VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Affiliated to JNTUH, Approved by AICTE, Accredited by NAAC and ISO 9001:2015 Certified

Shamshabad - 501 218, Hyderabad, Telangana State, India.

www.vardhaman.org

MASTER OF TECHNOLOGY
STRUCTURAL ENGINEERING
(CIVIL ENGINEERING)

ACADEMIC REGULATIONS (VCE-R18)
COURSE STRUCTURE AND SYLLABUS
(Accredited by NBA)

CHOICE BASED CREDIT SYSTEM

M. Tech. - Regular Two Year Degree Program
(For batches admitted from the Academic Year 2018 - 2019)

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PRELIMINARY DEFINITIONS AND NOMENCLATURES

❖ "Autonomous Institution / College" means an institution / college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.

❖ "Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.

❖ "Commission" means University Grants Commission.

❖ "AICTE" means All India Council for Technical Education.

❖ "University" means Jawaharlal Nehru Technological University Hyderabad.

❖ "College" means Vardhaman College of Engineering, Hyderabad unless indicated otherwise by the context.

❖ "Program" means:

- Master of Technology (M. Tech.) Degree program

- PG Degree Program: M. Tech

❖ "Branch" means specialization in a program like M. Tech. program in Structural Engineering, M. Tech. program in Computer Science and Engineering etc.

❖ "Course" or "Subject"means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester. For example, B4911 English for Research Papers Writing, means a theory or practical subject, identified by its course-number and course-title, which is normally studied in a semester. The description of allocation of course code is mentioned in the table 1.

Table 1: Course Code Description

First Digit	Second Digit	Third Digit	Fourth and Fifth Digit
Indicates Program	**Indicates Regulation**	**Indicates Department**	**Indicates Course Number**
A : B. Tech. **B** : M. Tech. **C** : MBA	**1** : R11 **2** : R14 **3** : R15 **4** : R18	**1** : WMC **2** : CSE **3** : PEED **4** : DECS **5**: SE **6** : ES **7** : ED **8** : Structural Engg. **9** : Other	**01** **02** .. ..

❖ T – Tutorial, P – Practical, D – Drawing, L - Theory, C - Credits

FOREWORD

The autonomy conferred on Vardhaman College of Engineering by UGC 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 norms set by the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC 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.

Vardhaman College of Engineering is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon 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 Board of Studies are constituted under the guidance of the Governing Body of the College and recommendations of the JNTUH to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after a prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college in order to produce quality engineering graduates for the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought, at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation 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
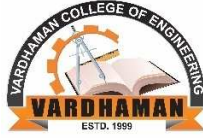
Institute Vision:

❖ To be a pioneer institute and leader in engineering education to address societal needs through education and practice.

Institute Mission:

❖ To adopt innovative student centric learning methods.

❖ To enhance professional and entrepreneurial skills through industry institute interaction.

❖ To train the students to meet dynamic needs of the society.

❖ To promote research and continuing education.

Quality Policy:

❖ We at Vardhaman College of Engineering, endeavour to uphold excellence in all spheres by adopting best practices in effort and effect.

Department Vision:

To be a center of excellence in civil engineering education, research and consultancy to support the community at large.

Department Mission:

❖ Providing knowledge based resources in civil engineering and aligned fields.

❖ Tandem with industry to facilitate advancement of technology.

❖ Promoting consultancy for industrial and societal needs.

❖ Inspiring to become an ethical entrepreneur.
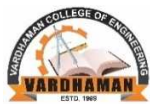
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ACADEMIC REGULATIONS

M.Tech. Regular Two Year Post-Graduate Programme
(For the batches admitted from the Academic Year 2018–2019)

For pursuing two year PG program of study in Master of Technology (M.Tech.) offered by Vardhaman College of Engineering and herein after Vardhaman College of Engineering is referred to as VCE.

1. APPLICABILITY

All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2018-2019 onwards. Any reference to "College" in these rules and regulations stands for Vardhaman College of Engineering.

2. EXTENT

All the rules and regulations, specified herein after shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies Principal, Vardhaman College of Engineering shall be the Chairman, Academic Council.

3. PROGRAMS OFFERED

Vardhaman College of Engineering, an autonomous college affiliated to JNTUH, offers the following M. Tech. programmes of study leading to the award of M. Tech. degree under the autonomous scheme.

S. No	M.Tech Courses	Offering Department	Intake
1	Computer Science and Engineering	CSE	18
2	Digital Electronics and Communication Systems	ECE	18
3	Embedded Systems	ECE	18
4	Power Electronics and Electrical Drives	EEE	18
5	Engineering Design	ME	18
6	Structural Engineering	CE	18

4. ADMISSION

Admission into first year of two Year M.Tech degree program of study:

4.1. Eligibility

Admission to the M.Tech degree program shall be made subject to the eligibility, qualifications and specialization prescribed by Telangana State Council of Higher Education TSCHE, Government of Telangana.

Admissions shall be made based on the rank secured in PGECET examination conducted by Telangana State Council for Higher Education (or) GATE examination for allotment of a seat by the Convener, PGECET subject to reservations prescribed by the University or policies formed by the Government of Telangana from time to time.

4.2. Admission Procedure:

Admissions are made into the first year of two year M.Tech program as per the stipulations of

Telangana State Council of Higher Education (TSCHE), Government of Telangana.

(a) Category - A seats are filled by the Convener, PGECET.

(b) Category - B seats are filled by the Management.

5. MEDIUM OF INSTRUCTION

The medium of instruction and examination is English for all the courses.

6. DURATION OF THE PROGRAMS

6.1 Normal Duration

M. Tech degree program extends over a period of two academic years leading to the Degree of Master of Technology (M.Tech) of the Jawaharlal Nehru Technology University Hyderabad.

6.2 Maximum Duration

6.2.1 The maximum period within which a student must complete a full-time academic program (Course Work i.e clearing all theory subjects) is 4 years for M.Tech. If a student fails to complete the academic program within the maximum duration as specified above, he / she will be required to withdraw from the program.

6.2.2 The period is reckoned from the academic year in which the student is admitted first time into the degree programme.

7. SEMESTER STRUCTURE

The College shall follow semester pattern. An academic year shall consist of a first semester and a second semester and the summer term. Each semester shall be of 21 weeks duration and this period includes time for course work, examination preparation, and conduct of examinations. Each semester shall have a minimum of 90 working days including Examinations. The academic calendar is shown in Table 2 is declared at the start of the semester. The duration for each semester shall be a minimum of 16 weeks of instruction.

Table 2: Academic Calendar

I Year I Semester (21 weeks)	Instruction Period :16 weeks	18 weeks
	Mid Semester Tests :2 weeks	
	Preparation & Practical Examinations	1 week
	External Examinations	2 weeks
Semester Break		2 weeks
I Year II Semester (21 weeks)	Instruction Period :16 weeks	18 weeks
	Mid Semester Tests :2 weeks	
	Preparation & Practical Examinations	1 week
	External Examinations	2 weeks
Summer Vacation		4 weeks
II Year I Semester (20 Weeks)	Instruction Period and Project Phase- I	18 weeks
	Mid semester tests	
	Preparation and External Examinations	2 weeks
	Semester Break	2 weeks
II Year II Semester (18 weeks)	Project Work Phase – II	18 weeks

8. CHOICE BASED CREDIT SYSTEM

All the academic programs under autonomy are based on credit system. Credits are assigned based on the following norms:

8.1 The duration of each semester will normally be 21 weeks with 6 days a week. A working day shall have 6 periods each of 60 minutes duration.

- 1 credit per lecture period per week
- 2 credits for four period hours of practical
- 2 credits for mini project with seminar
- 10 credits for project work phase – I
- 16 credits for project work phase – II

8.2 The two year curriculum of any M.Tech Specialization of study shall have total of 68 credits. The exact requirements of credits for each course will be as recommended by the Board of Studies concerned and approved by the Academic Council.

9. COURSE REGISTRATION

9.1. A 'faculty advisor or counsellor' shall be assigned to a group of 5 students, who will advise student about the Post graduate program, its course structure and curriculum, choice/option for subjects/courses, based on their competence, progress, pre-requisites and interest.

9.2. The college Exam cell invites 'registration forms' from students before the beginning of the semester through 'on-line registration', ensuring 'date and time stamping'. The on-line registration requests for any 'current semester' shall be completed before the commencement of SEEs (Semester End Examinations) of the 'preceding semester'.

9.3. A student can apply for on-line registration, only after obtaining the 'written approval' from faculty advisor/counsellor, which should be submitted to the Examination section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor/counsellor and the student.

9.4. If the student submits ambiguous choices or multiple options or erroneous entries during on-line registration for the subject(s)/course(s) under a given/specified course group/category as listed in the course structure, only the first mentioned subject/ course in that category will be taken into consideration.

9.5. Subject/course options exercised through on-line registration are final and cannot be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the head of the department, with due notification and time-framed schedule, within the first week after the commencement of class-work for that semester.

9.6. Open electives: The students have to choose one open elective (OEC) during II year I semester from the list of open electives given. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

9.7. Program Electives: The students have to choose Program elective I & II (PEC) in I year I semester, Program electives III, IV in I year II semester and Program elective V in II year I from the list of program electives given.

10. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in each semester shall be evaluated subject- wise (irrespective of credits assigned) for a maximum of 100 marks. The M.Tech. project work (major project) will be evaluated for 200 marks. (100 marks for Phase – I and 100 marks for Phase – II)

10.1. For the theory subjects 70 marks shall be awarded for the performance in the Semester End Examination (SEE) and 30 marks shall be awarded for Continuous Internal Evaluation (CIE). The Final marks of Continuous Internal Evaluation is calculated based on 75% of best Marks and 25% of least marks secured in the two Mid-Term Examinations conducted. First Mid-Term examinations will be conducted in the middle of the Semester and second Mid-Term examinations during the last week of instruction. Each Mid-Term Examination shall be conducted for a total duration of 90 minutes. The question paper consist of 5 questions out of which 3 questions are to be answered, each question carrying 10 marks for a total of 30 marks. The details of the Question Paper pattern for Semester End Examination (Theory) are given below:

The Semester End Examination will be conducted for 70 marks. It consists of two parts.

i. Part A for 20 marks,

ii. Part B for 50 marks.

