Introduction –Flexural vibrations of beams- Elementary case-Equation of motion –Analysis of undammed free shapes of simple beams with different end conditions-principles of application to continuous beams.

Expected Outcomes:

After the completion of the course the students will be able to

1. Identify different types of vibrations under SDOF and MDOF system conditions.
2. Evaluate impact of degree of freedom on vibration of structures.
3. Demonstrate skills in treating structures for earthquake analysis.
4. Develop skills relating to continuous system of structures relating to different loading conditions

Text books:

1. A.K.Chopra, "*Structural Dynamics for Earthquake Engineering*",Prentice Hall,1994
2. S.R DAMODARASAMY & S.KAVITHA,"Basics of*Structural Dynamics and a Seismic Design*", PHI Pvt. Ltd., 2009.

Reference books:

1. Clough & Penziem, *Dynamics of structures,* Mc Graw Hill Publications
2. Mario Paz, *Structural dynamics,* CBS Publications.
3. I.S:1893(latest)" code of practice for earthquakes resistant design of structures"
4. Anderson R.A, *Fundamentals of Vibration,* Amerind Publishing Co., 1972.

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech – II-Semester (STRUCTURAL ENGINEERING)

L	T	P	C
3	0	0	3

Code : (20BST16) ARTIFICIAL INTELLIGENCE

(PROFESSIONAL ELECTIVE –III)

Objectives: The objective of this course is to make students to

1. Understand the concepts of AI and Intelligent Agents
2. Explore Problem solving using search techniques in AI
3. Understand Logical Agents and First-Order logic
4. Explore knowledge Representation issues and concepts of learning from examples

UNIT – I

Introduction: What Is AI, the Foundations of Artificial Intelligence, the History of Artificial Intelligence, the State of the Art

Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, And The Structure of Agents

UNIT – II

Solving Problems by Searching: Problem-Solving Agents, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions

Beyond Classical Search: Local Search Algorithms and Optimization Problems, Searching with Nondeterministic Actions and Partial Observations, Online Search Agents and Unknown Environments **Constraint Satisfaction Problems:** Definition, Constraint Propagation, Backtracking Search, Local Search, the Structure of Problems

UNIT – III

Logical Agents: Knowledge-Based Agents, Propositional Logic, Propositional Theorem Proving, Effective Propositional Model Checking, Agents Based on Propositional Logic

First-Order Logic: Syntax and Semantics, Knowledge Engineering in FOL, Inference in First Order Logic, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution

UNIT – IV

Planning: Definition, Algorithms, Planning Graphs, Hierarchical Planning, Multi-agent Planning

Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information, the Internet Shopping World

UNIT – V

Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Linear Models, Artificial Neural Networks.

Expert Systems Architectures: Rule Based System Architecture, Non Production System Architecture, Knowledge System Building Tools.

Outcomes: At the end of the course, students should be able to

1. Understand foundation and basic concepts of AI and Intelligent Agents
2. Evaluate Searching techniques for problem solving in AI.
3. Apply First-order Logic and chaining techniques for problem solving
4. Handle knowledge representation techniques for problem solving
5. Apply supervised, unsupervised learning and Neural Networks for solving problem in AI.

Text books:

1. Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, Russell S, Norvig P, Education, 2010.
2. Introduction to Artificial Intelligence and Expert Systems, Dan W. Patterson ,PHI, New Delhi, 2006.