Part A is compulsory and consists of 5 questions, one from each unit and carrying 4 marks each. Part B consists of 5 questions carrying 10 marks each. There will be two questions from each unit and only one should be answered.

The question paper shall be set externally and valuated both internally and externally. If the difference between both the valuations is less than 15 marks, the average marks of the two valuations shall be awarded as final marks, otherwise third valuation will be conducted and the average marks of the best two valuations shall be awarded as final marks.

10.2. For practical subjects, 70 marks shall be awarded for performance in the Semester End Examinations and 30 marks shall be awarded for day-to-day performance as Internal Marks.

10.3. For conducting laboratory end examinations of all PG Programs, one internal examiner and one external examiner are to be appointed by the Principal of the College and this is to be informed to the Controller of Examinations within two weeks, before commencement of the lab end examinations. The external examiner should be selected from outside the College.

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

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

10.6. A candidate has to present in Project Work Review I, in consultation with his Project Supervisor, the title, objective and plan of action of his project work to the Project Work Review Committee (PRC) for approval within four weeks from the commencement of Second year First Semester. Only after obtaining the approval of the PRC the student can initiate the Project work.

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

10.8. A candidate shall submit his project progress report in two stages one in II year I semester and final one at the end of II year II Semester.

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

10.10. The Project Work Review II in II Year I Sem. carries internal marks of 100. Evaluation should be done by the PRC for 50 marks and the Supervisor will evaluate the work for the other 50 marks. The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey in the same domain and progress of the Project Work. A candidate has to secure a minimum of 50% of marks to be declared successful in Project Work Review II (Phase –I) . If he fails to obtain the minimum required marks, he has to reappear for Project Work Review-II as and when conducted.

10.11. The Project Work Review III in II Year II Sem.(Phase –II) carries 100 internal marks. Evaluation should be done by the PRC for 50 marks and the Supervisor will evaluate it for the other 50 marks. The PRC will examine the overall progress of the Project Work and decide whether or not the Project is eligible for final submission. A candidate has to secure a minimum of 50% of marks to be declared successful in Project Work Review III. If he fails to obtain the required minimum marks, he has to reappear for Project Work Review III as and when conducted. For Project Evaluation (Viva Voce) in II Year II Sem. there are external marks of 100 and it is evaluated by the external examiner. The candidate has to secure a minimum of 50% marks in Project Evaluation (Viva-Voce) examination.

10.12. After approval from the PRC, a soft copy of the thesis should be submitted for ANTIPLAGIARISM check and the plagiarism report should be submitted to the COE and to be included in the final thesis. The Thesis will be accepted for submission, if the similarity index is less than 30%. If the similarity index has more than the required percentage, the student is advised to modify accordingly and re-submit the soft copy of the thesis after one month. The maximum number of re-submissions of thesis after plagiarism check is limited to THREE. After three attempts, the admission is liable to be cancelled. The departments HODs are advised to make plagiarism check of every soft copy of theses before submissions.

10.13. Three copies of the Project Thesis certified by the supervisor shall be submitted to the department, after submission of a research paper related to the project work in any peer reviewed Journal or Scopus Indexed Conference. A copy of the submitted research paper shall be attached to thesis.

10.14. The thesis shall be adjudicated by an external examiner selected by the Principal. For this, the department HOD shall submit a panel of three examiners from among the list of experts in the relevant specialization as submitted by the supervisor concerned.

10.15. If the report of the external examiner is unsatisfactory, the candidate shall revise and resubmit the Thesis. If the report of the examiner is unsatisfactory again, the thesis shall be summarily rejected. Subsequent actions for such dissertations may be considered, only on the specific recommendations of the external examiner and /or Project work Review Committee. No further correspondence in this matter will be entertained, if there is no specific recommendation for resubmission.

10.16. If the report of the examiner is satisfactory, the Head of the Department shall coordinate and make arrangements for the conduct of Project Viva- Voce examination. The Project Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the Thesis. The candidate has to secure a minimum of 50% of marks in Project Evaluation (Viva-Voce) examination.

10.17. If he fails to fulfill the requirements as specified above, he will reappear for the Viva-Voce examination only after three months. In the reappeared examination also, if he fails to fulfill the requirements, he will not be eligible for the award of the degree, unless he is asked to revise and resubmit his project work by the board within a specified time period . The Project Viva-Voce External examination marks must be submitted to the Exam cell on the day of the examination.

10.18. A candidate shall be given one chance for a maximum of Three Theory subjects for Improvement of Internal evaluation marks for which the candidate has to re-register for the chosen subjects and fulfill the academic requirements.

10.19. For each subject, 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. in favour of the Principal, Vardhaman College of Engineering payable at Hyderabad along with the requisition through the concerned Head of the Department.

10.20. Audit course examination will be conducted at the end of the semester through open book system and evaluated internally.

11. ATTENDANCE REQUIREMENTS TO APPEAR FOR THE SEMESTER-END EXAMINATION

11.1. 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 subjects in a semester.

11.2. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Council.

11.3. Shortage of attendance below 65% in aggregate shall in no case be condoned.

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

11.5. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester. The student may seek readmission for the semester when offered next. He will not be allowed to register for the subjects 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.

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

11.7. Attendance may also be condoned as per the recommendations of academic council for those who participate in prestigious sports, co-curricular and extra-curricular activities provided as per the Govt. of Telangana norms in vogue.

12. ACADEMIC REQUIREMENTS FOR PROMOTION / COMPLETION OF REGULAR M.TECH PROGRAMME OF STUDY

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion / completion of regular M.Tech programme of study.

i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, and practical, if he secures not less than **40%** of marks in the semester-end examination and a minimum of **50%** of marks in the sum of the internal evaluation and semester - end examination taken together.

ii. In case of Mini Project with seminar, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them if he secures not less than **50%** of marks.

iii. In case of project work, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted if he secures not less than **50%** of marks on the aggregate in the internal evaluation and external end-evaluation taken together.

iv. A student shall register for all the **68** credits and earn all the 6**8** credits. Grades obtained in all the 68 credits shall be considered for the award of the class based on aggregate of grades (CGPA).

v. Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. However, all such readmitted students shall earn all the credits of subjects they have pursued for completion of the course.

13. SUPPLEMENTARY EXAMINATION

Supplementary examinations for the odd semester shall be conducted with the regular examinations of even semester and vice versa, for those who appeared and failed in regular examinations. Such of the candidates writing supplementary examinations may have to write more than one examination per day, if it is scheduled.

14. REVALUATION

Students shall be permitted to apply for revaluation(Only for theory courses) after the declaration of semester end examination results within due dates by paying prescribed fee. After revaluation if there is any betterment in the grade then improved grade will be considered. Otherwise old grade shall be retained.

15. TRANSITORY REGULATIONS

Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of four years for the award of M. Tech. Degree.

16. TRANSCRIPTS

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. Transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request, after payment of requisite fee.

17. AWARD OF DEGREE

The degree will be conferred and awarded by Jawaharlal Nehru Technological University Hyderabad on the recommendations of the Chairman, Academic Council.

17.1. Eligibility

A student shall be eligible for the award of M. Tech. Degree, if he fulfils all the following conditions:

i. Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.

ii. Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.

iii. Obtained not less than 50% of marks (minimum requirement for declaring as passed).

iv. Has no dues to the college, hostel, and library etc. and to any other amenities provided by the College.

v. No disciplinary action is pending against him.

17.2. Award of Class

After a student has satisfied the requirement prescribed for the completion of the Program and is eligible for the award of M. Tech. Degree, he shall be placed in one of the following four classes shown in Table 3:

Table 3: Declaration of Class based on CGPA (Cumulative Grade Point Average)

Class Awarded	Grades to be Secured	
First Class with Distinction	≥ 7.75 CGPA	From the aggregate marks secured from 68 Credits
First Class	=6.75 to <7.75 CGPA	
Pass Class	=6.0 to <6.75 CGPA	
Fail	Below 6.0 CGPA	

17.3. Letter Grade and Grade Point

It is necessary to provide equivalence of percentages and/or Class awarded with Grade Point Average (GPA). This shall be done by prescribing certain specific thresholds in averages for Distinction, First Class and Pass Class, as mentioned in Table 4.

Table 4: Percentage Equivalence of *Grade Points* (For a 10-Point Scale)

Grade	Grade Points (GP)	Percentage of Marks
O	10	≥ 90
A+	9	≥ 80 and <90
A	8	≥70 and < 80
B+	7	≥ 60 and <70
B	6	≥ 50 and <60
F	0	Below 50
AB	0	ABSENT

To calculate the final percentage of marks equivalent to the computed CGPA, the following formula may be used.

Percentage of marks = (CGPA-0.5) X 10

Semester Grade Point Average (SGPA)

The 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.

SGPA (S_i) = ∑ (C_i x G_i) / ∑C_i

Where C_i is the number of credits of the ith course and G_i is the grade point scored by student in the ith course.

Cumulative Grade Point Average (CGPA)

The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

CGPA = ∑ (C_i x S_i)/ ∑ C_j

Where S_i is the SGPA of the ith semester and C_i is the total number of credits in that semester.
C_j is the total number of credits of entire program.

18. REGISTRATION

Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely compulsory for the student to register for courses in time.

19. TERMINATION FROM THE PROGRAM

The admission of a student to the program may be terminated and the student is asked to leave the college in the following circumstances:

i. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

ii. The student fails to satisfy the norms of discipline specified by the institute from time to time.

20. CURRICULUM

21.1. For each program being offered by the Institute, a Board of Studies (BOS) is constituted in accordance with AICTE / UGC / JNTUH statutes.

21.2. The BOS for a program is completely responsible for designing the curriculum once in three years for that program.

21. WITH-HOLDING OF RESULTS

If the candidate has not paid any dues to the college / if any case of indiscipline / malpractice is pending against him, the results of the candidate will be withheld. The issue of the degree is liable to be withheld in such cases.