Reference books:

1. Artificial Intelligence, 3rd edition, Rich E, Knight K, Nair S B, Tata McGraw-Hill, 2009.
2. Artificial Intelligence: Structures and Strategies for Complex problem solving, 6th edition, Luger George F, Pearson Education, 2009
3. Minds and Computers An Introduction to the Philosophy of Artificial Intelligence, Carter M,Edinburgh University Press, 2007

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

M.Tech. **(STRUCTURAL ENGINEERING)**

M.Tech – II-Semester

L	T	P	C
3	0	0	3

(20BST17) PRESTRESSED CONCRETE (ELECTIVE – IV)

Objectives:

1 To understand the concepts of prestressing

2 To understand the behaviour of prestressed members in compression and flexure.

3 To understand the design of prestressed concrete members

4 To understand the transfer of prestress and Anchorage stresses

UNIT-I

DESIGN FOR FLEXURE: Definition of Type I, II, & III structures – Basic Assumptions- Permissible stresses in steel and concrete as per IS: 1343 – Basic four requirements – Design and choice of sections of Post tensioned beams – Layout of cables – check of limit state of collapse – Location of Position of wires in Pretensioned beams.

UNIT-II

DEFLECTION: Short term deflection of Uncracked Members – Long Term Deflection – Deflection due to creep – Code requirements for Limit State of Deflection.

UNIT-III

TRANSFER OF PRE STRESS: Transmission of Prestressing force by Bond – Transmission length – factors affecting transmission length – check for Transmission length – Anchorage Zone stresses in Post tensioned members – Calculation of Bearing stress and Bursting tensile forces & reinforcement in anchorage zones based on IS 1343 & Guyon's method.

UNIT-IV

STATICALLY INDETERMINATE PRESTRESSED CONCRETE STRUCTURES: Methods of Achieving continuity – Assumptions in elastic analysis – Pressure line – Linear transformation – concordant cables – Guyon's theorem – Analysis and design of continuous beams.

UNIT-V

CIRCULAR PRESTRESSING: Circular prestressing in liquid retaining tanks – Analysis for stresses – Design of tank wall incorporating recommendations of IS: 3370 Part III Code – Types of Prestressed Concrete Pipes – Design of Pipes.

Expected Outcomes:

After the completion of the course the students will be able to

1. Evaluate the behaviour, analyze and design of prestressed concrete structures, layout of tendon satisfying strength and serviceability limit states.
2. Analyze and design for shear in P.S.C members.
3. Analyze the stresses in anchorage zones and design of end anchorage
4. Analyze and design prestressed circular concrete pipes and tanks

Text books:

1. Prestressed Concrete by N. Krishna Raju, Tata Mc Graw- Hill Companies, 4th Edition 2007
2. Prestressed Concrete by S. Ramamrutham, Dhanpatrai Publishing Company (P) Ltd, 2006

Reference books:

1. T.Y.Lin, *Design of Prestressed Concrete Structures*, Asian Publishing house, Bombay, 1953.
2. Y.Guyon, *Prestressed Concrete*, Vol.I&II, Wiley and Sons, 1960.
3. F.Leohhardt, *Prestressed Concrete Design And Construction*, Wilhelm Ernst and shon, Berlin, 1964.
4. C.E.Reynolds and J.C. Steedman, *Reinforced Concrete Designers Hand Book*, A view point publication, 1989.
5. Edward P.Nawy, *Prestressed Concrete*, Prentise Hall
6. Raj Gopal, *Prestressed Concrete*, Alpha Science International, 2005

SRI VENKATESWARA COLLEGE OF ENGINEERING &TECHNOLOGY (AUTONOMOUS)

M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – II-Semester

L	T	P	C
3	0	0	3

(20BST18) EARTHQUAKE RESISTANT STRUCTURES (ELECTIVE – IV)

Objectives:

1. To make the students understand the fundamental concepts in the analysis of the structures subjected to seismic forces.
2. To understand the vibration of structures during earthquakes.
3. To understand the students to do a competent design & detailing of seismic resistant structures.
4. To understand the student fundamentals of Seismic Planning.