22. GRIEVANCES REDRESSAL COMMITTEE

"Grievance and Redressal Committee" (General) constituted by the principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. The composition of the complaints cum redressal committee shall be:

Headed by Senior Faculty member

Heads of all departments

A senior lady staff member from each department (if available)

The committee constituted shall submit a report to the principal of the college, the penalty to be imposed. The Principal upon receipt of the report from the committee shall, after giving an opportunity of being heard to the person complained against, submit the case with the committee's recommendation to the Governing Body of the college. The Governing Body shall confirm with or without modification the penalty recommended after duly following the prescribed procedure.

23. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the students who does malpractice / behaves indiscipline in examinations. The committee shall consist of:

Principal

Subject expert of which the subject belongs to

Head of the department of which the student belongs to

The invigilator concerned

In-charge Examination branch of the college

The committee constituted shall conduct the meeting on the same day of examination or latest by next working day to the incidence and punish the student as per the guidelines prescribed by the JNTUH from time to time.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff, who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

24. AMENDMENTS TO REGULATIONS

The Academic Council of Vardhaman College of Engineering reserves the right to revise, amend, or change the regulations, scheme of examinations, and / or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

25. STUDENTS' FEEDBACK

It is necessary for the Colleges to obtain feedback from students on their course work and various academic activities conducted. For this purpose, suitable feedback forms shall be devised by the College and the feedback obtained from the students regularly in confidence, by administering the feedback form in print or on-line in electronic form.

The feedback received from the students shall be discussed at various levels of decision making at the College and the changes/ improvements, if any, suggested shall be given due consideration for implementation.

26. GRADUATION DAY

The College shall have its own annual *Graduation Day* for the award of Degrees 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 Awards to meritorious students, for being given away annually at the *Graduation Day.* This will greatly encourage the students to strive for excellence in their academic work.

27. AWARD OF A RANK UNDER AUTONOMOUS SCHEME

27.1. One (1) Merit Rank will be declared only for those students who have been directly admitted in VCE under Autonomous Regulations and complete the entire course in VCE only within the minimum possible prescribed time limit, i.e., 2 years for M. Tech.

27.2. A student shall be eligible for a merit rank at the time of award of degree in each branch of Master of Technology, provided the student has passed all subjects prescribed for the particular degree program in first attempt only.

27.3. Award of prizes, scholarships, or any other Honours shall be based on the rank secured by a candidate, consistent with the guidelines of the Donor, wherever applicable.

28. CONDUCT AND DISCIPLINE

28.1. Each student shall conduct himself / herself in a manner befitting his / her association with VCE.

28.2. He / she is expected not to indulge in any activity, which is likely to bring disrepute to the college.

28.3. He / she should show due respect and courtesy to the teachers, administrators, officers and employees of the college and maintain cordial relationships with fellow students.

28.4. Lack of courtesy and decorum unbecoming of a student (both inside and outside the college), wilful damage or removal of Institute's property or belongings of fellow students, disturbing others in their studies, adoption of unfair means during examinations, breach of rules and regulations of the Institute, noisy and unruly behaviour and similar other undesirable activities shall constitute violation of code of conduct for the student.

28.5. **Ragging in any form is strictly prohibited and is considered a serious offence. It will lead to the expulsion of the offender from the college.**

28.6. Violation of code of conduct shall invite disciplinary action which may include punishment such as reprimand, disciplinary probation, debarring from the examination, withdrawal of placement services, withholding of grades / degrees, cancellation of registration, etc., and even expulsion from the college.

28.7. Principal, based on the reports of the warden of Institute hostel, can reprimand, impose fine or take any other suitable measures against an inmate who violates either the code of conduct or rules and regulations pertaining to college hostel.

28.8. A student may be denied the award of degree / certificate even though he / she have satisfactorily completed all the academic requirements if the student is found guilty of offences warranting such an action.

28.9. Attendance is not given to the student during the suspension period.

29. OTHER ISSUES

The quality and standard of engineering professionals are closely linked with the level of the technical education system. As it is now recognized that these features are essential to develop the intellectual skills and knowledge of these professionals for being able to contribute to the society through productive and satisfying careers as *innovators, decision makers and/or leaders* in the global economy of the 21st century, it becomes necessary that certain improvements are introduced at different stages of their education system. These include:

i. Selective admission of students to a programme, so that merit and aptitude for the chosen technical branch or specialization are given due consideration.

ii. Faculty recruitment and orientation, so that qualified teachers trained in good teaching methods, technical leadership and students' motivation are available.

iii. Instructional/Laboratory facilities and related physical infrastructure, so that they are adequate and are at the contemporary level.

iv. Access to good library resources and Information & Communication Technology **(ICT)** facilities, to develop the student's *mind* effectively.

These requirements make it necessary for the College to introduce improvements like:

i. Teaching-learning process on modern lines, to provide *Add-On* Courses for *audit*/credit in a number of peripheral areas useful for students' self-development.

ii. Life-long learning opportunities for faculty, students and alumni, to facilitate their dynamic interaction with the society, industries and the world of work.

iii. Generous use of ICT and other modern technologies in everyday activities.

30. GENERAL
Where the words "he", "him", "his", "himself" occur in the regulations, they include "she", "her", "herself".

Note: Failure to read and understand the regulations is not an excuse.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

		Nature of Malpractices/Improper conduct	Punishment
		If the student:	
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 student 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 student orally or by any other body language methods or communicates through cell phones with any student 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 students 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 student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student 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 student is to be cancelled and sent to the University.
3.		Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, 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 student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.		Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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 student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5.		Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.		Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any	In case of students of the college, they shall be expelled from examination halls and cancellation of

	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 of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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 student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	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 student 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 student is also debarred and forfeits the seat.
9.	If student of the college, who is not a student 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 student 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 student 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.	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 student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student 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 University for further action to award suitable punishment.	

COURSE STRUCTURE

M. TECH – STRUCTURAL ENGINEERING

I YEAR I SEMESTER

Code	Course	Periods per Week			Scheme of Examination Maximum Marks		
		L	P	Credits	Internal	External	Total
B4801	Advanced Structural Analysis	3	0	3	30	70	100
B4802	Theory of Elasticity	3	0	3	30	70	100
	PROGRAM ELECTIVE - I	3	0	3	30	70	100
	PROGRAM ELECTIVE - II	3	0	3	30	70	100
B4803	Structural Design Laboratory	0	4	2	30	70	100
B4804	Advanced Concrete Laboratory	0	4	2	30	70	100
B4905	Research Methodology and IPR	2	0	2	30	70	100
	Audit Course - I	2	0	0	100*	0	100*
	TOTAL	16	8	18	210	490	700

I YEAR II SEMESTER

Code	Course	Periods per Week			Credits	Scheme of Examination Maximum Marks	
		L	P	Credits	Internal	External	Total
B4805	Finite Element Method in Structural Engineering	3	0	3	30	70	100
B4806	Structural Dynamics	3	0	3	30	70	100
	PROGRAM ELECTIVE - III	3	0	3	30	70	100
	PROGRAM ELECTIVE – IV	3	0	3	30	70	100
B4807	Finite Element Lab	0	4	2	30	70	100
B4808	Numerical Analysis Laboratory	0	4	2	30	70	100
B4809	Mini Project with Seminar	0	4	2	100	0	100
	Audit Course – II	2	0	0	100*	0	100*
	TOTAL	14	12	18	280	420	700

II YEAR I SEMESTER

Code	Course	Periods per Week			Scheme of Examination Maximum Marks		
		L	P	Credits	Internal	External	Total
	PROGRAM ELECTIVE - V	3	0	3	30	70	100
	OPEN ELECTIVE	3	0	3	30	70	100
B4810	**Major Project Phase – I**	0	20	10	100	0	100
	TOTAL	6	20	16	160	140	300

II YEAR II SEMESTER

Code	Course	Periods per Week			Scheme of Examination Maximum Marks		
		L	P	Credits	Internal	External	Total
B4811	**Major Project Phase – II**	0	32	16	30	70	100
	Total	0	32	16	30	70	100

PROGRAM ELECTIVES			
PROGRAM ELECTIVE - I		**PROGRAM ELECTIVE – II**	
Code	**Course**	**Code**	**Course**
B4851	Advanced Design of Reinforced Concrete Structures	B4854	Design of Pre-stressed Concrete Structures
B4852	Design of Tall Structures	B4855	Structural Health Monitoring
B4853	Composite Materials	B4856	Optimization Techniques in Structural Engineering
PROGRAM ELECTIVE – III		**PROGRAM ELECTIVE – IV**	
Code	**Course**	**Code**	**Course**
B4857	Bridge Engineering	B4860	Advanced Design of Steel Structures
B4858	Advanced Concrete Technology	B4861	Theory of Plates
B4859	Experimental Stress Analysis	B4862	Advanced Foundation Engineering
PROGRAM ELECTIVE - V			
B4863	Repair and Rehabilitation of Structures		
B4864	Fracture Mechanics		
B4865	Earthquake Resistant Design of Structures		
OPEN ELECTIVES		**AUDIT COURSE-I & II**	
B4901	Business Analytics	B4911	English for Research Papers Writing
B4902	Industrial safety	B4912	Disaster Management
B4903	Operations Research	B4913	Sanskrit for Technical Knowledge
B4904	Waste to Energy	B4914	Value Education
		B4915	Constitution of India
		B4916	Pedagogy Studies
		B4917	Stress Management by Yoga
		B4918	Personality Development through Life Enlightenment skills.

SYLLABUS FOR I YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. STE I YEAR I SEM.   **VCE-R18**

ADVANCED STRUCTURAL ANALYSIS

COURSE CODE: B4801   **L   P   C**

                                                                           3   0   3

UNIT - I

Introduction to matrix methods of analysis - static indeterminacy and kinematic indeterminacy -degree of freedom - coordinate system - structure idealization stiffness and flexibility matrices – suitability element stiffness equations - elements flexibility equations - mixed force – displacement equations - for truss element, beam element and tensional element. Transformation of coordinates - element stiffness matrix - and load vector - local and global coordinates.