UNIT-I

ENGINEERING SEISMOLOGY : Earthquake – causes of earthquake – earthquakes and seismic waves – scale and intensity of earthquakes – seismic activity – Measurements of earth quakes – seismometer- strong motion accelerograph / field observation of ground motion – analysis of earthquakes waves – earth quake motion – amplification of characteristics of surface layers – earthquake motion on the ground surface;

UNIT-II

VIBRATION OF STRUCTURES UNDER GROUND MOTION: Elastic vibration of simple structures – modelling of structures and equations of motion – free vibrations of simple structures – steady state forced vibrations – Non steady state forced vibrations – response spectrum representations; Relation between the nature of the ground motion and structural damage.

UNIT-III

DESIGN APPROACHES: Methods of analysis – selection of analysis – equivalent lateral force procedure seismic base shear – seismic design co-efficient - vertical distribution of seismic forces and horizontal shear – twisting moment - Over turning moment – vertical seismic load and orthogonal effects lateral deflection – P-Δcharacteristics effect – soil structure Interaction Seismic – Graphs study, earthquake records for design – factors affecting accelerogram characteristics - artificial accelerogram – zoning map. Dynamic – analysis procedure: Model analysis – Inelastic – time history analysis Evaluation of the results.

UNIT-IV

EARTHQUAKE – RESISTANT DESIGN OF STRUCTURAL COMPONENTS AND SYSTEMS: Introduction – monolithic reinforced concrete structures – precast concrete structures – Prestressed concrete structures – steel structures – composite structures, masonry structures, Timber structures.

UNIT-V

FUNDAMENTALS OF SEISMIC PLANNING: Selection of materials and types of construction form of superstructure – framing systems and seismic units – devices for reducing. Earthquake loads,

Expected Outcomes: After the completion of the course the students will be able to

1. Analyse the forces acting on structures due to earthquake.
2. Computation of design moments and shears for framed structure as per IS:1893 and its detailing
3. Apply the concepts in the design of structures.
4. Implementing the Selection process of materials and construction form of super structure.

Text books:

1. J.A. Blume, N.M. Newmark, L.H. Corning., *Design of Multi-storeyed Buildings for Earthquake ground motions*', Portland Cement Association, Chicago,1961
2. Pankaj Agarwal, *Earthquake Resistant Design*

Reference books:

1. Minoru Wakabayashi, Design of earthquake resistant structures
2. A.K.Chopra, Structural Dynamics for Earthquake Engineering, PrenticeHall 1995.
3. R.W.Clough, Dynamics of structures. Mc GrawHill, 2nd edition, 1992.
4. N.M Newmark and E.Rosenblueth, Fundamentals of Earthquake Engineering, PrenticeHall, 1971.
5. David Key, Earthquake design practice for buildings. Thomas Telford, London, 1988
6. R.L. Wegel, Earthquake Engg; Prentice Hall 12nd edition 1989.
7. I.S.Codes No. 1893,4326,13920.

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M.Tech. **(STRUCTURAL ENGINEERING)**

M.Tech – II-Semester

L	T	P	C
3	0	0	3

(20BST19) ANALYSIS OF SHELLS AND FOLDED PLATES (ELECTIVE – IV)

Objectives:

1. To learn the principles of membrane theory and bending theory of shells.
2. To learn the governing DKJ equation for bending, Schorer's theory.
3. To develop the geometry and analysis of shells of double curvature.
4. To study the concepts of folded plate theory and Whitney's theory.

UNIT-I

EQUATIONS OF EQUILIBRIUM: Introduction, classification, derivation of stress Resultants, Principles of membrane theory and bending theory.

UNIT-II

CYLINDRICAL SHELLS: Derivation of governing DKJ equation for bending theory, details of Schorer's theory, Applications to the analysis and design of short shells and long shells. Introduction of ASCE manual coefficients for design.

UNIT-III

INTRODUCTION TO SHELLS OF DOUBLE CURVATURE: (other than shells of revolution :) Geometry and analysis of elliptic paraboloid, rotational paraboloid and hyperbolic paraboloid shapes by membrane theory.

UNIT-IV

FOLDED PLATES: Folded plate theory, plate and slab action, Whitney's theory, Simpson's theory for the analysis of different types of folded plates (Design is not included)

UNIT-V

SHELLS OF DOUBLE CURVATURE: Surfaces of revolution .Derivation of equilibrium equations by membrane theory, Applications to spherical shell and rotational Hyperboloid

Expected Outcomes:

After completion of the course the student will be able to

1. Understand the classification and stress resultants of shells.
2. Able to apply DKJ equation and schorer's theory for cylindrical shells.
3. Able to apply the geometry, analysis of shells subjected to double curvature.
4. Able to solve folded plates by using whiney's and Simpson's theories.

Text books:

1. Design and construction of concrete shell roofs by G.S. Rama Swamy – CBS Publishers & Distributors, 485, Jain Bhawan Bhola Nath Nagar, shahotra, Delhi.

2. Fundamentals of the analysis and design of shell structures by Vasant S.kelkar Robert T.Swell – Prentice hall, Inc., Englewood cliffs, new Jersy -02632.

Reference books:

1. N.k.Bairagi, Shell analysis, Khanna Publishers, Delhi, 1990.

2. Billington, Ithin shell concrete structures, Mc Graw Hill Book company, New york, St. Louis, Sand Francisco, Toronto, London.

3. ASCE Manual of Engineering practice No.31, design of cylindrical concrete shell roofs ASC, Newyork

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M.Tech – II-Semester

L	T	P	C
0	0	4	2

(20BST20) MINI PROJECT

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M.Tech – II-Semester

L	T	P	C
0	0	4	2

(20BST21) ADVANCED CONCRETE TECHNOLOGY LABORATORY-II

Objectives:

1. To learn the principles of accelerated curing of concrete cubes.
2. To learn the Non destructive test techniques.
3. To know the effective dosage of super plasticizer and to know the mix design procedures for high strength and fly ash concrete.
4. To know the procedures for permeability test, shrinkage of concrete and single, three point loading of RCC beams.

List of Experiments:

1. Accelerated curing test on Concrete cubes.

2. Non destructive test on concrete.

3. Study of effect of dosage of super plasticizer on Strength and workability of concrete.

4. Mix design of high strength concrete including casting and testing of specimens.

5. Mix design of fly ash concrete including casting and testing of specimens.

6. Determination of coefficient of permeability of concrete.

7. Determination of drying shrinkage of concrete.

8. Bending test on a RCC beam under.
    a) Single point load
    b) Three point load

Expected Outcomes:

After completion of the course the student will be able to

1. Understand the curing of concrete cubes by using accelerated tank.
2. Able to test the hardened concrete by using Non destructive test.
3. Ability to fix super plasticizer dosage and perfection on mix design procedures.
4. Able to test the concrete for durability and flexural test for RCC beams.

Text books:

1. Properties of Concrete by A.M Neville, Pearson Education

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M.Tech – II-Semester

L	T	P	C
0	0	4	2

(20BST22) ADVANCED STRUCTURAL ENGINEERING LABORATORY-II

Objectives:

1. To learn the software applications in structural engineering.
2. To learn the analysis of plane, space truss and frames subjected to different types of loadings.
3. To draw the detailing of RCC members and to learn the estimations.
4. To study the design concepts of steel members like truss, beams and columns.

List of Experiments:

Software Applications in Structural Engineering (by using STAAD, STRAP, STRUDS, etc.):

1. Analysis of reinforced concrete (RCC) and steel structures.
2. Analysis of plane and space truss and frames subjected to gravity and lateral loads.
3. Determination of natural frequency of a beam.
4. Dynamic analysis (Response spectrum) of plane frames.
5. Analysis of water tanks by using plate elements.