UNIT - II

Assembly of stiffness matrix from element stiffness matrix - direct stiffness method – general procedure - band matrix - semi bandwidth - computer algorithm for assembly by direct stiffness matrix method.

UNIT - III

Analysis of plane truss - continuous beam - plane frame and grids by flexibility methods.

UNIT - IV

Analysis of plane truss - continuous beam - plane frame and grids by stiffness methods.

UNIT - V

Equation solution techniques: Solution of system of linear algebraic equations, direct inversion method, Gauss elimination method, Cholesky method, Banded equation solvers, Frontal solution technique.

TEXT BOOKS:

1. Matrix Analysis of Frames structures by William Weaver J.R and James M.Gere, CBSpublications.
2. Advanced Structural Analysis by Ashok.K.Jain, New Channel Brothers.

REFERENCE BOOKS:

1. Basic Structural Analysis by C.S.Reddy.
2. Matrix Structural Analysis by Madhu B. Kanchi.
3. Indeterminate Structural Analysis by K.U.Muthu et al.,I.K.InternationalPublishing House Pvt. Ltd.
4. Matrix Methods of Structural Analysis by J.Meek.
5. Structural Analysis by Ghali and Neyveli.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. STE I YEAR I SEM

THEORY OF ELASTICITY

Course Code: B4802

LPC
303

UNIT - I

Introduction: Elasticity - notation for forces and stresses - components of stresses - components of strain - Hooks law. Plane stress and plane strain analysis - plane stress - plane strain – differential equations of equilibrium - boundary conditions - Strain Displacement Relations - compatibility equations - stress function.

UNIT - II

Two dimensional problems in rectangular coordinates - solution by polynomials - Saint- Venant's principle - determination of displacements - bending of simple beams - Simple Supported and Cantilever Beam.

UNIT - III

Two dimensional problems in polar coordinates – 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 general solution in polar coordinates.

UNIT -IV

Analysis of stress and strain in three dimensions - principal stress - stress ellipsoid - director surface - determination of principal stresses Stress Invariants - max shear stresses Stress Tensor – Strain Tensor- Homogeneous deformation - principal axes of strain rotation. General Theorems: Differential equations of equilibrium - conditions of compatibility - determination of displacement - equations of equilibrium in terms of displacements - principle of super position - uniqueness of solution - the reciprocal theorem Strain Energy.

UNIT - V

Torsion of Circular Shafts - Torsion of Straight Prismatic Bars– Saint Venant's Method - torsion of prismatic bars - bars with elliptical cross sections - membrane analogy - torsion of a bar of narrow rectangular bars - solution of torsional problems by energy method - torsion of shafts, tubes , bars etc. - Torsion of Rolled Profile Sections. Bending of Prismatic Bars: Stress function - bending of cantilever - circular cross section - elliptical cross section - rectangular cross section.

TEXT BOOKS:

1. Theory of Elasticity by Timeshanko, McGrawhill Publications.
2. Theory of Plasticity by J.Chakarbarthy, McGrawhill Publications.

REFERENCE BOOKS:

1. Theory of Elasticity by Y.C.Fung.
2. Theory of Elasticity by Gurucharan Singh.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR I SEM
ADVANCED DESIGN OF REINFORCED CONCRETE STRUCTURES
(Program Elective - I)

Course Code: B4851

LPC
303

UNIT - I

YIELD LINE ANALYSIS FOR SLABS: Upper bound and lower bound theorems, Yield line criterion, Virtual work and equilibrium methods of analysis for square and rectangular slabs with simple and continuous end conditions.

UNIT - II

DESIGN OF RIBBED SLABS: Analysis of the Slabs for moment and shears, Ultimate moment of Resistance, Design for shear, deflection, Arrangement of Reinforcements.
Flat slabs: Direct design method, Distribution of moments in column strip and middle strip, moment and shear transfer from slabs to columns, shear in Flat slabs, Check for one way and two way shears.

UNIT - III

Design of continuous beams with redistribution of moments

UNIT- IV

DESIGN OF REINFORCED CONCRETE DEEP BEAMS: Design of deep Beams, Design by IS 456, Checking for Local failures. Detailing of Deep Beams,
Design and analysis of corbels: Analysis of Forces in Corbels, Design of procedure of Corbels. Design ofNibs.

UNIT - V

Design of silos and bunkers.

TEXT BOOKS:
1. S. UnnikrishnaPillai&Menon, (2004), Reinforced Concrete Design, 2nd Edition Tata McGraw Hill, New Delhi, India.
2. P. C. Varghese (2008), Advanced Reinforced Concrete Design, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS

1. B. C. Punmia. Ashok kumar Jain and Arun Kumar Jain (2004), Reinforced Concrete Structures Vol.1, Laxmi Publications, India.
2. P. Purusthotham (1994), Reinforced Concrete Structural Elements - Behavior, Analysis and Designs, Tata McGraw Hill, India.
3. KennathLeet (1991), Reinforced Concrete Design, 2nd Edition, Tata McGraw Hill, India.
4. Dr. S. R. Karve and Dr. V. L. Shah (1994), Limit State Theory and Design of Reinforced Concrete, 3rd Edition, Standard publishers, Pune, India.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR I SEM

DESIGN OF TALL STRUCTURES
(Program Elective - I)

Course Code: B4852

LPC
303

UNIT - I

INTRODUCTION : Classification of Buildings – Low-rise, medium-rise, high-rise – Evolution of tall buildings – Ordinary framed buildings & Shear-wall buildings –Behavior of buildings under lateral loads like Wind loads, Earthquake loads & Blast loads – Basic structural & functional design requirements –Strength, Stiffness & Stability.

UNIT - II

LATERAL LOAD RESISTING ELEMENTS : Frames, Shear walls & Tubes – Shear, Bending & combined modes of deformation – Structural behavior of Rigid frames – Simplified methods of analysis – Substitute frame method, Portal method, Cantilever method, Equivalent frame method –Structural behavior of Shear walls – Approaches of analysis – Elastic continuum approach & Discrete approach -- Structural behavior of Tubes –Actions.

UNIT - III

CHOICE OF SYSTEM FOR A BUILDING: Frame building, Shear wall building, Shear walls acting with frames, Single framed tubes – Other structural forms – Staggered Wall-beam system, Tube-in-tube system, Base isolation technique for earthquake resistance. Load distribution in a tall building – Load resisted by different shear walls & frames – Determinate & Indeterminate problems – Equivalent Stiffness method.

UNIT - IV

METHODS OF ANALYSIS: Shear walls without Openings – Estimation of Stiffness by simple Cantilever theory & Deep beam theory – Shear walls with Openings – Equivalent frame for large openings – Muto's method for small openings –Elastic Continuum approach – Coull&Chowdhry's method – Design Charts – Limitations of Continuum approach. Shear wall- Frame Interaction : Sharing of loads between wall &frame - Different methods – comparison -- Khan &Sbrounis' method – Design charts - - Mac Leod'smethod - Advantages & limitations -- Cooperation of Floor slabs – Equivalent width.

UNIT - V

MODERN METHODS: Analysis of Tall buildings by Stiffness method – Available Softwares for analysis of tall buildings.

TEXT BOOKS:

1. Concrete & Composite Design of Tall Buildings by Taranath B., McGraw Hill.
2. Reinforced Concrete Design of Tall Buildings by Bungales. Taranath, CRC Press.

REFERENCE BOOKS:

1. Analysis of Shear Walled Buildings by S. M. A. Kazimi& R. Chandra, Tor-steel Research Foundation,Calcutta, India.
2. Analysis of Framed Structures by Gere & Weaver
3. Design of Building Structures by Wolfgang Schuller, Prentice Hall

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR I SEM

COMPOSITE MATERIALS
(Program Elective - I)

Course Code: B4853

LPC
303

UNIT - I

INTRODUCTION: Requirements of structural materials influence of nature of materials in structural form, Nature of structural materials- Homogeneous materials, composite materials.

UNIT - II

MACRO MECHANICAL PROPERTIES OF COMPOSITE LAMINAE: Introduction, Assumptions and Idealizations, Stress Strain relationships for composite Laminae- Isotropic, Orthotropic laminae, Strength Characteristics- Basic concepts, Strength hypothesis for isotropic and Orthotropic laminae. Macro mechanical Analysis of composite Laminae: Introduction, Assumptions and Limitations, Stiffness characteristics of glass reinforced laminae- Stress-Strain relationships in continuous, discontinuous fiber laminae, Strength characteristics of glass reinforced laminae- Strengths in continuous, discontinuous fiber laminae.

UNIT - III

BEHAVIOUR OF GLASS FIBRE-REINFORCED LAMINATES: Introduction, Stiffness characteristics of laminated composites-Behaviour of Laminated beams and plates, Strength characteristics of laminated composites- Strength analysis and failure criteria, Effect of inter laminar structures. Glass Reinforced Composites: Introduction, Continuously reinforced laminates- uni-directionally and multi directionally continuously reinforced laminates, discontinuously reinforced laminates – Stiffness and Strength properties.

UNIT - IV

GRP PROPERTIES RELEVANT TO STRUCTURAL DESIGN: Introduction, Short-term strength and stiffness-Tensile, Compressive, Flexural and Shearing. Long term strength and stiffness properties, Temperature effects, Effect of fire, Structural joints- Adhesive, mechanical, Combinational, Transformed sections.

UNIT - V

DESIGN OF GRP BOX BEAMS: Introduction, loading, span and cross-sectional shape, Selection of material, Beam manufacture, Beam stresses, Experimental Behaviour, Effect on Beam performance- Modulus of Elasticity, Compressive Strength, I value, prevention of compression buckling failure, Behaviour under long term loading. Design of Stressed skinned roof structure: Introduction, loading and material properties, preliminary design, and computer analysis.