Design of Reinforced Concrete Members:

6. Design, detailing and estimating of beams, slabs, columns and foundations, Shear wall design.

Design of Steel Members:

7. Design of truss members.
8. Design of beams and columns.

Expected Outcomes: After completion of the course the student will be able to

1. Understand the software usages for structural members.
2. Able to analyse plane, space frames and dynamic response and natural frequency for beams and frames.
3. Able to design, detailing and estimations of RC members.
4. Able to design the steel members like truss, beams and columns.

References:

1. Zienkiewicz, *The Finite Element Method*, O.C., McGraw Hill Publications, London.
2. Cook, R.D, *Concepts and Applications of Finite Element Analysis*,
3. Reference Manual for STADD, STRAP, STRUDS,

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M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – II-Semester

L	T	P	C
2	0	0	0

(20BST23) AUDIT COURSE - II

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Course Objectives

1. To learn to achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

Syllabus

Unit	Content	Hours
1	Neetisatakam-Holistic development of personality • Verses- 19,20,21,22 (wisdom) • Verses- 29,31,32 (pride & heroism) • Verses- 26,28,63,65 (virtue) • Verses- 52,53,59 (dont‟s) • Verses- 71,73,75,78 (do‟s)	8
2	• Approach to day to day work and duties. • ShrimadBhagwadGeeta : Chapter 2-Verses 41, 47,48, • Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, • Chapter 18-Verses 45, 46, 48.	8
3	• Statements of basic knowledge. • ShrimadBhagwadGeeta: Chapter2-Verses 56, 62, 68 • Chapter 12 -Verses 13, 14, 15, 16,17, 18 • Personality of Role model. ShrimadBhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, • Chapter 4-Verses 18, 38,39 • Chapter18 – Verses 37,38,63	8

Suggested reading

1. “Srimad Bhagavad Gita” by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata
2. Bhartrihari‟s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students

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M.Tech – III-Semester

L	T	P	C
3	0	0	3

(20BST24) DESIGN OF TALL BUILDINGS (ELECTIVE – V)

Objectives:

1. To understand the Design philosophy and essential amenities.
2. To understand the Types of loads and Materials for the tall buildings.
3. To understand the load distribution in steel and concrete and different resisting systems
4. To study the concepts of analysis for displacements and member forces for load transfer systems and dynamic analysis
5. To understand the research needs in tall building materials, systems and designs.

UNIT-I

INTRODUCTION

Design Philosophy - History - advantages and disadvantages - Vertical city-concepts - essential amenities - fire safety - water supply - drainage and garbage disposal - service systems - structural and foundation systems.Factors affecting height, growth and form - Human comfort criteria.

UNIT-II

LOADS AND MATERIALS

Gravity loading - Dead and Live load - calculation - Impact and construction loads. Wind loading - static and dynamic approach - Analytical and wind tunnel experimental method. Earthquake loading - Equivalent lateral force,Modal analysis - combination of loading in various design philosophies. Materials for tall buildings - High strength concrete - Lightweight concrete - Fiber reinforced concrete Composite Materials.

UNIT-III

STRUCTURAL SYSTEMS

Behavior of High Rise structures - Different system for load distribution in steel and concrete - Vertical and horizontal load resistant systems – Rigid frames - braced frames - infilled frames - shear walls - wall frames – tubular systems - outrigger braced systems - Mega systems.

UNIT-IV

ANALYSIS AND DESIGN

Analysis and Design principles of various horizontal load transfer systems - approximate methods - Modelling for accurate analysis - 3D analysis - Member forces - displacements. Analysis for various secondary effects -Creep, shrinkage and temperature. Stability Analysis - Overall buckling analysis of frames, wall frames, approximate methods, second order effects of gravity loading, P - effect and various methods of analysis - influence of foundation instability, out of plumb effects - Elastic Deformations. Dynamic Analysis - Principles of design of tall braced frames for earthquake and blastresistant design.

UNIT-V

ADVANCED TOPICS

Structural systems for future generation buildings - Expert systems for consultations - Economics - Research needs in tall building materials, systems and designs.

Outcomes:

After completion of the course the student will be able to

1. Calculate the loads on the tall buildings like live loads, dead loads, impact loads etc.
2. Know the load distribution in different resisting systems.
3. Analysis and design of the various horizontal load transfer systems.
4. Know the structural systems for future generation buildings.

Text books:

1. Schuller.W.G., "High Rise Building Structures", John Wiley & sons, 1977
2. Lynn.S. Beedle, "Advances in Tall Buildings", CBS Publishers and Distributors, New Delhi, 1996

Reference books

1. LinT.Y. and Burry D.Stotes, " Structural Concepts and Systems for Architects and Engineers ", John Wiley, 1994.
2. Gupta.Y.P.,(Editor), “Proceedings of National Seminar on High RiseStructures - Design and Construction Practices for Middle Level Cities”, New Age International Limited, New Delhi,1995.
3. Lecture Notes on "Tall Buildings" - Short Term Course organized by Civil Engineering Department, SRM Engg college, Kattankulathur. June 2002
4. Smith .B.S. and Coull .A., "Tall Building Structure", 'Analysis and Design', John Wiley & Sons, Inc., 1991
5. Taranath .B.S., "Structural Analysis and Design of Tall Buildings", Mc Graw Hill Co. 1988

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M.Tech – III-Semester

L	T	P	C
3	0	0	3

(20BST25) DESIGN OF OFFSHORE STRUCTURES (ELECTIVE – V)

Objectives:

1 To provide an overview and basics on wave theories.

2 To introduce wind forces and wave forces on different structures.

3 To introduce the different types of offshore structures and their foundation modelling.

4 Introducing Static method of analysis and dynamic analysis of offshore structures.

UNIT 1:

WAVE THEORIES

Wave generation process, small and finite amplitude wave theories.

UNIT 2.

FORCES OF OFFSHORE STRUCTURES

Wind forces, wave forces on vertical, inclined cylinders, structures - current forces and use of Morison equation.

UNIT 3.

OFFSHORE SOIL AND STRUCTURE MODELLING

Different types of offshore structures, foundation modelingand structural modeling.

UNIT 4

ANALYSIS OF OFFSHORE STRUCTURES

Static method of analysis, foundation analysis and dynamics of offshore structures.

UNIT 5

DESIGN OF OFFSHORE STRUCTURES

Design of platforms, helipads, Jacket tower and mooring cables and pipe lines.

Outcomes:

After the completion of the course the students will be able to

1 Analyse the wind, Wave and current forces on the structures.

2 Able to analyse the different types of offshore structures.

3 Conduct the static and dynamic analysis for the structures.

4 Design the pipe lines, Helipads, Platforms.

Text books:

1. Chakrabarti, S.K. “Hydrodynamics of Offshore Structures”, Computational Mechanics Publications, 1987.
2. Brebia, C.A and Walker, S., “Dynamic Analysis of Offshore Structures”, New Butterworths, U.K. 1979.

Reference books:

1. API, Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms, American Petroleum Institute Publication, RP2A, Dalls, Tex,2000.
2. Reddy, D.V. and Arockiasamy, M., “Offshore Structures”, Vol.1 and Vol.2, Krieger Publishing Company, Florida, 1991

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M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – III-Semester

L	T	P	C
3	0	0	3

(20BST26) DISASTER RESISTANT STRUCTURES (ELECTIVE-V)

Objectives:

1 To understand the behaviour of life line structures.
2 To understand the Repairs and retrofitting techniques of community structures.
3 To understand the definitions of rehabilitation and retrofitting and different materials for strengthening.
4 To understand the materials for disaster reduction and damage assessment.

UNIT-I
BEHAVIOUR OF LIFE LINE STRUCTURES
Design philosophy to resist flood, cyclone, and earthquake and fire disasters-National and International Codes of practice - Bye-laws of urban and semi urban areas - Past history and lessons from disasters - Approach to traditional and Modern Structures - Concept of life period based Design - case studies.