TEXT BOOKS:

1. Composite materials by Krishan Chawla.
2. Mechanics of Composite Materials by Robert M Jones.
3. Composite Materials: Engineering and Science by F. L. Matthews and Rees D. Rawlings

REFERENCE BOOKS:

1. GRP in Structural Engineering M.Holmes and D.J.Just.
2. Mechanics of Composite materials and Structures by ManjunathMukhopadhyay; Universities Press

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. STE I YEAR I SEM

DESIGN OF PRE-STRESSED CONCRETE STRUCTURES
(Program Elective - II)

Course Code:B4854

LPC
303

UNIT – I

GENERAL PRINCIPLES OF PRESTRESSED CONCRETE : Pre–tensioning and post – tensioning – Prestressing by straight, concentric, eccentric, bent and parabolic tendons – Different methods and systems of Prestressing like Hoyer system, Freyssinet system, MagnelBlaton system – Lee-Mccall system. Losses of Prestress : Loss of Prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, relaxation of steel, slip in anchorage, bending of member and frictional loss – Analysis of sections for flexure.

UNIT - II

DESIGN OF SECTION FOR FLEXURE: Allowable stresses – Elastic design of simple beams having rectangular and I-section for flexure – kern lines – cable profile and cable layout. Design of Sections for Shear: Shear and Principal Stresses – Improving shear resistance by different prestressing techniques – horizontal, sloping and vertical prestressing – Analysis of rectangular and I–beam – Design of shear reinforcement – Indian code provisions.

UNIT - III

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS: Short term deflections of un-cracked members–Prediction of long-time deflections – load – deflection curve for a PSC beam – IS code requirementsfor max. Deflections.

UNIT - IV

TRANSFER OF PRESTRESS IN PRETENSIONED MEMBERS : Transmission of prestressing force by bond –Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in End block – Analysis by approximate,Guyon and Magnel methods – Anchorage zone reinforcement.

UNIT - V

COMPOSITE CONSTRUCTION: Need for composite construction, types of composite construction, flexural stresses, longitudinal and transverse shear transfer, creep and shrinkage effects in composite construction.

TEXT BOOKS:

1. Krishnaraju, "Pre-Stressed Concrete", Tata Mcgraw Hill, 2007.
2. N Rajagopalan, "Prestressed Concrete", Narosa, 2nd Ed., 2006.

REFERENCE BOOKS:

1. Naaman, A. E. – "Pre-Stressed Concrete Analysis and Design: Fundamentals", 2nd Edition, Techno Press, 2005.
2. Nilson, "Design of Pre-Stressed Concrete", 2nd Edition, John Wiley, 1987.
3. Lin and Burns – "Design of Pre-Stressed Concrete Structures", 3rd Editions, John Wiley, 1981.
4. Nawy - "Pre-Stressed Concrete – A Fundamental Approach", 5th Ed. 2009.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR I SEM

STRUCTURAL HEALTH MONITORING
(Program Elective - II)

Course Code: B4855

LPC
303

UNIT - I

STRUCTURAL HEALTH MONITORING: Concepts, Various Measures, Structural Safety in Alteration.

UNIT - II

STRUCTURAL AUDIT: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures.

UNIT - III

STATIC FIELD TESTING: Types ofStatic Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static Response Measurement.

UNIT - IV

DYNAMIC FIELD TESTING: TypesofDynamic Field Test, Stress History Data, Dynamic ResponseMethods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring.

UNIT - V

INTRODUCTION TO REPAIRS AND REHABILITATIONS OF STRUCTURES: Case Studies (Site Visits), piezo–electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMI technique.

TEXT BOOKS:

1. Structural Health Monitoring, Daniel Balageas, Claus_PeterFritzen, Alfredo Güemes, John Wiley and Sons, 2006.
2. Health Monitoring of Structural Materials and Components_Methods with Applications, Douglas E Adams, John Wiley and Sons, 2007.

REFERENCE BOOKS:

1. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan,Taylor and Francis Group, London, UK, 2006.
2. Structural Health Monitoring with Wafer Active Sensors, Victor Giurglutiu, Academic Press Inc, 2007.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR I SEM
OPTIMIZATION TECHNIQUES IN STRUCTURALENGINEERING
(PROGRAM ELECTIVE - II)
COURSE CODE: B4856

LPC
303

UNIT - I

LINEAR PROGRAMMING: Introduction and need for optimization in engineering design, formulating linear programs, graphical solution of linear programs, special cases of linear programming.

UNIT - II

THE SIMPLEX METHOD: Converting a problem to standard form, the theory of the simplex method, the simplex algorithm, special situations in the simplex algorithm, obtaining initial feasible solution.

UNIT - III

DUALITY AND SENSITIVITY ANALYSIS: Sensitivity analysis, shadow prices, dual of a normal linear program, duality theorems, dual simplex method. Integer Programming: Formulating integer programming problems, the branch-and-bound algorithm for pure integer programs, the branch-andboundalgorithm for mixed integer programs.

UNIT - IV

NON-LINEAR PROGRAMMING: Introduction to non-linear programming (NLP), Convex and concave functions, NLP with one variable, Line search algorithms, Multivariable unconstrained problems,constrainedproblems, Lagrange Multiplier, The Karush-Kuhn-Tucker (KKT) conditions, the method ofsteepest ascent, convex combination method, penalty function, Quadratic programming.

UNIT - V

DYNAMIC PROGRAMMING: Evolutionary algorithms: Genetic Algorithm, concepts ofmulti-objectiveoptimization, Markov Process, Queuing Models.

TEXT BOOKS:

1. F.H. Hiller and G.J.Liberman, Introduction to Operations Research, Tata-McGraw-Hill, 2010.Introduction to Optimum Design by J.S.Arora,
2. W.L.Winston, Operations Research: Applications and Algorithm, 4th Edition, CengageLearning, 1994.

REFERENCE BOOKS:

1. K.Deb, Optimization for Engineering Design, Prentice Hall, 2013.
2. M.C.Joshi and K.M.Moudgalay, Optimization: Theory and Practice, Narosa, 2004.
3. K.Deb, Multi-objective Optimization using evolutionary algorithms, John Wiley and Sons, 2009.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR I SEM

STRUCTURAL DESIGN LABORATORY

COURSE CODE: B4803

LPC
042

Syllabus Content:

1. Design of Square/ Rectangular Bunker.

2. Design of Circular Bunker.

3. Design of silos for storing of cement.

4. Design of Transmission tower.

5. Design of Intz Type overhead water tank.

6. Design of Conical Type overhead water tank.

7. Design of Box Culvert.

8. Design of slab Deck Bridge.

9. Design of T-Beam Bridge.

10. Design of Gantry girder.

11. Design and detailed drawing of complete G+ 3 structures.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR I SEM

ADVANCED CONCRETE LABORATORY

Course Code: B4804

LIST OF EXPERIMENTS:

1. To study the effect of water/cement ratio on workability and strength for different grades (M20 & M30) of concrete.

2. To study the effect aggregate/cement ratio on strength of concrete for different sizes (20 mm & 16 mm) aggregates.

3. To draw the Gradation Charts of Aggregates (Fine and Coarse aggregates).

4. To develop a Mix design for two grades of concrete using (a) I.S. Code method (b) ACI Code method.

5. To study the behavior of concrete member by developing stress-strain curve for two grades of concrete.

6. To study the correlation between cube strength, cylinder strength, split tensile strength and modulus of rupture for a given grade of concrete

7. To study the behavior of concrete member by developing stress-strain curve for Fe - 415 and High Tension steel.

8. To study the effect of mineral admixtures and chemical admixtures on workability of concrete.

9. To study the strength of concrete using nondestructive testing equipment.

10. To study the workability Tests on Fresh self-compacting concrete

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR I SEM

RESEARCH METHODOLOGY AND IPR

Course Code: B4905

LPC
222

UNIT – I

Meaning of research problem, Sources of research problem, Criteria Characteristicsof a good research problem, Errors in selecting a research problem, Scope and objectives ofresearchproblem.Approaches of investigation of solutions for research problem, data collection, analysis,interpretation, Necessary instrumentations

UNIT - II

Effective literature studies approaches, analysisPlagiarism, and Research ethics.

UNIT - III

Effective technical writing, how to write report, PaperDeveloping a Research Proposal, Format of research proposal, a presentation and assessmentby a review committee

UNIT - IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process ofPatenting and Development: technological research, innovation, patenting, development.International Scenario: International cooperation on Intellectual Property. Procedure forgrants of patents, Patenting under PCT.

UNIT - V

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patentinformation and databases. Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc., Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science& engineering students.
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction.

REFERENCE BOOKS:

1. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008.
2. Ranjit Kumar, 2nd Edition , "Research Methodology: A Step by Step Guide for beginners.

SYLLABUS FOR I YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR II SEM
FINITE ELEMENT METHOD IN STRUCTURAL ENGINEERING
COURSE CODE: B4805

LPC
303

UNIT - I

INTRODUCTION: Concepts of FEM - steps involved - merits and demerits - energy principles – Discretization - Raleigh - Ritz method of functional approximation. Principles of Elasticity: Stress equations - strain displacement relationships in matrix form plane stress, plane strain and axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT - II

ONE DIMENSIONAL FEM: Stiffness matrix for beam and bar elements - shape functions for 1-D elements. Two dimensional FEM: 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

UNIT - III

ISOPARAMETRIC FORMULATION: Concept - different iso-parametric elements for 2D analysis -formulation of 4-noded and 8-noded isoparametric quadrilateral elements - Lagrange elements – serendipity elements. Axi Symmetric Analysis: bodies of revolution - axi symmetric modeling - strain displacement relationship - formulation of axi symmetric elements. Three dimensional FEM: Different 3-D elements-strain-displacement relationship – formulation of hexahedral and isoparametric solid element.

UNIT - IV

INTRODUCTION TO FINITE ELEMENT ANALYSIS OF PLATES: Basic theory of plate bending - thin plate theory - stress resultants - Mindlin's approximations - formulation of 4-noded isoperimetric quadrilateral plate element – Shell Element.