UNIT-II
COMMUNITY STRUCTURES
Safety analysis and rating - Reliability assessment repairs and Retrofitting techniques of Community Structures - Protection of Nuclear Structures -Dams, bridges and buildings.

UNIT-III
REHABILITATION AND RETROFITTING OF STRUCTURES
Testing and evaluation - Classification according to safety level – methods and materials for strengthening for different disasters - qualification tests

UNIT-IV
MATERIALS, DESIGN AND DETAILING OF STRUCTURES
Modern Materials for disasters reduction - Detailing aspects of structures subject to probable disasters - Construction techniques – Analysis methodology - Techniques for optimal performance - Provisions for artificial disasters - blast and impact.

UNIT-V
TECHNIQUES OF DAMAGE ASSESSMENT
Damage surveys - Maintenance and modification to improve hazard resistance - application GIS in disaster management – foundation improvement techniques.

Outcomes:
After the completion of the course the students will be able to

1. Know about the design philosophy to resist floods and earthquakes.
2. Assess the suitable retrofitting technique for different structures in different conditions.
3. Know about the methods and materials for strengthening for different disasters.
4. Apply the GIS software in disaster management to assess the damage.

Text books:

1. Raiker, R.N. "Learning from failures, Deficiencies in Design, Construction and Service", R&D Center, Raiker Bhavan, 1987
2. Allen.R.T., and Edwards.S.C., "Repairs of Concrete Structure";ie and Sons, U.K.1987

Reference books:

1. Moskvin.V "Concrete and Reinforced Concrete" - Deterioration andprotection - MIR Publishers - Moscow 1983
2. Lecture notes on the course "Disasters Management" - conducted byAnna University, 2000

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M.Tech. (STRUCTURAL ENGINEERING)

M.Tech – III-Semester

L	T	P	C
3	0	0	3

(20BST27) PRECAST AND PREFABRICATED STRUCTURES (PROFESSIONAL ELECTIVE – VI)

Objectives:

1 To understand the prefabrication structures.
2 To understand the loading of members techniques of community structures.
3 To understand the joints of different materials for precast construction.
4 To understand the production technology .

UNIT -I

Need for prefabrication – General Principles of Prefabrication - Comparison with monolithic construction, types of prefabrication, site and plant prefabrication, economy of prefabrication, modular coordination, standardization – Materials – Modular coordination – Systems – Production – Transportation – Erection.

UNIT -II

Prefabricated Load Carrying Members-Planning for components of prefabricated structures, disuniting of structures, design of simple rectangular beams and I-beams, handling and erection stresses, elimination of erection stresses, beams, columns, symmetric frames. Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls.

UNIT -III

Joints - Joints for different structural connections, effective sealing of joints for water proofing, provisions for non-structural fastenings, expansion joints in precast construction.

UNIT -IV

Production Technology - Choice of production setup, manufacturing methods, stationary and mobile production, planning of production setup, storage of precast elements, dimensional tolerances, acceleration of concrete hardening. Hoisting Technology - Equipment for hoisting and erection, techniques for erection of different types of members like beams, slabs, wall panels and columns, vacuum lifting pads.

UNIT -V

Applications - Designing and detailing of precast UNIT for factory structures, purlins, principal rafters, roof trusses, lattice girders, gable frames, singe span single storied simple frames, single storied buildings, slabs, beams and columns. Progressive collapse – Code

provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

Course Outcomes: At the end of the course, the student will be able to:

CO1	Analyze the prefabricated load carrying members
CO2	Analyze the production technology of prefabrication
CO3	Design and detailing of precast UNIT for factories
CO4	Design single storied simple frames

TEXT BOOKS

1. Precast Concrete Structures- Kim S Elliott, CRC Press
2. CBRI, Building materials and components, India, 1990
3. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994
4. Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.