UNIT - V

Introduction to non – linear finite analysis – basic methods – application to Special structures.

TEXT BOOKS:

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha, John Wiley & Sons.
2. Finite element Methods by OC Zienkiewicz

REFERENCE BOOKS:

1. Finite element analysis, theory and programming by GS Krishna Murthy.
2. Introduction to Finite element Method by Tirupathi Chandra Patla and Belugunudu.
3. Introduction to Finite element Method by JN Reddy.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR II SEM

STRUCTURAL DYNAMICS

COURSE CODE: B4806

LPC
303

UNIT - I

INTRODUCTION: Elements of vibratory system, degree of freedom, continuous system, lumped mass idealization, oscillatory motion, simple harmonic motion, vectorial representation of S.H.M.

THEORIES OF VIBRATIONS: Free vibrations of single degree of freedom system, un-damped and damped vibration, critical damping, logarithmic decrement, forced vibrations of SDOF systems, harmonic excitation, dynamic magnification factor, phase angle, Band width.

UNIT - II

INTRODUCTION TO STRUCTURAL DYNAMICS: Fundamental objectives of dynamic analysis -Types of prescribed loading - Methods of discretization - Formulation of equations of motion by differentmethods – Direct equilibration using Newton's law of motion / D'Alembert's principle, Principle ofvirtual work and Hamilton principle.

UNIT - III

SINGLE DEGREE OF FREEDOM SYSTEMS: Formulation and solution of the equation of motion – Freevibration response - Response to Harmonic, Periodic, Impulsive and general dynamic loadings -Duhamel integral.

Multi Degree of Freedom Systems : Selection of the degrees of Freedom - Evaluation of structuralproperty matrices - Formulation of the MDOF equations of motion -Undamped free vibrations - Solutions of Eigen value problem for natural frequencies and mode shapes - Analysis of Dynamic response – Normal co-ordinates - Uncoupled equations of motion - Orthogonal properties of normal modes - Mode superposition procedure.

UNIT - IV

PRACTICAL VIBRATION ANALYSIS: Introduction - Stodola method - Fundamental mode analysis – Analysisof second and higher modes - Holzer method - Basic procedure.

UNIT - V

CONTINUOUS SYSTEMS: Introduction - Flexural vibrations of beams - Elementary case – Derivation of governing differential equation of motion - Analysis of undamped free vibrations of beams in flexure - Natural frequencies and mode-shapes of simple beams with different end conditions - Principles of application to continuous beams.

TEXT BOOKS:
1. Mario Paz (1980)*, Structural Dynamics*, C.B.S publishers, New Delhi, India.
2. Anil K. Chopra (2011), *Dynamics of Structures*, 4th Edition, Pearson Education (Singapore), New Delhi, India.

REFERENCE BOOKS:
1. Earthquake Resistant Design of Building Structures, Vinod Hosur, WILEY (India)
2. Structural Dynamics- Clough &Penzien: TMH
3. Vibration Problems in Engineering Timoshenko, S, Van-Nostrand Co

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. STE I YEAR II SEM

BRIDGE ENGINEERING
(PROGRAM ELECTIVE - III)

Course Code: B4857

LPC
303

UNIT - I

CONCRETE BRIDGES: Introduction-Types of Bridges-Economic span length-Types of loading-Dead loadliveload-Impact Effect-Centrifugal force-wind loads-Lateral loads-Longitudinal forces-Sesmic loads- Frictional resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forcesand effects-Width of roadway and footway-General Design Requirements.

UNIT - II

SOLID SLAB BRIDGES: Introduction-Method of Analysis and Design.

UNIT - III

GIRDER BRIDGES: Introduction-Method of Analysis and Design-Courbon's Theory, Grillage analogy

UNIT - IV

PRE-STRESSED CONCRETE BRIDGES: Basic principles-General Design requirements-Mild steelreinforcement in pre-stressed concrete member-Concrete cover and spacing of pre-stressing steel-Slender beams-Composite Section-Propped-Design of Propped Composite Section-Un-propped composite section-Two-stage Prestressing-Shrinking stresses-General Design requirements for RoadBridges.

UNIT - V

ANALYSIS OF BRIDGE DECKS: Harmonic analysis and folded plate theory-Grillage analogy- Finite stripmethod and FEM. Sub-structure of bridges: Substructure- Beds block-Piers- Pier Dimensions- Designloads for piers- Abutments-Design loads for Abutments.

TEXT BOOKS:

1. Design of Concrete Bridges by M.G.Aswani, V.N.Vazirani and M.M.Ratwani.
2. Essentials of Bridge Engineering by Johnson Victor, Oxford & IBH.

REFERENCE BOOKS:

1. Bridge Deck Behaviour by E.C.Hambly.
2. Design of Bridges by N.KrishnaRaju, Oxford & IBH.
3. Design of Bridges by V.V.Sastry, DhanpatRai& Co
4. Concrete Bridge Design and Practice by V.K.Raina.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR II SEM

ADVANCED CONCRETE TECHNOLOGY
(PROGRAM ELECTIVE - III)

COURSE CODE: B4858

LPC
303

UNIT - I

CEMENT: Chemical composition – Bogues compounds – heat of hydration – influence of compound composition on properties of cement.

Aggregates: Classification of aggregate – particle shape and texture – gradation – fineness modules – grading curves. Gap graded aggregates – combined grading – alkali aggregate reaction – soundness of aggregate.

ADMIXTURES: Admixtures – mineral and chemical admixtures– admixtures of RMC & HCC – latest generation admixture.

UNIT - II

FRESH CONCRETE: Workability - factors affecting workability - measurement of workability - effect of time and temperature on work - segregation and bleeding, Mixing of setting times of concrete – steps in manufacture of concrete –Curing of concrete.

UNIT - III

HARDENED CONCRETE: Concrete – Abram's law – Gel / space ratio – maturity concept – effective water in mix. – Testing of hardness concrete – Non-destructive and semi destructive testing of concrete – Durability of concrete – Strength in compression and tension– modulus of elastics, shrinkage and creep of concrete.

UNIT - IV

CONCRETE MIX DESIGN: Design of mixes by BIS method, ACI method, DOE method – Entroy and Shaklok method. High Strength Concrete – Micro structure – Manufacturing and Properties- Design of HSC Using Erintroy and Shaklok Method- Ultra High Strength Concrete. High Performance Concrete- Requirements and properties of High Performance Concrete- Design Considerations.

UNIT - V

Quality control of concrete – Quality assurance quality management and quality audit – statistical quality control – Acceptance criteria – codal provisions.

Special Concrete: Light weight concrete mix design – Fiber reinforced concrete – SFRC and GFRC - Self Compacting concrete – polymer concrete – Geo Polymer concrete – high performance concrete – smart concrete.

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville, ELBS publications.
2. Concrete: Micro Structure, Properties and Materials by P.K.Mehta, Tata McGraw Hill Publishing House Pvt. Ltd

REFERENCE BOOKS:

1. Concrete Technology by A.K. Santhakumar, Oxford Press.
2. Concrete Technology by M.S.Shetty, S.Chand& Co.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR II SEM

EXPERIMENTAL STRESS ANALYSIS
(PROGRAM ELECTIVE - III)

COURSE CODE: B4859

LPC
303

UNIT - I

BASIC EQUATIONS AND PLANE ELASTICITY THEORY: Introduction, Strain equations of Transformation,Compatibility, Stress-Strain Relations-Two dimensional State of Stress. The Plane-Elastic problem, The Plane-Strain Approach, Plane Stress, Airy's Stress function-Cartesian Co-ordinates-Twodimensional problems in Polar Co-ordinates, Polar Components of Stress in terms of Airy's Stressfunction, Forms. Principles of Experimental Approach: Merit of Experimental Analysis introduction, uses ofexperimental stress analysis-Advantages of experimental stress analysis, Different methods,Simplification ofproblems.

UNIT - II

STRAIN MEASUREMENT USING STRAIN GAUGES: Definition of strain and its relation to ExperimentalDeterminations, properties of strain-gauge systems, Types of strain gauges, Mechanical and Optical strain gauges. Electrical Strain Gauges - Introduction, LVDT - resistance strain gauge - various types- gauge factor, Materials for adhesion base, etc.Strain Rosettes: Introduction, The three element rectangular Rosette - The delta rosette – Corrections for Transverse strain effects.

UNIT - III

BRITTLE COATING METHOD: Introduction, Coating stresses - Failure theories - Brittle coating Crack pattern- Crack detection - Types of Brittle coating - Test procedures for brittle coating analysis – Calibrationprocedures - Analysis of brittle coating data.

UNIT - IV

THEORY OF PHOTO ELASTICITY: Introduction, Temporary double refraction - The stress optic law – Effects of stressed model in a Polaris cope for various arrangements - Fringe sharpening, Brewster stressoptic law.

UNIT - V

TWO DIMENSIONAL PHOTO ELASTICITY: Introduction, Isochromatic Fringe patterns - Isoclinic fringe patterns, passage of light through plane Polaris cope and circular Polaris cope, Isoclinic fringe pattern-Computation techniques - calibration methods, separation methods, scaling Model to Proto type stress- Materials for photo - elasticity, properties of photo elastic materials.

TEXT BOOKS:

1. Experimental Stress Analysis by J.W.Dally and W.F.Riley
2. Experimental Stress Analysis by Dr. Sadhu Singh

REFERENCE BOOKS:

1. Experimental Stress Analysis by Dove and Adams

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR II SEM

ADVANCED DESIGN OF STEEL STRUCTURES
(PROGRAM ELECTIVE - IV)

COURSE CODE: B4860

LPC
303

UNIT - I

SIMPLE CONNECTIONS – BOLTED, PINNED AND WELDED CONNECTIONS: Bolted Connections- Load Transfer Mechanism – Failure of Bolted Joints – Specifications for Bolted Joints – Bearing – Type Connections – Tensile Strength of Plate – Strength and Efficiency of the Joint – Combined Shear and Tension – Slip – Critical Connections – Praying Action – Combined Shear and Tension for Slip- Critical Connections. Design of Groove welds- Design of Fillet Welds- Design of Intermittent fillet welds- Failure of Welds.

UNIT - II

ECCENTRIC AND MOMENT CONNECTIONS: Introduction – Beams – Column Connections- Connections Subjected to Eccentric Shear – Bolted Framed Connections- Bolted Seat Connections – Bolted Bracket Connections. Bolted Moment Connections – Welded Framed Connections – Welded Bracket Connections – Moment Resistant Connections.

UNIT - III

ANALYSIS AND DESIGN OF INDUSTRIAL BUILDINGS: Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs, design of built up purlins, and design of knee braced trusses and stanchions. Design of bracings.

UNIT - IV

DESIGN OF STEEL TRUSS GIRDER BRIDGES : Types of truss bridges, component parts of a truss bridge, economic proportions of trusses, self weight of truss girders, design of bridge compression members, tension members; wind load on truss girder bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing.

UNIT - V

DESIGN OF STEEL BUNKERS AND SILOS: Introduction – Janseen's Theory – Airy's Theory – Design of Parameters – Design Criteria – Analysis of Bins – Hopper Bottom –Design of Bins.

TEXT BOOKS:

1. Ram Chandra, "Design of Steel Structures", Vol. II, Standard Book House, New Delhi,
2. Neal, B.G., "The Plastic Methods of Structural Analysis", 2ed., Chapman & Hall, London, 1963.

REFERENCE BOOKS:

1. Baker, J.F., Horne, M.R. and Heyman, J., "The Steel Skeleton", Vol. II – "Plastic Behavior and Design", ELBS & Cambridge University Press, London, 1961.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR II SEM

THEORY OF PLATES
(PROGRAM ELECTIVE - IV)

COURSE CODE: B4861

LPC
303

UNIT - I

CYLINDRICAL BENDING: Different kind of plates – Assumptions - Derivation of differential equation for cylindrical bending of long rectangular plates - Analysis of uniformly loaded rectangular plates with edges simply supported and fixed subjected to uniform load. Pure Bending of Plates: Slope and curvature of slightly bent plates – relations between moments and curvature - Particular cases of pure bending - Strain energy in pure bending Energy methods like Ritz and Galerkin Methods to rectangular plates subjected to simple loadings.

UNIT - II

SMALL DEFLECTION THEORY OF THIN RECTANGULAR PLATES: Assumptions – Derivation of governing differential equation for thin plates – Boundary conditions – simply supported plate under sinusoidal load – Navier's solution – Application to different cases – Levy's solution for various boundary conditions subjected to different loadings like uniform and hydrostatic pressure.

UNIT - III

CIRCULAR PLATES : Symmetrical loading – Relations between slope, deflection, moments and curvature – Governing differential equation – Uniformly loaded plates with clamped and simply supported edges – Central hole – bending by moments and shearing forces uniformly distributed. Orthotropic Plates: Introduction – Bending of anisotropic plates - Derivation of governing differential equation – Determination of Rigidities in various cases like R.C. slabs, corrugated sheet – Application to the theory of grid works.

UNIT - IV

PLATES ON ELASTIC FOUNDATIONS: Governing differential equation – deflection of uniformly loaded simply supported rectangular plate – Navier and Levy type solutions - Large plate loaded at equidistant points by concentrated forces P.

UNIT - V

BUCKLING OF PLATES: Governing equation for Bending of plate under the combined action of in-plane loading and lateral loads – Buckling of rectangular plates by compressive forces acting in one and two directions in the middle plane of plate.

TEXT BOOKS:

1. Theory of Plates and Shells by Timoshenko, McGraw Hill Book Co., New York.
2. Theory and Analysis of Plates by P. Szilard, Prentice Hall.

REFERENCE BOOKS:

1. Theory of Plates by Chandrasekhar, University Press.
2. Plate Analysis by N. K. Bairagi, Khanna Publishers. New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE I YEAR II SEM

ADVANCED FOUNDATION ENGINEERING
(PROGRAM ELECTIVE - IV)

Course Code: B4862

LPC
303

UNIT-I

SOIL EXPLORATION:Exploration Methods; Planning the Exploration Program; Boring and Sampling; In Situ Tests: Standard& Cone Penetration Tests, Field Vane, Dilatometer, Pressure meter; Rock Sampling, Core Recovery, RQD; Geophysical Exploration; Preparation of Soil Report, Case Studies.

UNIT- II

SHALLOW FOUNDATIONS: Bearing Capacity:- Shear Failure; Effect of Water Table; Footings with Eccentric or Inclined Loads, Footings on Layered Soils, Slopes on finite layer with a Rigid Base at Shallow Depth, effect of compressibility of soil, on soils with strength increasing with depth, Plate Load tests, Presumptive bearing capacity.

UNIT- III

SETTLEMENT: Components – Immediate, Primary and Secondary Settlements, Consolidation, Stresses and Displacements in Homogeneous, Layered and Anisotropic Soils; Bearing Pressure using SPT, CPT, Dilatometer and Pressure meter; Settlement of foundations on Sands-Schmertmann and Burland&Burbridge methods; Structure Tolerance to Settlement and Differential Settlements, Rotation, Codal Provisions.

UNIT- IV

DEEP FOUNDATIONS: Single Pile: Vertically loaded piles, Static capacity- α, β and λ Methods, Dynamic formulae; Wave Equation Analyses; Point Bearing Resistance with SPT and CPT Results; Bearing Resistance of Piles on Rock; Settlement; Pile Load Test; Uplift Resistance; Laterally Loaded Piles -Ultimate Lateral Resistance; Negative Skin Friction; Batter Piles; Under Reamed Piles; Ultimate Capacity of Pile Groups in Compression, Pullout & Lateral Load; Efficiency; Settlements of Pile Groups; Interaction of Axially & Laterally Loaded Pile Groups, Codal Provisions.

UNIT- V

SPECIAL TOPICS OF FOUNDATION ENGINEERING FOUNDATIONS ON COLLAPSIBLE SOILS: Origin and occurrence, Identification, Sampling and Testing, Preventive and Remedial measures. Foundations on Expansive Soils: The nature, origin and occurrence, Identifying, testing and evaluating expansive soils, typical structural distress patterns and Preventive design & construction measures. *Introduction to Reliability-Based Design: Brief introduction of probability and statistics, LRFD for structural strength requirements, LRFD for geotechnical strength requirements, Serviceability requirements

TEXT BOOKS:

1. Bowles, J. E. - Foundation Analysis & Design 5th Edition McGraw-Hill Companies, Inc. (1996).
2. Poulos, H. G. & Davis, E. H. - Pile Foundation Analysis and Design john wiley& sons inc (1980-08).

REFERENCE BOOKS:

1. Tomlinson, M. J. - Foundation Design and Construction - Prentice Hall (2003).
2. Baecher, G.B. & Christian, J.T. – Reliability and Statistics in Geotechnical Engineering, Wiley Publications (2003).

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. STE I YEAR II SEM

FINITE ELEMENT LAB

Course Code: B4807

LPC
042

SYLLABUS CONTENT:

1. Introduction to ANSYS.

2. Linear static analysis of elements 1D, 2D, and 3D.

3. Stress analysis of a plate with a circular hole.

4. Stress analysis of beams (Cantilever, Simply supported, fixed ends).

5. Stress analysis of an axi-symmetric component.

6. Analysis of Trusses.

7. Mode frequency analysis of beams.

8. Dynamic analysis and nonlinear analysis of beam.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. STE I YEAR II SEM

NUMERICAL ANALYSIS LABORATORY

Course Code: B4808

**LPC
042**

LIST OF EXPERIMENTS:

1. Find the Roots of Non-Linear Equation Using Bisection Method.

2. Find the Roots of Non-Linear Equation Using Newton's Method.

3. Curve Fitting by Least Square Approximations.

4. Solve the System of Linear Equations Using Gauss - Elimination Method.

5. Solve the System of Linear Equations Using Gauss - Seidal Iteration Method.

6. Solve the System of Linear Equations Using Gauss - Jorden Method.

7. Integrate numerically using Trapezoidal Rule.

8. Integrate numerically using Simpson's Rules.

9. Numerical Solution of Ordinary Differential Equations by Euler's Method.

10. Numerical Solution of Ordinary Differential Equations byRunge- Kutta Method.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE I YEAR I / II SEM

ENGLISH FOR RESEARCH PAPERS WRITING
(AUDIT COURSE)

Course Code: B4911

L P C
2 0 2

UNIT - I

Planning and Preparation, Word Order, breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

UNIT - II

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction.

UNIT - III

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check.

UNIT - IV

Key skills are needed when writing a Title, key skills are needed when writing an abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

UNIT - V

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, and skills are needed when writing the Conclusions

TEXT BOOKS:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press

REFERENCE BOOKS:

1. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook .
2. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE I YEAR I / II SEM

DISASTER MANAGEMENT
(AUDIT COURSE)

Course Code: B4912

L P C
3 0 3

UNIT - I

INTRODUCTION DISASTER: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT - II

REPERCUSSIONS OF DISASTERS AND HAZARDS: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

UNIT - III

DISASTER PRONE AREAS IN INDIA: Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

UNIT - IV

DISASTER PREPAREDNESS AND MANAGEMENT: Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data From Meteorological and other Agencies, Media Reports: Governmental And Community Preparedness.

UNIT - V

DISASTER RISK: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment.Strategies for Survival.

TEXT BOOKS:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE I YEAR I / II SEM

SANSKRIT FOR TECHNICAL KNOWLEDGE
(AUDIT COURSE)

COURSE CODE: B4913

L P C
3 0 3

UNIT - I

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences.

UNIT - II

Order Introduction of roots Technical information about Sanskrit Literature

UNIT - III

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics.

TEXT BOOKS:

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" PrathamaDeeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

REFERENCE BOOKS:
1. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE I YEAR I / II SEM

VALUE EDUCATION
(AUDIT COURSE)

Course Code: B4914

L P C
3 0 3

UNIT - I

Values and self-development –Social values and individual attitudes.Work ethics, Indian vision of humanism.Moral and non- moral valuation.Standards and principles.Value judgements.