REFERENCES

1. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.
2. Mokk. L, (1964), Prefabricated Concrete for Industrial and Public Structures, Publishing House of the Hungarian Academy of Sciences, Budapest.

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M.Tech. **(STRUCTURAL ENGINEERING)**

M.Tech – III-Semester

L	T	P	C
3	0	0	3

(20BST28) STRUCTURAL HEALTH MONITORING AND RETROFITTING OF STRUCTURES (PROFESSIONAL ELECTIVE – VI)

Objectives:

1. To learn mechanism of damage and deterioration of structures.
2. To learn about phenomena of desiccation.
3. To learn about NDT testing.
4. To learn about types of repairs and instrumentation of building.

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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.

Outcomes: After completion of the course the Students will be able to

1. Assess strength and materials deficiency in concrete structure.
2. Suggest methods and techniques used in repairing / strengthening existing concrete structures.
3. Apply non-destructive testing techniques to field problems.
4. Apply cost effective retrofitting strategies for repairs in buildings.
5. Assess the health condition of structures.

Text Books:

1. Diagnosis and treatment of Structures in Distress – R N Raikar,1994
2. A.R. Santakumar. Concrete Technology, Oxford University press,2006

Reference Books:

1. Bungey. Non-Destructive Evaluation of Concrete Structures– Surrey University Press, Hyderbad,1982

2. EF & N Spon. Building Failures: Diagnosis and Avoidance, London, B.A.Richardson (1991), London
3. Dr. B. Vidivelli. Rehabilitation of Concrete Structures, Standard Publications**,2007**
4. Handbook on repair and rehabilitation of rcc buildings - CPWD

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M.Tech – III-Semester

L	T	P	C
3	0	0	3

(20BST29) INDUSTRIAL STRUCTURES (PROFESSIONAL ELECTIVE – VI)

Objectives:

1. To learn the planning and functional requirements.
2. To learn about inustiral buildings
3. To learn about pre engineered buildings.
4. To learn about power plant structures and power transmission structures.

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UNIT: I

Planning and functional requirements-classification of industries and industrial structures-planning for layout-requirements regarding lighting ventilation and fire safety-protection against noise and vibrations

UNIT: II

Industrial buildings- roofs for industrial buildings (Steel) - design of gantry girder- design of corbels and nibs- machine foundations

UNIT: III

Design of Pre Engineered Buildings

UNIT: IV

Power plant structures- Bunkers and silos- chimney and cooling towers- Nuclear containment structures

UNIT: V

Power transmission structures- transmission line towers- tower foundations- testing towers

Course Outcomes: At the end of the course, the student will be able to

1. Plan the functional requirements of structural systems for various industries.
2. Get an idea about the materials used and design of industrial structural elements.
3. Realize the basic concepts and design of power plant structures.
4. Design power transmission structures.
5. Possess the ability to understand the design concepts of Chimneys, bunkers and silos

TEXT BOOKS

1. Handbook on Machine Foundations by P. Srinivasulu and C. V. Vaidyanathan, Structural Engineering Research Center
2. Tall Chimneys- Design and Construction by S. N. Manohar Tata Mc Grawhill Publishing Company

REFERENCES:

1. Transmission Line Structures by S. S. Murthy and A. R. Santakumar McGraw Hill
2. SP 32: 1986, Handbook on functional requirements of Industrial buildings
3. Design of steel structures by N. Subramanian

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M.Tech.	**(STRUCTURAL ENGINEERING)**	**L**	**T**	**P**	**C**
		0	**0**	**20**	**10**

M.Tech – III-Semester

20BST30 **DISSERTATION PHASE-I**

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M.Tech.	**(STRUCTURAL ENGINEERING)**	**L**	**T**	**P**	**C**
		0	**0**	**32**	**16**

M.Tech – IV-Semester

20BST31 **DISSERTATION PHASE-II**