UNIT - II

Importance of cultivation of values.Sense of duty.Devotion, Self-reliance.Confidence, Concentration.Truthfulness, Cleanliness.Honesty, Humanity.Power of faith, National Unity.Patriotism. Love for nature, Discipline

UNIT - III

Personality and Behavior Development - Soul and Scientific attitude.Positive Thinking.Integrity and discipline.Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance.True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits.Association and Cooperation.Doing best for saving nature.

UNIT - IV

Character and Competence –Holy books vs Blind faith.Self-management and Good health.Science of reincarnation.Equality, Nonviolence, Humility, Role of Women.All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

TEXT BOOKS:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE I YEAR I / II SEM

CONSTITUTION OF INDIA
(AUDIT COURSE)

Course Code: B4915

L P C
3 0 3

UNIT - I

HISTORY OF MAKING OF THE INDIAN CONSTITUTION: Drafting Committee, (Composition& Working).

UNIT - II

PHILOSOPHY OF THE INDIAN CONSTITUTION: Preamble, Salient Features

UNIT - III

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.

UNIT - IV

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.

UNIT - V

LOCAL ADMINISTRATION: District's Administration head, Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO 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.

TEXT BOOKS:

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.

REFERENCE BOOKS

1. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE I YEAR I / II SEM

PEDAGOGY STUDIES
(AUDIT COURSE)

Course Code: B4916

L P C
3 0 3

UNIT - I

INTRODUCTION AND METHODOLOGY: Aims and rationale, Policy background, Conceptual framework and terminology. Theories of learning, Curriculum, Teacher education.Conceptual framework, Research questions**.**Overview of methodology and Searching.

UNIT - II

THEMATIC OVERVIEW: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT - III

EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES, METHODOLOGY FOR THE IN DEPTH STAGE: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change.Strength and nature of the body of evidence for effective pedagogical practices.Pedagogic theory and pedagogical approaches.Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT - IV

PROFESSIONAL DEVELOPMENT: alignment with classroom practices and follow up support, Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes

UNIT - V

RESEARCH GAPS AND FUTURE DIRECTIONS: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

TEXT BOOKS:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.

REFERENCE BOOKS:

1. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
2. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basicmaths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
3. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE I YEAR I / II SEM

STRESS MANAGEMENT BY YOGA
(AUDIT COURSE)

Course Code: B4917

L P C
3 0 3

UNIT - I

Definitions of Eight parts of yoga. (Ashtanga)

UNIT - II

Yam and Niyam.
Do`s and Don'ts in life.
i) Ahimsa, satya, astheya, bramhacharya and aparigraha, ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT - III

Asan and Pranayam
i) Various yoga poses and their benefits for mind & body, ii) Regularization of breathing techniques and its effects-Types of pranayam

REFERENCE BOOKS:

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami YogabhyasiMandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE I YEAR I / II SEM

PERSONALITY DEVELOPMENT THROUGH
LIFE ENLIGHTENMENT SKILLS

Course Code: B4918

L P C
3 0 3

UNIT - I
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).

UNIT - II
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.

UNIT - III
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

REFERENCE BOOKS:

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.

SYLLABUS FOR II YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE II YEAR I SEM

REPAIR AND REHABILITATION OF STRUCTURES
(Program Elective - V)

Course Code: B4863

LPC
303

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS

1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Defects and Deterioration in Buildingts, E F & N Spon, London

REFERENCE BOOKS:

1. Non-Destructive Evaluation of Concrete Structures by Bungey - Surrey University Press
2. Maitenance , Repair & Rehabilitation and Minor Works of Buildings by P.C.Varghese,PHI.
3. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, StandardPublications.
4. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W. H. Ranso,(1981)
5. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B. A. Richardson, (1991).

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE II YEAR I SEM

FRACTURE MECHANICS
(Program Elective - V)

Course Code: B4864

LPC
303

UNIT - I

Fundamentals of Fracture Mechanics, Mechanisms of fracture and crack growth

UNIT II.

Cleavage fracture, ductile fracture, fatigue cracking, Environment assisted cracking, Quasi brittle materials.

UNIT - III

Service failure analysis, linear elastic fracture mechanics, Griffith's criteria, stress intensity factors, crack tip plastic zone, Erwin's plastic zone correction, R curves, compliance, J Integral, nonlinear analysis ,Review of concrete behavior in tension and compression, Basic frameworks for modeling of quasi-brittle materials.

UNIT - IV

Nonlinear Fracture Mechanics – Discrete crack concept/Smeared crack concept, Size effect, Plasticity models for concrete – Associated and non-associated flow, Failure surfaces for quasi-brittle materials.

UNIT - V

Concept of CTOD and CMD, Material models, crack models, band models, models based on continuum damage mechanics.

TEXT BOOKS

1. Elementary engineering fracture mechanics – David Broek – Sijthoff&Noordhoff -Alphen aanden Rijn – Netherlands
2. Fracture mechanics of concrete structures–Theory and applications – Rilem Report- Edited by L.Elfgreen – Chapman and Hall – 1989.

REFERENCE BOOKS:

1. Fracture mechanics–applications to concrete–Edited by Victor, C. Li, & Z.P. Bazant–ACI SP 118.
2. Valliappan S. "Continuum Mechanics Fundamentals" (1982), Oxford IBH, N D. New Delhi.
3. Venkataraman and Patel "Structural Mechanics with introduction to Elasticity and Plasticity" – Mcgraw Hill, 1990.
4. Shanes – "Introduction to Solid Mechanics – II Edition, PH, 1989

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M. TECH. STE II YEAR I SEM

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
(Program Elective - V)

Course Code: B4865

LPC
303

UNIT - I

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

UNIT - II

CONCEPTUAL DESIGN: Introduction-Functional planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength-Horizontal and Vertical members-Twisting of buildings- Ductility-definition-ductility relationships-flexible buildings-framing systems-choice of construction materials- unconfined concrete-confined concrete-masonry-reinforcing steel. Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis-equivalent lateral force method-dynamic analysis response spectrum method-Time history method.

UNIT - III

REINFORCED CONCRETE BUILDINGS: Principles of earthquake resistant deign of RC members- Structural models for frame buildings- Seismic methods of analysis- Seismic deign methods- IS code based methods for seismic design- Seismic evaluation and retrofitting- Vertical irregularities- Plan configuration problems- Lateral load resisting systems- Determination of design lateral forces- Equivalent lateral force procedure- Lateral distribution of base shear. Masonry Buildings: Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings- Behavior of unreinforced and reinforced masonry walls- Behavior of walls- Box action and bands- Behavior of infill walls- Improving seismic behavior of masonry buildings- Load combinations and permissible stresses- Seismic design requirements- Lateral load analysis of masonry buildings.

UNIT - IV

STRUCTURAL WALLS AND NON-STRUCTURAL ELEMENTS: Strategies in the location of structural walls- sectional shapes- variations in elevation- cantilever walls without openings – Failure mechanism of non-structures- Effects of non-structural elements on structural system- Analysis of non-structural elements- Prevention of non-structural damage- Isolation of non-structures.

UNIT - V

DUCTILITY CONSIDERATIONS IN EARTHQUAKE RESISTANT DESIGN OF RC BUILDINGS: Introduction- Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behavior of beams, columns and joints in RC buildings during earthquakes- Vulnerability of open ground storey and short columns during earthquakes. Capacity Based Design: Introduction to Capacity Design, Capacity Design for Beams and Columns- Case studies.

TEXT BOOKS

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

REFERENCE BOOKS:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons
2. Masory and Timber structures including earthquake Resistant Design –AnandS.Arya, Nemchand& Bros
3. Earthquake –Resistant Design of Masonry Building –MihaTomazevic, Imperial College Press.
4. Earthquake Tips – Learning Earthquake Design and Construction C.V.R. Murty.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE II YEAR I SEM

BUSINESS ANALYTICS
(Open Elective)

Course Code: B4901

LPC
303

UNIT - I

BUSINESS ANALYTICS: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review ofprobability distribution and data modelling, sampling and estimation methods overview.

UNIT - II

TRENDINESS AND REGRESSION ANALYSIS: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

UNIT - III

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

UNIT - IV

FORECASTING TECHNIQUES: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

UNIT - V

DECISION ANALYSIS: Formulating Decision Problems, Decision Strategies with the withoutOutcome Probabilities, Decision Trees, The Value of Information, Utility and DecisionMaking.

TEXT BOOKS

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE II YEAR I SEM

INDUSTRIAL SAFETY
(Open Elective)

Course Code: B4902

LPC
303

UNIT - I

INDUSTRIAL SAFETY: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT - II

FUNDAMENTALS OF MAINTENANCE ENGINEERING: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT - III

WEAR AND CORROSION AND THEIR PREVENTION: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT - IV

FAULT TRACING: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT - V

PERIODIC AND PREVENTIVE MAINTENANCE: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

TEXT BOOKS

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.

REFERENCE BOOKS:

1. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
2. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE II YEAR I SEM

OPERATIONS RESEARCH
(Open Elective)

Course Code: B4903

LPC
303

UNIT - I

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

UNIT - II

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

UNIT - III

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flowproblem - CPM/PERT

UNIT - IV

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT - V

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

TEXT BOOKS:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.

REFERENCE BOOKS:

1. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
2. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
3. Pannerselvam, Operations Research: Prentice Hall of India 2010
4. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

M Tech. STE II YEAR I SEM

WASTE TO ENERGY
(Open Elective)

Course Code: B4904

LPC
303

UNIT - I

INTRODUCTION TO ENERGY FROM WASTE: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

UNIT - II

BIOMASS PYROLYSIS: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT - III

BIOMASS GASIFICATION: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers - Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT - IV

BIOMASS COMBUSTION: Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT - V

BIOGAS: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

TEXT BOOKS:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I &II,Tata McGraw Hill Publishing Co. Ltd., 1983.

REFERENCE BOOKS:

1. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.